

# Catalog

1998 • 1999

[art][technology]  
[science] learn by doing  
hands on experience

CAL POLY  
SAN LUIS OBISPO

about the  
*Cover*

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**Renaissance man or woman.**

A man or woman who has broad intellectual interests and is accomplished in both the arts and the sciences.

Cal Poly offers a true Renaissance education. Students can explore  
*art & technology,*

*business & ecology,*

*architecture & agriculture,*

*music & engineering, and*

*science & literature,*

all while using the latest technology. This inspired Art and Design student Katy Walneuski to illustrate the juxtaposition of intellectual disciplines with technology for this year's catalog cover.

"My goal was to have the cover image represent art merging with technology. Cal Poly graduates are ready to work in the most exciting career fields like software development, biotechnology research or movie animation. Students are given a wide venue of areas for self-expression and to develop truly fulfilling career skills. This seems especially important to emphasize as we move into the next millenium. "

Katy Walneuski.

The cover began with Jordan Reeder's photograph of a tractor which was taken at night . Jordan uses a long exposure and paints trails of light with his flashlight. With this technique, an inanimate object, like the tractor, is brought to life with light.

Next, Katy created a new image of the tractor by superimposing visual symbols of science, math, literature, architecture over the photo of the tractor.

Jordan Reeder, an Art and Design major, is the 1998 recipient of the Eastman Kodak Professional Photography scholarship.

For more

*Information*

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*Cal Poly*

1998 • 1999

*Catalog*

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## THE 1998-99 CAL POLY CATALOG

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The *Catalog* is prepared in the office of the Vice Provost for Academic Programs. The Academic Programs Analyst and catalog editor is Mary Whiteford, catalog assistant, Kay Jensen, and student assistant, Heather Brown.

Special thanks to:

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Teresa Taylor, Robert E. Kennedy Library Archives; and

Danelle Hamilton, Office of the State Printer.

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# TABLE OF CONTENTS

|   |    |  |    |
|---|----|--|----|
| <b>INTRODUCING CAL POLY</b> .....                   | 5  | <b>Other Undergraduate Admission Information</b> ..... | 54 |
| <b>The Program</b> .....                            | 7  | Returning Students .....                               | 54 |
| <b>The Place</b> .....                              | 11 | International (Foreign) Student General                |    |
| <b>The History</b> .....                            | 13 | Admission Requirements .....                           | 55 |
| <b>Guide to Using the Catalog</b> .....             | 17 | <b>Undergraduate Admission Requirements - CSU</b>      |    |
| <b>Academic Calendar</b> .....                      | 19 | Freshman Requirements .....                            | 55 |
| <b>Academic Programs</b> .....                      | 20 | Transfer Requirements .....                            | 56 |
| Enrollment .....                                    | 24 | Test Requirements .....                                | 57 |
| Accreditation .....                                 | 26 | <b>Determination of Residence for Nonresident</b>      |    |
| <b>Policies on the Rights of Individuals</b> .....  | 27 | <b>Tuition Purposes</b> .....                          | 57 |
| Nondiscrimination Policy .....                      | 27 |  |    |
| Sexual Harassment Policy .....                      | 27 |  |    |
| Procedures for Cal Poly .....                       | 28 |  |    |
| Gender Harassment .....                             | 28 |  |    |
| Statement on Racism and Discrimination .....        | 28 |  |    |
| Statement on Academic Freedom .....                 | 28 |  |    |
| Campus Student Relations and Judicial Affairs ..... | 28 |  |    |
| Cheating and Plagiarism .....                       | 29 |  |    |
| <b>The California State University</b> .....        | 30 |  |    |
| <b>SPECIAL PROGRAMS AND RESOURCES</b>               |    | <b>FEES, EXPENSES AND FINANCIAL AID</b>                |    |
| Alumni Association .....                            | 34 | <b>Fees and Expenses</b> .....                         | 60 |
| Commuter Services .....                             | 34 | Registration Fees Per Quarter .....                    | 60 |
| Computing at Cal Poly .....                         | 34 | Refund of Fees .....                                   | 60 |
| Continuing Education in Agriculture .....           | 35 | Debts Owed to the University .....                     | 61 |
| Extended University Programs and Services .....     | 35 | Credit Cards .....                                     | 61 |
| Food Service .....                                  | 35 | Procedure for the Establishment of a Student           |    |
| The Foundation .....                                | 36 | Body Fee .....   | 61 |
| Health Sciences—Preprofessional Preparation .....   | 36 | <b>Financial Aid</b> .....                             | 62 |
| Public Safety Services .....                        | 38 | Typical Student Expenses .....                         | 62 |
| Research and Project Involvement .....              | 38 | Alan Pattee Scholarships .....                         | 62 |
| Robert E. Kennedy Library .....                     | 38 | University Scholarships .....                          | 62 |
| Services to Vocational Agriculture .....            | 39 | Loans .....  | 66 |
| Study and Travel – U.S. and Abroad .....            | 39 | Grants .....   | 67 |
| Teacher Preparation Programs .....                  | 41 | State Aid to the Physically Handicapped .....          | 67 |
| University Advancement .....                        | 41 | <b>ACADEMIC REQUIREMENTS AND POLICIES</b>              |    |
| <b>STUDENT AFFAIRS</b>                              |    | <b>Academic Placement</b>                              |    |
| Associated Students, Inc. ....                      | 43 | English Placement Test (EPT) .....                     | 69 |
| Campus Student Relations/Judicial Affairs .....     | 46 | Entry Level Mathematics (ELM) Exam .....               | 69 |
| Career Services .....                               | 46 | Cal Poly Mathematics Placement Exam (MAPE) .....       | 70 |
| Health and Psychological Services .....             | 47 | Evaluation of Transfer Credit .....                    | 70 |
| Housing and Residential Life .....                  | 47 | Student Classification .....                           | 71 |
| Parents Association .....                           | 48 | Other Academic Credit .....                            | 71 |
| Student Academic Services .....                     | 48 | <b>General Requirements for the Bachelor's Degree</b>  |    |
| Student Life and Activities .....                   | 49 | Choice of Catalog .....                                | 74 |
| <b>INTERCOLLEGIATE ATHLETICS DEPARTMENT</b> .....   | 51 | General Graduation Requirements .....                  | 74 |
| <b>ADMISSIONS</b>                                   |    | Graduation Requirement in Writing Proficiency .....    | 75 |
| <b>Undergraduate Application Procedures</b> .....   | 53 | Other Information .....                                | 75 |
| <b>Undergraduate Admission Policy</b> .....         | 53 | Curriculum Substitution .....                          | 75 |
| Admissions Options and Notification .....           | 54 | Change of Major .....                                  | 75 |
| Confirmation of Admission .....                     | 54 | Double Majors .....                                    | 75 |
| Hardship Consideration .....                        | 54 | Second Bachelor's Degree .....                         | 75 |
|   |    | Graduate Credit Taken by Undergraduates .....          | 75 |
|   |    | Honors .....   | 75 |
|   |    | Commencement .....                                     | 75 |
|   |    | Minors .....   | 76 |
|   |    | <b>General Education and Breadth (GEB)</b> .....       | 77 |
|   |    | <b>U.S. Cultural Pluralism (USCP)</b> .....            | 81 |
|   |    | <b>Registration</b>                                    |    |
|   |    | CAPTURE Registration .....                             | 81 |
|   |    | Class Attendance .....                                 | 81 |
|   |    | Holding of Records .....                               | 81 |
|   |    | Enrollment Status .....                                | 81 |

|   |                   |
|---|-------------------|
| <b>Registration (continued)</b>                                   |                   |
| Maximum Unit Load .....   | 82                |
| Add/Drop .....  | 82                |
| Leaves of Absence .....   | 82                |
| Returning Students .....  | 83                |
| Health Screening .....  | 83                |
| <b>Grading and Academic Standards</b>                             |                   |
| <b>Grading</b> .....  | 83                |
| Grading Symbols .....   | 83                |
| Credit/No Credit Grading .....                                    | 83                |
| Administrative Grading Symbols .....                              | 84                |
| Repeating a Course .....  | 84                |
| Withdrawals / Renewal .....                                       | 85                |
| <b>Academic Standards</b> .....                                   | 85                |
| Academic Obligations .....  | 85                |
| Academic Probation and Disqualification .....                     | 86                |
| Administrative-Academic Probation or<br>Disqualification .....    | 86                |
| Eligibility for Intercollegiate Athletics .....                   | 87                |
| Eligibility for Student Activities .....                          | 87                |
| Student Grievance, Conduct, Discipline .....                      | 87                |
| <b>GRADUATE PROGRAMS</b>  |                   |
| Master's Degree Programs .....                                    | 89                |
| Application for Admission .....                                   | 89                |
| Graduate and Postbaccalaureate Admission<br>Requirements .....    | 90                |
| Academic Requirements and Responsibilities .....                  | 92                |
| General Policies Governing Graduate Studies .....                 | 92                |
| <b>COLLEGE OF AGRICULTURE</b> .....                               | 96                |
| Agribusiness .....  | 103               |
| Agricultural Education and Communication .....                    | 106               |
| Animal Science .....  | 109               |
| Bioresource and Agricultural Engineering .....                    | 111               |
| Crop Science .....  | 117               |
| Dairy Science .....   | 122               |
| Environmental Horticultural Science .....                         | 124               |
| Food Science and Nutrition .....                                  | 126               |
| Military Science .....  | 130               |
| Natural Resources Management .....                                | 132               |
| Soil Science .....  | 138               |
| <b>COLLEGE OF ARCHITECTURE AND<br/>ENVIRONMENTAL DESIGN</b> ..... | 141               |
| Architectural Engineering .....                                   | 143               |
| Architecture .....  | 145               |
| City and Regional Planning .....                                  | 149               |
| Construction Management .....                                     | 153               |
| Landscape Architecture .....                                      | 155               |
| <b>COLLEGE OF BUSINESS</b> .....                                  | 158               |
| B.S. Business Administration .....                                | 161               |
| Accounting .....  | 162               |
| Finance .....   | 162               |
| Global Strategy and Law .....                                     | 163               |
| Management .....  | 163               |
| Marketing .....   | 164               |
| B.S. Economics .....  | 165               |
| B.S. Industrial Technology .....                                  | 167               |
| Academic Minors .....   | 168               |
| Graduate Programs .....   | 170               |
| <b>COLLEGE OF ENGINEERING</b> .....                               | 174               |
| Aeronautical Engineering .....                                    | 183               |
| Civil and Environmental Engineering .....                         | 187               |
| Computer Engineering .....  | 194               |
| Computer Science .....  | 197               |
| Electrical Engineering .....                                      | 201               |
| General Engineering .....   | 205               |
| Industrial and Manufacturing Engineering .....                    | 208               |
| Materials Engineering .....                                       | 214               |
| Mechanical Engineering .....                                      | 217               |
| <b>COLLEGE OF LIBERAL ARTS</b> .....                              | 220               |
| Art and Design .....  | 223               |
| English .....   | 226               |
| Ethnic Studies .....  | 230               |
| Graphic Communication .....                                       | 231               |
| History .....   | 234               |
| Humanities .....  | 236               |
| Journalism .....  | 237               |
| Liberal Studies .....   | 239               |
| Modern Languages and Literatures .....                            | 241               |
| Music .....   | 243               |
| Philosophy .....  | 245               |
| Political Science .....   | 247               |
| Psychology and Human Development .....                            | 249               |
| Social Sciences .....   | 256               |
| Speech Communication .....  | 260               |
| Theatre and Dance .....   | 262               |
| Women's Studies .....   | 263               |
| <b>COLLEGE OF SCIENCE AND MATHEMATICS</b> .....                   | 264               |
| Biological Sciences .....   | 267               |
| Chemistry and Biochemistry .....                                  | 274               |
| Mathematics .....   | 277               |
| Physical Education and Kinesiology .....                          | 280               |
| Physics .....   | 284               |
| Statistics .....  | 288               |
| <b>UNIVERSITY CENTER FOR TEACHER<br/>EDUCATION</b> .....          | 290               |
| <b>COURSES</b> .....  | 299               |
| <b>FACULTY AND STAFF DIRECTORIES</b> .....                        | 486               |
| <b>APPENDIX</b>   |                   |
| "Student-Right-to-Know" Disclosure of<br>Graduation Rate .....    | 518               |
| Privacy Rights of Students in Education Records .....             | 518               |
| Student Discipline .....  | 518               |
| Institutional and Financial Assistance .....                      | 520               |
| Average Annual Cost of Education .....                            | 521               |
| <b>INDEX</b> .....  | 522               |
| <b>CAMPUS MAP</b> .....   | Inside Back Cover |



Left to right: Professors John Cotton (Architecture) and Eric Johnson (Art and Design) discuss rendering techniques with Kenny Chavez, Art & Design senior, and Chris Tebbutt, 5<sup>th</sup> year Architecture student.

Photo by Josef Kasparowitz.

Mike Romey using the 3D digitizer to scan his sculpture into the computer.

Photo by Michael K. Wong.

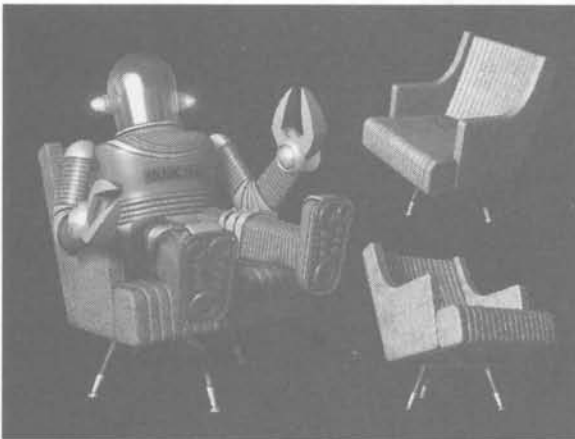


## RAML Studio - Collaboration and Teamwork

RAML (Rendering, Animation and Modeling Lab) is a new facility created jointly by the Art and Design Department and the College of Architecture and Environmental Design with support from Cal Poly Plan funds. The studio is equipped with six high-performance Power Macs with Form Z Modeling software, Electric Image animation system, a hard disk array and a video compression card. Students from each discipline form teams to create joint animation projects.

During a recent RAML studio session, students expressed appreciation of their valuable teamwork experiences, as well as learning the software. After four weeks of instruction, the students created one-minute finished animations. The teams developed storyboards, built 3D models in Form Z, and then exported the models into Electric Image where they added texture, lighting, and motion. When the modeling and rendering were completed, the students produced their animations with Adobe After Effects. It was essential for partners to communicate clearly, keep on schedule, and make decisions together.

The course is taught by Professors Eric Johnson (Art and Design) and John Cotton (Architecture), with the invaluable assistance of Mike Romey, Art and Design senior. The skillful support from Barbara Greenwood, Instructional Support Technician, contributes to the successful operation of the RAML studio. The significant software donation by Electric Image Inc. is greatly appreciated.



The Music Man. 3D model built by Mike Romey in Form Z and rendered in Electric Image.

Introducing

*Cal Poly*



### **National Girls and Women in Sports Day**

Cal Poly women's basketball player, Sherilyn Frazier, plays some one-on-one with four-year old Mariah Weaver, at the 12<sup>th</sup> Annual National Girls and Women in Sports Day.

*Photo by Jennifer Bullock.*

### **The Senior Project**

Cal Poly requires all students to complete a senior project that provides them with the opportunity to synthesize their coursework with actual hands-on experiences. For one such project, Jennifer Ishii and Nicola Nakasi, Kinesiology majors, brought the 12th Annual National Girls and Women in Sports Day to Cal Poly. The sports festival included soccer and basketball demonstrations, games, raffles, and information booths. Speakers included MaryLou Youngblood, of the LA Sparks, and Becky Heidesch, of Women's Sports Wire. This activity coincided with Cal Poly's annual Women's Week event.

"As Kinesiology majors, we wanted to encourage everyone to see that participation in sports can be fun, as well as a positive step towards living a healthy life. Although we spent lots of time on our project, we received many unexpected rewards, including the positive feedback from the community, and the joy of watching the children interacting with Cal Poly athletes. The valuable skills that we learned as a result of our senior project -- how to network, plan and organize a large, community event -- will help us in our future professions."

Jennifer Ishii, Nicola Nakasi  
Kinesiology seniors  
*Adviser: Dr. Kellie Green Hall*



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# THE PROGRAM

*CAL POLY IS DIFFERENT*

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**W**alk 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.

**F**rom 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.

**C**al 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.

**C**al Poly is one of 23 campuses in The California State University, the nation's largest four-year undergraduate 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.

**T**he difference shows also in the programs. Of the 58 undergraduate majors offered, eleven 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 robust curricula in the arts, sciences, mathematics and humanities.

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*Emphasis on the  
Undergraduate*

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### Monarch Butterfly Collection

Biology graduate student Anson Lui and Dr. Dennis Frey, Professor of Biological Sciences and Behavioral Ecologist, collect monarch butterflies at North Beach Campground Site, Pismo Beach, CA.

### The Master's Thesis

Dr. Frey has conducted research during several seasons on monarch butterflies at North Beach Campground, Pismo Beach, CA. From November through March, Dr. Frey and graduate and undergraduate students observe and gather butterflies for research in the laboratory. Anson's interest grew out of his undergraduate experiences (BS Biological Sciences, 1994).

Anson Lui, a student in the MS Biological Sciences program, is developing a thesis titled, *Relationship of Phosphoglucose Isomerase Isoenzyme Forms and Flight Ability Near Flight Threshold Temperatures of The Monarch Butterfly Overwintering Population in Southern California (North Beach Campground Site, Pismo Beach, CA)*. Dr. Elena Levine, Assistant Professor of Biology, and Dr. Frey are the co-advisors for Anson's thesis project.

As Anson states, "butterflies do not regulate their internal body temperature metabolically and thus their activity level is under the influence of the environment." Anson is researching some molecular characteristics that may cause differences in male monarch flight activity. This may help explain why some males arrive at meadows near their overnight roosts before others in the early morning. In other kinds of butterflies, a model exists that shows that genetic differences allow some butterflies to fly at lower temperatures than others. Anson is applying this model to his research of monarch butterfly populations.

Dr. Frey and Dr. Levine are enthusiastic about Anson's thesis because it links molecular-level explanations of flight with those at behavioral and ecological levels. It is rare to find this complete approach in research.



Anson Liu and biology senior, Mark Widle, use nets attached to long poles to gather clusters of butterflies.

Photos by Katy Walneuski.

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### *A Complete Education*

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

**Y**et even as it believes in the importance of a practical education, Cal Poly firmly believes that such useful 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 17 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.

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### *An Effective Education*

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**I**n 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.

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### *A Faculty of Teachers*

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**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 the arts, 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.

**W**ith 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.



Students relax in the sun between classes.

## University Union (UU) Plaza

*Photo by Cole Bybee.*

With several places to eat, El Corral Bookstore, and numerous student activities and services available in the Union, the UU Plaza is a popular spot for the campus community to socialize. As a Cal Poly tradition, no classes are scheduled during the University Hour, Thursdays at 11:00.

Student clubs, sororities, and fraternities set up information tables promoting their activities. A band is frequently playing in the plaza while friends gather to have lunch, take care of business and enjoy the atmosphere. The UU Plaza provides a venue for a variety of other campus activities such as the Lantern Festival, Take Back the Night, and Craft Fairs.



On Halloween, the band Hot Weelz entertains the crowd during the University Hour.

*Photo by Michael Troxell.*



Chinese dragons entertain the crowd at the 3<sup>rd</sup> Annual Lantern Festival. Over 200 people participated in the celebration of Asian and Pacific Island Cultures that was sponsored by Chi Delta Theta, Omega Xi Delta, and the Asian Pacific Islander Student Leadership Commission.

*Photo by Michael K. Wong.*

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# THE PLACE

*A FRIENDLY, SMALL-CAMPUS FEELING*

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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 21,000-square-foot \$7.7 million Dairy Products Technology Center, where students gain hands-on experience with milk, butter and ice cream production and where applied research projects will be undertaken to benefit consumers and industry. Computers and distance learning are increasing in importance in today's education. The campus is expanding its use of technology in the classroom as one of the methods of becoming more efficient in transmitting information to students.

The university's spacious, modern library contains about 700,000 books and 111,000 bound periodicals, as well as a highly rated government documents collection and other special collections.

Cal Poly prides itself on its partnership with individuals, corporations and the local government and community. Nowhere are the benefits of these coalitions more evident than in the \$30 million state-of-the-art Performing Arts Center recently built on campus. Cal Poly and the state joined with the City of San Luis Obispo and a community fund-raising foundation to raise the funds to make this 30-year dream a reality. World-class entertainers have performed before enthusiastic audiences since fall 1996.

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.

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

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*For the Necessities, a Choice*

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*A World of Activities*

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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 16,700 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.

Students are also responsible for running the university's high-tech Recreation Center, which offers exercise and fitness rooms, a 50-meter swimming pool, a double-level gymnasium, racquetball courts, and martial arts rooms to students, faculty, staff and alumni.

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's reputation for success applies to sports, too. In intercollegiate athletics, the university has completed its transition from NCAA Division II to Division I. In the campus intramurals program, more than 750 teams participate in 22 sports open to both men and women. Students also can join 16 clubs involved in more-exotic sports like rugby, crew and ultimate Frisbee. Plans are under way to build a baseball and softball stadium complex and new recreational fields.

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) 756-2311, or write to the Admissions office. Special group tours can be arranged. On weekends, campus maps are available in the University Union (weekend parking doesn't require a permit except for special events).

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# THE HISTORY

A VISION THAT NEVER WAVERED

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**O**n 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.

**T**he 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."

**I**n 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."

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*Born with a New Century*

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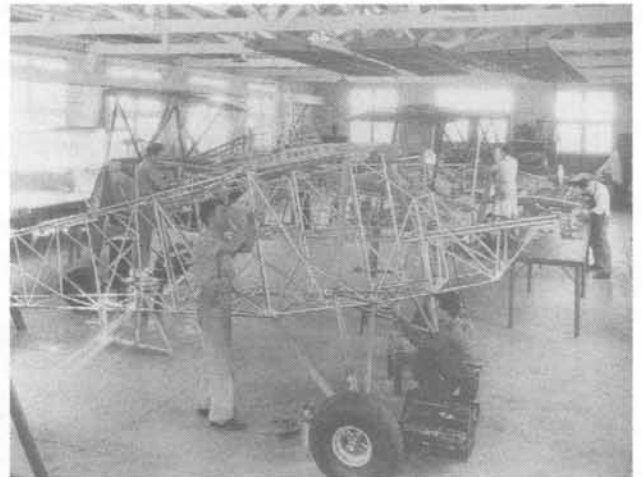
Photography staff for El Mustang and El Rodeo (yearbook), circa 1953.



Girls' basketball team of 1909.



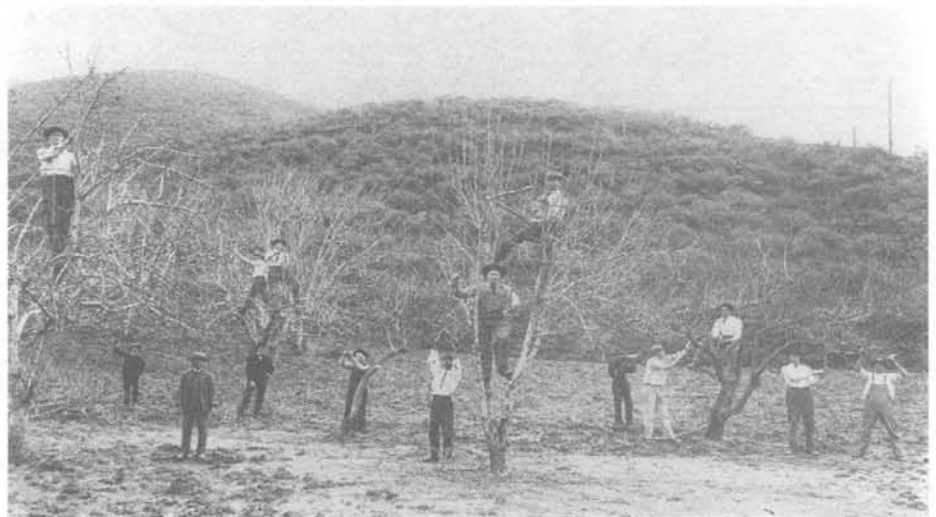
Faculty football team, circa 1907-08.



Aeronautical engineering students learning to construct airplanes, circa 1940s.



Cal Poly Print Shop, circa 1930s.



Horticulture students pruning fruit trees, circa 1905-10.



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.

**C**al 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.

**D**uring 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.

**D**uring 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.

**I**t 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.

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### *From a School to a College*

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*New Times, New Challenges*

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**R**apid 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.

Built upon earlier university strategic initiatives, the far-reaching Cal Poly Plan developed in 1996 links new funding partnership, enhanced academic quality, and improved student and institutional productivity in order to bring about an even more complete realization of Cal Poly's commitment to excellence. The Cal Poly Plan, containing the university's promise to hold itself fully accountable to students, their parents, and taxpayers, has been hailed by the CSU Board of Trustees as a model for public higher education in the 21st century.

**A**s 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.



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# A GUIDE TO USING THE CATALOG

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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 does not 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 20.

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 *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 and/or colleges, 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 *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 (GE)** courses provide a common foundation of knowledge for all undergraduate programs. Cal Poly's GE requirements are described in detail on page 77.

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

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

**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.

### 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 93.
- 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.

### 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.

| Mode              | Class meets weekly for:     |
|-------------------|-----------------------------|
| <b>Activity</b>   | 2 hours per unit of credit. |
| <b>Laboratory</b> | 3 hours per unit of credit. |
| <b>Lecture</b>    | 1 hour per unit of credit.  |
| <b>Seminar</b>    | 1 hour per unit of credit.  |

**Supervision** courses involve independent work done by students under the guidance of the faculty. Supervision courses do not meet regularly in a classroom. Students are expected to complete 3 hours of work per week per unit of credit.

## 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 and be shown on the diploma.

## MINORS

A **minor** is an integrated, coherent group of courses designed to give a student knowledge in an academic area outside of the major field of study. The minor will be completed along with the requirements for the bachelor's degree. For more information and a list of available minors at Cal Poly, see page 76.

## 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

# 1998–1999

**Please note:** This is not intended to be construed as an employee work calendar.

## SUMMER TERM 1998

|                           |   |
|---------------------------|---|
| June 22                   | Beginning of university year<br>Beginning of summer term— classes begin             |
| July 3                    | Academic holiday—<br>Independence Day observed                                      |
| July 6                    | End of second week of instruction<br>Last day to drop a class                       |
| July 7                    | Last day to add a class<br>Last day to register late &<br>pay late registration fee |
| July 13                   | End of third week of instruction—<br>Census date                                    |
| August 10                 | End of seventh week of instruction  |
| August 28                 | Last day of classes   |
| August 31—<br>September 4 | Final examination period  |
| September 4               | End of summer term  |
| September 5–13            | Academic holiday  |

## FALL TERM 1998

|                           |   |
|---------------------------|---|
| September 14              | Beginning of fall term (faculty only)   |
| September 21              | Fall term classes begin   |
| October 2                 | End of second week of instruction<br>Last day to drop a class                       |
| October 5                 | Last day to add a class<br>Last day to register late &<br>pay late registration fee |
| October 9                 | End of third week of instruction—<br>Census date                                    |
| November 6                | End of seventh week of instruction  |
| November 11               | Academic holiday— Veterans' Day   |
| November 25–29            | Academic holiday— Thanksgiving  |
| December 4                | Last day of classes   |
| December 7–11             | Final examination period  |
| December 12               | Mid-Year Commencement<br>End of fall term   |
| December 13—<br>January 3 | Academic holiday  |

## WINTER TERM 1999

|             |   |
|-------------|---|
| January 4   | Beginning of winter term<br>Winter term classes begin                               |
| January 15  | End of second week of instruction<br>Last day to drop a class                       |
| January 18  | Academic holiday—<br>Martin Luther King, Jr. Birthday observed                      |
| January 19  | Last day to add a class<br>Last day to register late &<br>pay late registration fee |
| January 25  | End of third week of instruction—<br>Census date                                    |
| February 15 | Academic holiday—<br>George Washington's Birthday observed                          |
| February 23 | End of seventh week of instruction  |
| March 12    | Last day of classes   |
| March 15–19 | Final examination period  |
| March 19    | End of winter term  |
| March 20–28 | Academic holiday  |

## SPRING TERM 1999

|                  |   |
|------------------|---|
| March 29         | Beginning of spring term<br>Spring term classes begin                               |
| April 9          | End of second week of instruction<br>Last day to drop a class                       |
| April 12         | Last day to add a class<br>Last day to register late &<br>pay late registration fee |
| April 16         | End of third week of instruction—<br>Census date                                    |
| May 14<br>May 31 | End of seventh week of instruction<br>Academic holiday—<br>Memorial Day observed    |
| June 4           | Last day of classes   |
| June 7–11        | Final examination period  |
| June 12          | Commencement<br>End of spring term<br>End of university year (faculty only)         |
| June 13–20       | Academic holiday  |

# ACADEMIC PROGRAMS

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

| Colleges and Departments  | Curricula with Concentrations   | Degrees, Minors  |
|---|---|--|
| <b>College of Architecture and Environmental Design</b>                 |   |  |
| Architectural Engineering Department<br>Architecture Department         | Architectural Engineering<br>Architecture<br><i>Specializations (for M.S.):</i><br>Environmental Design<br>Professional Practice  | B.S.<br>B.Arch., M.S.  |
| City and Regional Planning Department                                   | City and Regional Planning<br>City and Regional Planning/Engineering<br><i>Specialization: Transportation Planning</i>  | B.S., M.C.R.P.<br>M.C.R.P./M.S.                                  |
| Construction Management Department<br>Landscape Architecture Department | Construction Management<br>Landscape Architecture<br><i>Concentrations:</i><br>Environmental Design<br>Recreation and Open Space<br>Regional Landscape Assessment   | B.S., Minor<br>B.L.A.  |
| <b>College of Business</b>  |   |  |
| Bachelor of Science Degrees   | Business Administration<br><i>Concentrations:</i><br>Accounting<br>Financial Management<br>Human Resources Management<br>Independent Course of Study<br>International Business Management<br>Management<br>Management Information Systems<br>Marketing Management<br>Economics<br><i>Concentrations:</i><br>Business and Industrial Economics<br>Independent Course of Study<br>International Trade and Development<br>Quantitative Economics | B.S.<br><br><br><br><br><br><br><br><br><br><br><br><br><br>B.S. |
| Minors  | Industrial Technology<br>Business<br>Economics<br>Integrative Technology<br>Packaging   | B.S.<br>Minor<br>Minor<br>Minor<br>Minor                         |
| Graduate Programs   | Business Administration<br><i>Specialization: Agribusiness</i><br>Business Administration/Engineering<br><i>Specialization: Engineering Management</i><br>Industrial and Technical Studies  | M.B.A.<br><br>M.B.A./M.S.<br><br>M.A.                            |
| <b>College of Engineering</b>   |   |  |
|   | Business Administration/Engineering<br><i>Specialization: Engineering Management</i><br>City and Regional Planning/Engineering<br><i>Specialization: Transportation Planning</i><br>Engineering   | M.B.A./M.S.<br><br>M.C.R.P./M.S.<br><br>M.S.                     |
|   | <i>Specializations:</i><br>Biochemical Engineering<br>Industrial Engineering<br>Integrated Technology Management<br>Materials Engineering<br>Mechanical Engineering<br>Water Engineering<br>General Engineering   | B.S.   |

| <i>Colleges and Departments</i>   | <i>Curricula with Concentrations</i>  | <i>Degrees, Minors</i>    |
|---|---|---------------------------|
| <b>College of Engineering (continued)</b>                                     |   |                           |
| (College of Agriculture, Bioresource and Agricultural Engineering Department) | Agricultural Engineering  | B.S.                      |
| Aeronautical Engineering Department   | Aeronautical Engineering<br><i>Concentrations (for B.S.):</i><br>Aeronautics<br>Astronautics  | B.S., M.S.                |
| Civil and Environmental Engineering Department                                | Civil Engineering<br>Environmental Engineering<br>Civil and Environmental Engineering   | B.S.<br>B.S.<br>M.S.      |
| Computer Engineering<br>Computer Science Department                           | Computer Engineering<br>Computer Science  | B.S.<br>B.S., M.S., Minor |
| Electrical Engineering Department   | Electrical Engineering  | B.S., M.S.                |
| Industrial and Manufacturing Engineering Department                           | Industrial Engineering<br>Manufacturing Engineering   | B.S.<br>B.S.              |
| Materials Engineering Department  | Materials Engineering   | B.S.                      |
| Mechanical Engineering Department   | Mechanical Engineering<br><i>Concentration:</i><br>Mechatronics   | B.S.                      |
| <b>College of Liberal Arts</b>  |   |                           |
| Art and Design Department   | Agricultural Communication<br>Values, Technology and Society<br>Art and Design  | Minor<br>Minor<br>B.S.    |
|   | <i>Concentrations:</i><br>Graphic Design<br>Photography and Digital Imagery<br>Studio Art   |                           |
|   | Art   | Minor                     |
|   | English   | B.A., M.A., Minor         |
| English Department  | Linguistics   | Minor                     |
| Ethnic Studies Department   | Ethnic Studies  | Minor                     |
| Graphic Communication Department  | Graphic Communication<br><i>Concentrations:</i><br>Design Reproduction Technology<br>Electronic Publishing and Imaging<br>Printing Management | B.S., Minor               |
|   | History   | B.A., Minor               |
|   | Journalism  | B.S.                      |
| Journalism Department   | Liberal Studies   | B.A.                      |
| Liberal Studies   | Modern Languages and Literatures  | B.A.                      |
| Modern Languages and Literatures Department                                   | French  | Minor                     |
|   | German  | Minor                     |
|   | Spanish   | Minor                     |
|   | Music   | B.A., Minor               |
| Music Department  | Philosophy  | B.A., Minor               |
| Philosophy Department   | Political Science<br><i>Concentrations:</i><br>International Affairs<br>Pre-Law<br>Public Administration                                      | B.A.                      |
| Political Science Department  | International Relations<br>Public Administration  | Minor<br>Minor            |
|   | Child Development<br>Psychology   | B.S.<br>B.S., M.S., Minor |
|   | <i>Concentrations:</i><br>Applied Social Psychology<br>Counseling and Family Psychology<br>Developmental Psychology                           |                           |
| Psychology and Human Development Department                                   | Gerontology   | Minor                     |



| <i>Colleges and Departments</i>                | <i>Curricula with Concentrations</i>  | <i>Degrees, Minors</i>      |
|--|---|-----------------------------|
| <b>College of Liberal Arts (continued)</b>     |   |                             |
| Social Sciences Department                     | Social Sciences<br><i>Concentrations:</i><br>Criminal Justice<br>Cross-Cultural Studies<br>Environmental Geography<br>Organizations<br>Pacific Rim<br>Social Sciences (Teaching)<br>Social Services                       | B.S.                        |
| Speech Communication Department                | Anthropology and Geography  | Minor                       |
| Theatre and Dance Department                   | Sociology<br>Speech Communication   | Minor<br>B.A., Minor        |
| Women's Studies                                | Dance<br>Theatre<br>Women's Studies   | Minor<br>Minor<br>Minor     |
| <b>College of Science And Mathematics</b>      |   |                             |
| Biological Sciences Department                 | Biotechnology<br>Biological Sciences<br><i>Concentrations (in B.S.):</i><br>Anatomy-Physiology<br>Biology<br>Ecology and Systematic Biology<br><i>Concentrations:</i><br>Marine Biology and Fisheries<br>Wildlife Biology | Minor<br>B.S., M.S.<br>B.S. |
| Chemistry and Biochemistry Department          | Microbiology<br>Biochemistry<br>Chemistry<br><i>Concentration: Polymers and Coatings</i>  | B.S.<br>B.S.<br>B.S.        |
| Mathematics Department                         | Mathematics   | B.S., M.S., Minor           |
| Physical Education and Kinesiology Department  | Kinesiology<br><i>Concentrations (in B.S.):</i><br>Commercial/Corporate Health Promotion<br>Health Education<br>Pre-Physical Therapy<br>Teaching  | B.S., M.S.                  |
| Physics Department                             | Physical Science<br>Physics<br><i>Concentrations:</i><br>Electronics<br>Electro-Optics  | B.S.<br>B.S.                |
| Statistics Department                          | Statistics  | B.S., Minor                 |
| <b>University Center for Teacher Education</b> |   |                             |
|  | Education<br><i>Specializations:</i><br>Counseling and Guidance<br>Curriculum and Instruction<br>Educational Administration<br>Reading<br>Special Education   | M.A.                        |

## Enrollment in Programs by College and Major, Fall 1997

| <i>Colleges and Major Curricula</i>                     | <i>Undergrad</i> | <i>Graduate</i> | <i>Men</i> | <i>Women</i> | <i>Total</i> |
|---|------------------|-----------------|------------|--------------|--------------|
| <b>College of Agriculture</b>                           |                  |                 |            |              |              |
| Agricultural Business .....                             | 816              | 0               | 443        | 373          | 816          |
| Agricultural Education/Science .....                    | 144              | 0               | 52         | 92           | 144          |
| Agricultural Engineering (& AET) .....                  | 150              | 0               | 132        | 18           | 150          |
| Agricultural Systems Management .....                   | 70               | 0               | 65         | 5            | 70           |
| Agriculture (M.S.) .....                                | 0                | 93              | 43         | 50           | 93           |
| Animal Science .....                                    | 457              | 0               | 137        | 320          | 457          |
| Crop Science .....                                      | 163              | 0               | 133        | 30           | 163          |
| Dairy Science .....                                     | 125              | 0               | 72         | 53           | 125          |
| Food Science .....                                      | 117              | 0               | 36         | 81           | 117          |
| Forestry and Natural Resources .....                    | 327              | 0               | 228        | 99           | 327          |
| *Home Economics .....                                   | 1                | 0               | 0          | 1            | 1            |
| Fruit Science .....                                     | 57               | 0               | 36         | 21           | 57           |
| Nutritional Science .....                               | 361              | 0               | 34         | 327          | 361          |
| Ornamental Horticulture .....                           | 267              | 0               | 127        | 140          | 267          |
| Plant Protection Science .....                          | 35               | 0               | 18         | 17           | 35           |
| Recreation Administration .....                         | 198              | 0               | 75         | 123          | 198          |
| Soil Science .....                                      | 156              | 0               | 91         | 65           | 156          |
| Totals .....  | 3444             | 93              | 1722       | 1815         | 3537         |
| <b>College of Architecture and Environmental Design</b> |                  |                 |            |              |              |
| Architectural Engineering .....                         | 238              | 0               | 146        | 92           | 238          |
| Architecture .....                                      | 633              | 42              | 384        | 291          | 675          |
| City and Regional Planning .....                        | 144              | 22              | 105        | 61           | 166          |
| Construction Management .....                           | 232              | 0               | 211        | 21           | 232          |
| Landscape Architecture (B.S.) .....                     | 21               | 0               | 13         | 8            | 21           |
| Landscape Architecture (B.L.A.) .....                   | 149              | 0               | 92         | 57           | 149          |
| Totals .....  | 1417             | 64              | 951        | 530          | 1481         |
| <b>College of Business</b>                              |                  |                 |            |              |              |
| Business Administration .....                           | 1934             | 79              | 1050       | 963          | 2013         |
| Economics .....   | 175              | 0               | 121        | 54           | 175          |
| Industrial and Technical Studies (M.A.) .....           | 0                | 26              | 24         | 2            | 26           |
| Industrial Technology .....                             | 232              | 0               | 192        | 40           | 232          |
| Engineering Management (M.B.A./M.S.) .....              | 0                | 1               | 1          | 0            | 1            |
| Totals .....  | 2341             | 106             | 1388       | 1059         | 2447         |
| <b>College of Engineering</b>                           |                  |                 |            |              |              |
| Aeronautical Engineering .....                          | 224              | 4               | 195        | 33           | 228          |
| Civil and Environmental Engineering (M.S.) .....        | 0                | 10              | 6          | 4            | 10           |
| Civil Engineering .....                                 | 473              | 0               | 359        | 114          | 473          |
| Computer Engineering .....                              | 403              | 0               | 344        | 59           | 403          |
| Computer Science .....                                  | 473              | 38              | 423        | 88           | 511          |
| Electrical Engineering .....                            | 621              | 0               | 538        | 83           | 621          |
| Electronic Engineering .....                            | 22               | 0               | 20         | 2            | 22           |
| Electronic and Electrical Engineering .....             | 0                | 16              | 15         | 1            | 16           |
| Engineering (M.S.) .....                                | 0                | 27              | 22         | 5            | 27           |
| Engineering Management (M.B.A./M.S.) .....              | 0                | 15              | 12         | 3            | 15           |
| General Engineering .....                               | 83               | 0               | 60         | 23           | 83           |
| Environmental Engineering .....                         | 248              | 0               | 139        | 109          | 248          |

### Enrollment in Programs by College and Major, Fall 1997 (continued)

| <i>Colleges and Major Curricula</i>            | <i>Undergrad</i> | <i>Graduate</i> | <i>Men</i>  | <i>Women</i> | <i>Total</i> |
|--|------------------|-----------------|-------------|--------------|--------------|
| <b>College of Engineering (continued)</b>      |                  |                 |             |              |              |
| Industrial Engineering .....                   | 252              | 0               | 162         | 90           | 252          |
| Materials Engineering .....                    | 141              | 0               | 118         | 23           | 141          |
| Manufacturing Engineering .....                | 60               | 0               | 56          | 4            | 60           |
| Mechanical Engineering .....                   | 857              | 0               | 779         | 78           | 857          |
| Transportation Engineering (M.C.R.P./M.S.)     | 0                | 0               | 0           | 0            | 0            |
| Totals .....                                   | 3857             | 110             | 3248        | 719          | 3967         |
| <b>College of Liberal Arts</b>                 |                  |                 |             |              |              |
| Applied Art and Design .....                   | 215              | 0               | 109         | 106          | 215          |
| English .....                                  | 262              | 61              | 97          | 226          | 323          |
| Graphic Communication .....                    | 289              | 0               | 143         | 146          | 289          |
| History .....                                  | 166              | 0               | 101         | 65           | 166          |
| Human Development .....                        | 154              | 0               | 8           | 146          | 154          |
| Journalism .....                               | 217              | 0               | 76          | 141          | 217          |
| Liberal Studies .....                          | 397              | 0               | 72          | 325          | 397          |
| Music .....                                    | 66               | 0               | 32          | 34           | 66           |
| Philosophy .....                               | 73               | 0               | 35          | 38           | 73           |
| Political Science .....                        | 233              | 0               | 121         | 112          | 233          |
| Psychology .....                               | 296              | 49              | 67          | 278          | 345          |
| Social Sciences .....                          | 283              | 0               | 120         | 163          | 283          |
| Speech Communication .....                     | 182              | 0               | 55          | 127          | 182          |
| Totals .....                                   | 2833             | 110             | 1036        | 1907         | 2943         |
| <b>College of Science and Mathematics</b>      |                  |                 |             |              |              |
| Biochemistry .....                             | 223              | 0               | 107         | 116          | 223          |
| Biological Sciences .....                      | 506              | 39              | 209         | 336          | 545          |
| Chemistry .....                                | 90               | 0               | 58          | 32           | 90           |
| Ecology and Systematic Biology .....           | 163              | 0               | 59          | 104          | 163          |
| Mathematics .....                              | 185              | 12              | 93          | 104          | 197          |
| Microbiology .....                             | 121              | 0               | 48          | 73           | 121          |
| Physical Education .....                       | 388              | 30              | 181         | 237          | 418          |
| Physical Science .....                         | 20               | 0               | 10          | 10           | 20           |
| Physics .....                                  | 84               | 0               | 71          | 13           | 84           |
| Statistics .....                               | 29               | 0               | 16          | 13           | 29           |
| Totals .....                                   | 1809             | 81              | 852         | 1038         | 1890         |
| <b>University Center for Teacher Education</b> |                  |                 |             |              |              |
| Education (M.A.) .....                         | 0                | 341             | 95          | 246          | 341          |
| All College                                    | 103              | 26              | 65          | 64           | 129          |
| <b>CAMPUS TOTALS</b> .....                     | <b>15804</b>     | <b>931</b>      | <b>9357</b> | <b>7378</b>  | <b>16735</b> |

Note: Undergraduate enrollment includes students enrolled in Second Baccalaureate programs.

\* Students not currently being admitted to this program.

## 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.

- Art and Design - National Association of Schools of Art and Design
- 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, Architectural Engineering, Bioresource and Agricultural Engineering, Civil Engineering, Electrical Engineering, Environmental Engineering, Industrial Engineering, Manufacturing Engineering, Materials Engineering, and Mechanical Engineering) – Accreditation Board for Engineering and Technology, Engineering Accreditation Commission
- Forestry and Natural Resources – Society of American Foresters
- Industrial Technology – National Association of Industrial Technology
- Journalism – Accrediting Council on Education in Journalism and Mass Communication
- 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

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## POLICIES ON THE RIGHTS OF INDIVIDUALS

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### NONDISCRIMINATION POLICY

The California State University does not discriminate on the basis of race, color, national origin, sex, physical handicap or sexual orientation in the educational programs or activities it conducts.

#### 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 Sean Banks, Director, Campus Student Relations and 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.

#### Disability

The California State University does not discriminate on the basis of disability 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 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 these Acts in its implementing regulations. Inquiries concerning compliance may be addressed to her. Where student discrimination occurs, referral may be made to either Disability Resource Center, Office of Student Affairs, or Affirmative Action Office.

#### Race, Color, National Origin or Disability

The California State University complies with the requirements of Title VI of the Civil Rights Act of 1964 as amended by the Americans with Disabilities Act and the regulations adopted thereunder. No person shall, on

the grounds of race, color, national origin, or disability, 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

#### Sexual Harassment is unwelcomed or unwanted attention of a sexual nature

Examples include:

- *Unwelcomed sexual propositions, invitations, or solicitations*
- *Unwelcomed and inappropriate touching, patting, pinching, or obscene gestures*
- *Requests for sex in exchange for grades, letters of recommendation, or employment*
- *Unwelcome verbal expressions of a sexual nature, including graphic sexual comments about a person's body, dress, appearance, or sexual activities*
- *Consensual sexual relationships where such relationships lead to favoritism of the student or subordinate employee with whom the professor or supervisor is involved*
- *Threatening demands for sexual favors*

If you experience sexual harassment, first state that it is not welcome and ask the harasser to stop the behavior. If the harassment continues, please report it to a Sexual Harassment Advisor or to the department chair or program manager.

Cal Poly's Policy Against Sexual Harassment (AB93-1) provides a formal avenue of redress for sexual harassment offenses. Some incidents can be addressed through less formal steps that involve a discussion between the parties.

The policy and procedures are available from an advisor, the Affirmative Action Office, and the Office of Women's Programs and Services.

**Informal Procedures**

Complainant directly, or through an advisor, notifies the harasser to stop the offensive behavior; or

Complainant may attempt to resolve complaint with the alleged harasser's supervisor, department head/chair; or

Student may bring a complaint directly to the Office of the Vice President for Student Affairs (*Admin Bldg Rm 209*), 756-1521.

Employees should contact the Director of Affirmative Action (*Admin Bldg Rm 413*), 756-2062.

**Formal Procedures**

Students file written charges with the Office of the Vice President for Student Affairs within 120 days of the alleged date of the harassment.

Employees and applicants for employment file written charges with the Director of Affirmative Action.

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

The investigators forward a final report with a recommended remedy to the President's designee who imposes corrective measures.

**Sexual Harassment Advisors**

Cal Poly employees serving as Sexual Harassment Advisors help complainants by providing information about sexual harassment. Advisors may assist in mediating a resolution between parties. Advisors are prepared to discuss sexual harassment concerns with any constituent who needs assistance.

**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

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responsibilities. At Cal Poly, Campus Student Relations and Judicial 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 Campus Student Relations and Judicial Affairs. For more information please see pages 46, 87.

### **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.*

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## THE CALIFORNIA STATE UNIVERSITY

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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.

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. California State University, Monterey Bay, became the CSU's 21st campus in September 1994. The California Maritime Academy in Vallejo, founded in 1929, joined the CSU as its 22nd campus in July 1995. The CSU's 23rd campus—California State University, Channel Islands—is in the planning stage to serve students in the Ventura County region.

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, or by distance learning from home or work via computer or television. 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 1996, the system enrolled approximately 336,000 students, taught by more than 17,000 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 22 campuses since 1960.

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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 134, Long Beach, CA 90802-4275



**OFFICE OF THE CHANCELLOR**  
The California State University  
400 Golden Shore, Suite 322  
Long Beach, California 90802-4275  
(562) 985-2500

|                             |   |
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**CAMPUSES—THE CALIFORNIA STATE UNIVERSITY**

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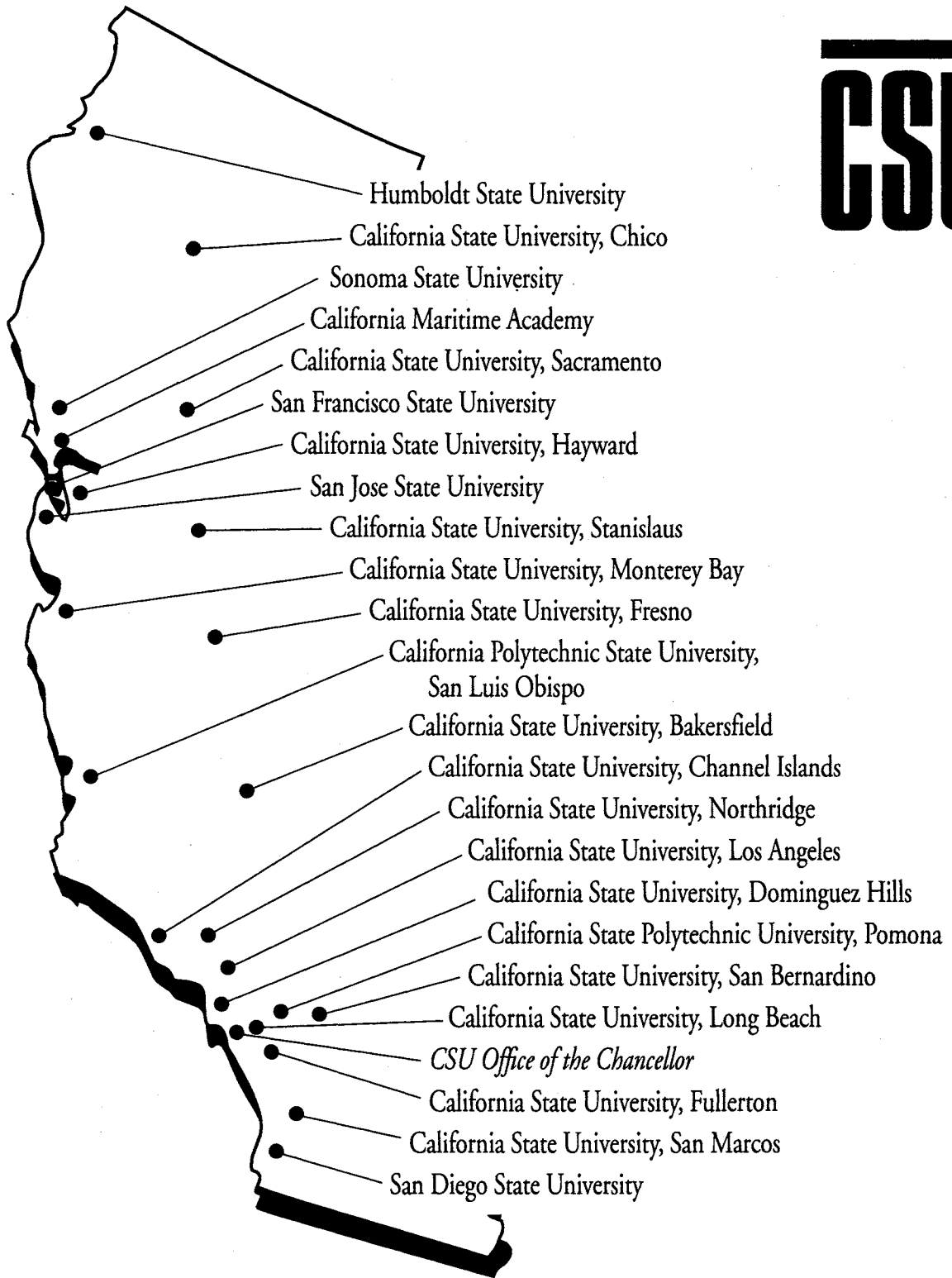
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# THE CALIFORNIA

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# STATE UNIVERSITY



**Wat Pho, Bangkok.** From left: Professor George Jercich (Art & Design), Kari Stettler (Philosophy), Tim Davis (Business), Allison Pernell (City & Regional Planning), Paula McCarthy (Soil Science), and Marilyn Pruitt (Continuing Education). *Photo courtesy of Allison Pernell.*

### Thailand Study

Students experienced the culture of Thailand while completing Cal Poly courses that complemented their travels, including ART 101 Basic Drawing and ART 111 Introduction to Art.

*"Studying the Buddhist cosmology with Thai professors gave us incredible insight into the people, culture and art of the country. For example, we could look at the walls within a temple and see deeper, beyond the surface glitz and gold, relating the surface decoration to the history, religion, art, and culture of the people."*  
Allison Pernell

### London Study

Each spring quarter, Cal Poly faculty and students participate in London Study. The program is open to all majors, with students having the opportunity to complete several general education classes, often having a special emphasis on London. Recent course offerings included MU 324 Musical Theatre in London, AGED 470 British Gardens, ENGL 353 Modern Drama in London, and HUM 310 World Cultures: London.

*"Going to London was the best educational decision I've made. London has so much to offer—plays, museums, musicals, gardens, people, and history and the program made the world my classroom."* Heather Brown.

**Tower of London.** At right: Lori Good (Business), Cari Gudgeon (Biological Science), Sharon Wong (Materials Engineering), Alison Silzer (Speech Communication), Joy Usón (Business), Heather Brown (Business) and Vanessa Vorie (Liberal Studies). *Photo courtesy of Heather Brown.*



Special  
*Programs*  
& *Resources*

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# SPECIAL PROGRAMS AND RESOURCES

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## ALUMNI ASSOCIATION

*Alumni Relations, Albert B. Smith Alumni and Conference Center, 805 756-2586*

Cal Poly's Alumni Association links the university with the more than 150,000 students who have attended Cal Poly since 1901. To keep in touch with former students, the Alumni Association coordinates a variety of functions including continuing education, university updates, and spirited programs both on and off campus and throughout California and across the nation.

The Alumni Association is governed by a president, a president elect, a secretary-treasurer, and a board that represents the association both regionally and by college; the Office of Alumni Relations coordinates the activities of the association. The association, with nearly 30 active regional alumni chapters, coordinates events in Alaska, Hawaii, Colorado, New England, Portland, Seattle, and throughout California. The association also coordinates activities of interest-based alumni chapters such as Vines to Wines, FANS, Rose Float and WOW Alumni Associations.

Active members of the Alumni Association enjoy unique benefits such as access to all CSU libraries, access to Cal Poly recreational facilities, group insurance programs, SLO merchant discounts, and special invitations to alumni-sponsored events such as Homecoming and Open House.

The Cal Poly Alumni Association has a special interest in student activities and enhancing the undergraduate experience. Sponsoring POLY REPS, a student alumni council, Senior Cabinet, Running Thunder, ASI Student Alumni Advisory Board, and many student scholarships and student club grants are just a few of the ways that the Alumni Association is positively impacting the student experience.

## COMMUTER SERVICES

*RideShare Office, Public Safety Services Bldg. (74), 805 756-6680*

The RideShare office is available to all students, faculty and staff to help them choose the best option for traveling to Cal Poly. Carpool partner matching services, special bus rates for the city and county buses, and vanpools for employees are a few of the convenient choices offered. Commuter Services is committed to help reduce traffic, keep the air clean, solve parking congestion on campus, as well as to help students and employees save money and wear-and-tear on their cars.

## COMPUTING AT CAL POLY

*Information Technology Services  
Computer Science Bldg. (14), 805 756-7000*

Information technology plays an increasingly important role on campus, both in the academic programs and administrative services. Computer literacy is a General Education requirement at Cal Poly, and information technology is used in all academic disciplines. Thus students frequently encounter computers in their classes, and are encouraged to have access to a computer in their residences.

Professional techniques and systems are simulated in the classroom environment. Research grants, special projects, and equipment donations from industry supplement existing campus computing resources to provide a practical, "hands on" learning environment.

Information Technology Services plans, coordinates, manages and supports campuswide information technology resources and services. These include shared administrative and instructional applications and databases; computer processing; basic telephone and network services; open access student computing labs, mediated classrooms and other facilities; multimedia and web development; and consulting and training on supported hardware, software, and network services.

## Resources and Facilities

Campuswide hardware systems include an IBM 9672-R24 CMOS mainframe computer, HP and other UNIX servers, a network of Sun/Java workstations, various departmental servers, and advanced workstations. While some of the computers run specialized academic applications, many are available for use by all Cal Poly students.

Campuswide communication systems include an Ericsson digital telephone switch, high-speed ethernet network (including network connections in every campus residence hall room), dial-in modem pool, wireless modems, and open access ports in student study areas and classrooms.

These systems provide access to electronic mail, application software, the Internet and World Wide Web, on-line library resources and specialized databases, and other networks and information services.

Cal Poly has several microcomputer lab/classroom facilities for instruction, independent study, and research and development. Apple Macintosh, HP, IBM,

Sun and other systems are available to students. Extensive efforts are underway to make campus information technology resources accessible to persons with disabilities.

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 the campuswide data communications network.

The Faculty Multimedia Development Center provides faculty access to specialized resources to design, produce and deliver mediated instructional materials. A similar facility is available in the library for student use.

Other campus resources include distance learning and videoconferencing facilities, on-line tools to facilitate easy access to and retrieval of information from university databases, and a centrally-located help desk to advise students, faculty and staff on how to access and use these technologies.

## CONTINUING EDUCATION IN AGRICULTURE

*Agricultural Education and Communication*  
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 UNIVERSITY PROGRAMS AND SERVICES (EUPS)

This division is responsible for providing high quality, educational activities and opportunities in the areas of extended education, distance learning, and conference services. EUPS is committed to providing instructional development support for a wide range of lifelong learning opportunities for the broader community, including professional growth and development delivered through traditional modes of instruction as well as distance technologies, and client centered services for on- and off-campus constituencies.

## EXTENDED EDUCATION

*Jespersen Hall (116), Room 101, 805 756-2053*  
<http://www.calpoly.edu/~exted>.

Extended education provides a variety of learning programs to residents of San Luis Obispo, northern Santa Barbara, and southern Monterey Counties. These programs are self-supporting through student enrollment fees or agency funding. *The Extended Education Catalog*, published quarterly, describes the programs and courses available each quarter. Individuals may request to be placed on our mailing list and will automatically receive a new *Catalog* each quarter. Current course listings can also be viewed on the Extended Education Website:

Extended Education offers an option for working people and community members of all ages to earn coursework credit. The types of credit available are: Academic Unit Credit; Professional Unit Credit; Continuing Education Unit Credit. Any one of these types of credit can be proposed for a particular course, workshop, or seminar. The type of credit offered for an event is identified in the proposal phase of the course development. Course proposal forms are available by calling the Extended Education Office.

Extended Education also offers courses that do not earn credit. The *Extended Education Catalog* lists these courses and identifies any that may be part of a certificate program. Some certificate programs have enrollment requirements that Extended Education staff can review with the customer.

### Concurrent Enrollment

Individuals may take regular on-campus courses on a space-available basis through the concurrent enrollment program. Limits may apply when using concurrent enrollment courses toward a degree. Individuals should check with the university they plan to enroll in before petitioning for the courses. Petitions to enroll may be obtained from Extended Education two weeks prior to the beginning of each quarter. This enrollment process is not available to regularly matriculated students.

## 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 each day. With fourteen food outlets located throughout campus, Campus Dining has an extensive offering of snacks to full meals to campus-grown produce. Three dining restaurants, Light House, VG Cafe, and Sandwich Plant, provide meal plan service. Other restaurants include BackStage Pizza, Julian's Gourmet Coffee, Tapangos, The Avenue Food Court, Lucy's Juice, Lucy's Juice Too, Staff Room, vending areas including the Cellar, and the Campus Store, our convenience store

with lots of items including campus produced products. Vista Grande Restaurant offers elegant, full table service meals. Campus Catering is available for special events.

Membership in the **Campus Express Club**, a debit card program, is open to all Cal Poly students, faculty and staff. Members deposit money to their accounts and then use their campus I.D. cards to make purchases at Campus Dining locations and El Corral Bookstore. Membership has its privileges, including special discounts offered at Campus Dining locations.

## 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.

## HEALTH SCIENCES—Preprofessional Preparation

*Access to Health Careers, 805 756-2840  
College of Science and Mathematics Advising Center,  
805 756-2615*

### 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. A major should be chosen on the basis of interest and as preparation for an alternate career. Professional schools are concerned with the overall quality and scope of the undergraduate work and not with the major course of study. Specific requirements vary for each professional school, so students should contact the schools directly.

### Preprofessional Advising

The Health Professions Advising 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.

The Committee consists of faculty and staff from the departments of Animal Sciences, Biological Sciences, Chemistry and Biochemistry, English, Mathematics, Physical Education and Kinesiology, Physics, Psychology and Human Development, Speech, Access to Health Careers, Career Services, and Health Center.

**Chiropractic.** Students generally complete two years of undergraduate coursework prior to admission to chiropractic school. 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        | PHYS 121, 122, 123            |
| or BACT 221              | PSY 201/202, 304              |
| CHEM 127, 128, 129, 216, | ZOO 240, 241                  |
| 217, 318                 | 7-8 courses in Social Science |
| ENGL 114, 125, 215/218   | or Humanities                 |

**Dentistry.** Students generally complete their undergraduate coursework 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. The following Cal Poly courses meet the minimum preparation:

|                          |                        |
|--------------------------|------------------------|
| BIO 151, 153; 152        | ENGL 114, 125, 215/218 |
| and/or BACT 221          | PHYS 121, 122, 123     |
| CHEM 127, 128, 129, 216, | ZOO 240, 241           |
| 217, 318                 |                        |

**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. The following Cal Poly courses meet the minimum preparation:

|  |                    |
|--|--------------------|
| BACT 221, 222, 423                                       | PHYS 121, 122, 123 |
| BIO 151, 153   | ZOO 426, 428       |
| CHEM 127, 128, 129, 212,<br>231, 313, 337, 338, 437, 438 |                    |

**Medicine (Allopathic, Osteopathic, Podiatric).** Students generally complete their undergraduate coursework prior to admission to medical school. For exact prerequisites, check individual catalogs. 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 (2450 N St., N.W., Washington, D.C. 20037). For osteopathic medicine, the latest edition of "The College Information Booklet," 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. The Medical College Admissions Test (MCAT) should be taken at least one year prior to the projected date of admission. The following Cal Poly courses meet the minimum preparation for most schools:

|                                      |   |
|--------------------------------------|---|
| BIO 151, 153; 152 or<br>BACT 221     | ENGL 114, 125, 215/218<br>MATH 118, 119 |
| CHEM 127, 128, 129, 216,<br>217, 318 | PHYS 121, 122, 123                      |

**Nursing.** Two years are usually required to complete prerequisites prior to transferring into a nursing program. Prerequisites vary 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). The following Cal Poly courses meet the minimum preparation for transferring to a BS in nursing degree program:

|                    |                  |
|--------------------|------------------|
| ANT 201            | FSN 210          |
| BACT 221           | PSY 201/202, 405 |
| BIO 151, 153       | SOC 105          |
| CHEM 127, 128, 212 | ZOO 240, 241     |
| ENGL 114, 125      |                  |

**Optometry.** Students generally complete their undergraduate coursework prior to admission 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                        | MATH 141  |
| BIO 151, 152, 153               | PHYS 121, 123   |
| CHEM 127, 128, 129, 216,<br>217 | PSY 201/202, plus 2 PSY courses<br>STAT 130/221/217/218 |
| ENGL 114, 215/218               | ZOO 240, 241  |

**Pharmacy.** Students generally complete their undergraduate coursework 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). The following Cal Poly courses meet the minimum preparation:

|   |   |
|---|---|
| BIO 151, 153; 152 or 431 or<br>BACT 221 | ENGL 114, 125, 215/218<br>MATH 141, 142 |
| CHEM 127, 128, 129, 216,<br>217, 318    | PHYS 121, 122, 123<br>PSY 201/202       |
| ECON 211                                | SPC 201/202                             |

**Physical Therapy.** Students generally complete their undergraduate degree prior to admission to a physical therapy program. 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 may require the Graduate Record Examination (GRE). The following Cal Poly courses meet the minimum preparation:

|                    |                      |
|--------------------|----------------------|
| BACT 221           | PHYS 121, 122, 123   |
| BIO 151, 153       | PSY 201/202, 256/405 |
| CHEM 127, 128, 129 | STAT 221/217/218     |
| CSC 110            | ZOO 240, 241         |
| KINE 302, 303, 402 |                      |

**Physician Assistant.** Students generally complete their undergraduate coursework and have health care experience prior to admission. 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               | PSY 201/202, 405 |
| CHEM 127, 128, or 111  | SOC 105, 106     |
| ENGL 114, 125, 215/218 | ZOO 240, 241     |
| MATH 118               |                  |

**Public Health.** Students generally complete their undergraduate degree prior to admission to a school of public health. Because the fields of concentration in public health are so varied, diverse educational backgrounds are welcomed and there are no specific courses identified as required. For exact prerequisites, check individual catalogs. For more information, contact the Association of Schools of Public Health (1660 L St., Suite 204, Washington, D.C. 20036).

**Veterinary Medicine**

Students generally complete their undergraduate coursework prior to admission to veterinary school. 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). Applicants are expected to have considerable

experience in the field. A professional exam is usually required for entrance. The following Cal Poly courses meet the minimum preparation for Davis:

|   |  |
|---|--|
| BACT 221                                  | PHYS 121, 122,                           |
| BIO 151, 153, 303/351                     | PSY 201/202                              |
| CHEM 127, 128, 129, 216,<br>217,, 313/371 | STAT 211/218                             |
| ENGL 114, 125, 215/218                    | ZOO 405                                  |
|   | BIO 431, 432 or VS 438 or<br>ZOO 240/241 |

## PUBLIC SAFETY SERVICES

*Building 74, (805) 756-2281 (For non-emergencies)*

Public Safety Services offers safety and security services to the Cal Poly population. *The New Cal Poly Farmer's Almanac*, printed annually, includes vital safety and security information. Copies of the almanac are available in the Residence Halls and Public Safety Services.

In an **emergency**, dial **9 1 1** to reach Public Safety's Emergency Line. White campus phones are available in every Residence Hall and other campus facilities, and alarm boxes are also available for emergency calls. Emergency alarm box locations are marked by a star on campus maps available at Public Safety. A button on the face of the alarm box links the call to Public Safety Services' Emergency line. After activation, a police vehicle is immediately dispatched to the alarm box location.

In **non-emergency** situations, use the Public Safety main line, 756-2281. This line is also for the campus Escort Service, a Cal Poly Police Community Service Officer Program. Escort service is offered daily from campus locations to off campus sites within one mile. Escort Service hours are available at Public Safety Services.

## 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 who have ongoing projects, to explore becoming part of the project team.

## ROBERT E. KENNEDY LIBRARY

*Building 35, 805 756-2598  
<http://www.lib.calpoly.edu>*

The Robert E. Kennedy Library provides a comfortable and attractive environment for study, research, and browsing. The building features an interior courtyard design, with open stack accessibility, and individual as well as group study areas. The library collection contains nearly five million bibliographic items. This includes over 750,000 volumes in the book collection; periodicals; journals; art prints; more than 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 teaching students how to locate, evaluate and apply knowledge. Individual instruction in the use of the library, and library tours for groups and individuals are available. Librarians also give lectures to class groups at the request of instructors, and assist users in accessing electronic services available via the library's World Wide Web homepage. The Library also 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. The collection also contains industrial standards from the major professional and trade associations, annual reports and college catalogs from all fifty states.

In addition to regular reference services, the reference department maintains many electronic services to meet student and researcher needs. These include a wide range of electronic indexes and full text databases, the online catalog of the library's collections, and connections to a host of resources designed to facilitate research. Most of these electronic resources are available from stations throughout the library and over the World Wide Web for convenient use of the library from anywhere on or off campus.

The **Learning Resources and Curriculum Department** contains a variety of collections: 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. It is also home to University Media Services.

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** offers more than 80 unique research collections on topics ranging from architecture to the early history of television. Many formats of rare materials are found in these collections, including manuscripts, correspondence, business records, architectural drawings, photographs and negatives, and audio and videotape. Collections accepted by the department must relate to the university's curriculum. Collection strengths include architectural records and drawings, fine printing and graphic arts, and local and California history. The University Archives houses materials that document the history, growth and development of the university, from its beginnings in 1901 to the present.

Materials that are not available in the Library's collections can be requested from **Interlibrary Loan and Document Delivery**. These items may be obtained from one of the twenty-two CSU libraries, the University of California libraries, or from other cooperating libraries throughout the United States and the world.

The **Polycat/Systems Support Division** is responsible for the implementation, management, organization, and maintenance of the library's electronic resources. These include Polycat (the online catalog), public workstations, printers, and network connections. The division also oversees the library's email system and its World Wide Web servers. PSS staff work closely with the campus Information Technology Services (ITS) unit and with the California State University system on automated information service initiatives.

## SERVICES TO VOCATIONAL AGRICULTURE

*Agricultural Education and Communication, 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 AND TRAVEL: U.S. & ABROAD

*Global Affairs Office  
Building 38, Room 108, 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, 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:** The institutions of higher education in the German Federal State of Baden-Württemberg, including: Ruprecht-Karls-Universität (Heidelberg), Musikhochschule Trossingen, Universität Hohenheim, Fachhochschule Furtwangen, Fachhochschule Mannheim, Fachhochschule Nürtingen, Fachhochschule Reutlingen, Berufsakademie Stuttgart, Universität Freiburg, Universität Karlsruhe, Universität Konstanz, Universität Mannheim, Universität Stuttgart, Universität Ulm, Eberhard-Karls-Universität (Tübingen)

**Israel:** Tel Aviv University, 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)

**Korea:** Yonsei University (Seoul)

**Mexico:** Universidad Pedagógica Nacional (Mexico City), Instituto Tecnológico y de Estudios Superiores de Monterrey, Campus Querétaro

- 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 (Greater London), Sheffield University, University of Wales, Swansea
- Zimbabwe:** University of Zimbabwe (Harare)

The CSU International Program 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 these requirements. 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 California State University International Programs, 400 Golden Shore, Suite 122, Long Beach, CA 90802-4275. Visit us on the World Wide Web at <http://www.gateway.calstate.edu/csuienet/>.

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'S INTERNATIONAL EXCHANGE PROGRAMS**

- Australia**  
 Univ of Canberra .....Landscape Arch & Construction Mgt  
 Royal Melbourne Institute Tech (RMIT) .....Construction Mgt  
 Univ of New South Wales.....Architecture  
 Univ of Queensland .....Architecture

- Univ of Technology, Sydney ..... Construction Mgt  
 Victoria College of Agric & Hort ...Environ Horticultural Sci
- Canada**  
 University of Guelph ..... Landscape Architecture
- Costa Rica (Internship Exchange)**  
 Escuela de Agricultura de la Región  
 Tropical Humeda (EARTH)..... All Majors
- Denmark**  
 Horsens University..... Construction Management
- Kenya**  
 Farming Systems Kenya..... All Majors
- Mexico**  
 Instituto Tecnológico y de Estudios Superiores de  
 Monterrey, Campus Querétaro ..... All Majors
- Norway**  
 University of Norway ..... Landscape Architecture
- Switzerland**  
 Interkantonales Technikum, Rapperswil..... Landscpe Arch
- United Kingdom**  
 Univ of Nottingham .....Civil Engr, Environental Engr

**EXCHANGE PROGRAMS IN THE UNITED STATES**

- Cornell University** ..... Dairy Science
- National Student Exchange Consortium** .....All Majors  
 Cal Poly students have an opportunity to study at one of 143 U.S. schools for a term up to a year, including schools in Puerto Rico, the Virgin Islands, and at one of the traditional African-American, Hispanic or Native American schools.

**CAL POLY STUDY ABROAD PROGRAMS**

**Thailand Study and Internship Program**  
 Students have the opportunity to experience the culture of Thailand while completing one-quarter of coursework. A variety of courses are available for all majors. The city of Bangkok serves as a base of operations for Cal Poly faculty and students while they explore and experience the rich diversity of Southeast Asia's culture, society and commerce.



**Wat Pho**  
 While in Thailand, students visit Wat Pho, the oldest and largest wat in Bangkok. The galleries extending among the four chapels feature 394 gilded images of Buddha. Wat Pho is the national headquarters for the teaching and preservation of traditional Thai medicine.

*Photo courtesy of Allison Pernel.*

For qualified students, a limited number of internships with U.S. corporations and the U.S. Embassy in Thailand are available. Brochures are available at the University Union Information Desk and at the Global Affairs Office.

### London Study Program

The university sponsors a spring-term London Study Program as a means to enrich the educational 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 GE coursework. Brochures are available at the University Union Information Desk, the Global Affairs Office, or by calling (805) 756-1477.



### London Study

The Changing of the Guard outside of Buckingham. It is a popular site for both tourists and Londoners.

*Photo courtesy of Heather Brown.*

## TEACHER PREPARATION PROGRAMS

*Education Building 02, Room 120, 805 756-2584*

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

- Multiple Subjects (as commonly practiced in California elementary schools)
- Single Subject Instruction (as commonly practiced in California high schools and most junior high schools)
- Crosscultural, Language and Academic Development
- 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 Bilingual Crosscultural, Language and Academic Development Credential

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.

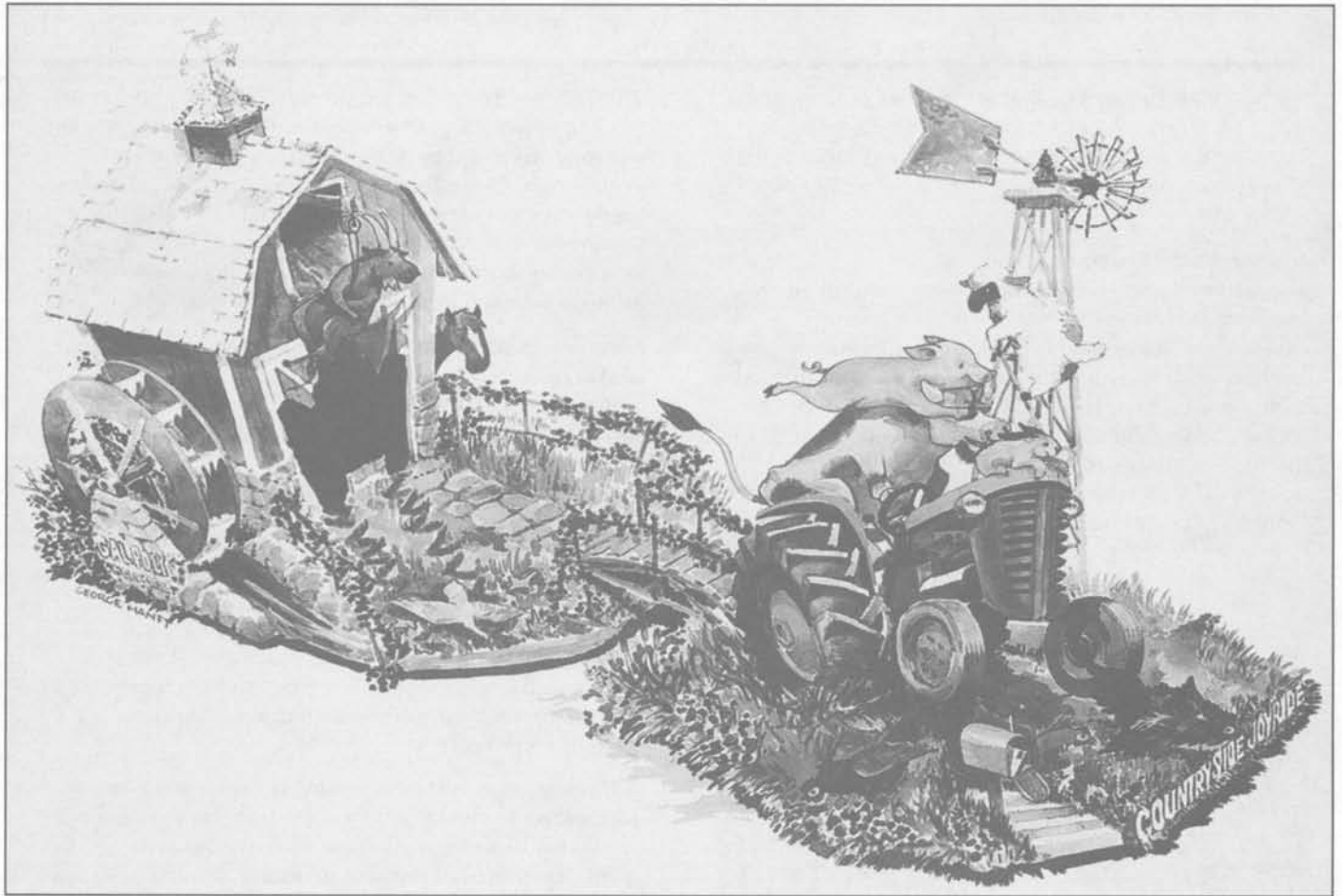
## UNIVERSITY ADVANCEMENT

*Administration Bldg. (01), Room 415, 805 756-1445*

Donations 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 enhance ongoing programs, support scholarships, improve the learning environment, and provide funds for the "extras" that State resources no longer can provide.

Gifts can come to the university in many ways: major gifts, planned giving (which often benefits the donor during his lifetime), endowments (only the earnings are spent, the principle remains invested), annual cash gifts, equipment or other in-kind donations, scholarships, and partnerships between the university and corporations and foundations.

Donations can either be restricted to a particular college or program or be given without restrictions to be used where the need is greatest. Non-academic programs such as athletics and the campus library also benefit greatly from donors' generosity.



**“Countryside Joyride”  
50<sup>th</sup> Anniversary  
Rose Parade Float, 1998**

The Rose Float Committee, one of the best-known campus clubs, won the Founder’s Trophy, which is awarded for the most beautiful float entry built by volunteers. This was the 50<sup>th</sup> consecutive float to be entered by Cal Poly students.

With wheels spinning, the farmer’s cow crashes through the barn, wildly driving the tractor across the yard.

Working cooperatively with students from Cal Poly, Pomona, members of the Rose Float Committee do everything from design to parade staging. They utilize hydraulics and a computer for animation, and a propane engine for clean power.

*Rendering courtesy of the Cal Poly Rose Float Committee.*

*Student  
Affairs*

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# STUDENT AFFAIRS

*Office of the Vice President for Student Affairs  
Administration Building (01) Room 209  
805 756-1521*

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The Office of the Vice President for Student Affairs oversees a division that provides services and learning experiences for all Cal Poly students. Through advocacy, program development, and serving as a liaison to student organizations on behalf of the University, Student Affairs is the key link to student life on campus. Dedicated to student learning, Student Affairs staff mentor students, encourage personal development, and support important initiatives to enhance retention and matriculation of students.

## **Mission Statement**

The mission of the Student Affairs Division is to advance and encourage the learning and personal development of students. Together with the University, the Student Affairs Division is committed to the principle of integrating Student Affairs programs and services into the student's total learning environment, in and out of the classroom, and fostering within each student respect and responsibility for self and members of the greater community.

Delivery of programs and services will be guided by an ongoing assessment of student needs, the campus climate and established outcomes. The mission is carried out through teaching and personal instruction, advisement and counseling, and through community service learning, internships and experiential education, organized programming and services.

The mission is achieved through the following programs and services:

- Associated Students, Inc.
- Campus Student Relations/Judicial Affairs
- Career Services
- Health and Psychological Services
- Housing and Residential Life
- Parents Association
- Student Academic Services
- Student Life and Activities

## **ASSOCIATED STUDENTS, INC. (ASI)**

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

The mission of Associated Students, Inc. (ASI) is to enrich the lives of Cal Poly students. This is realized through the support and sponsorship of a variety of programs, services, clubs and organizations. ASI

encourages opportunities to enhance the development of students through leadership participation, social interaction, and the development of individual attitudes and values.

As a corporation owned and governed by students for students, ASI promotes student interests through advocacy and representation. ASI achieves its mission through Student Governance, Business Office or staff administrators, and programs and services.

## **Student Governance of ASI**

*Executive Office, University Union (65), Room 217A,  
805 756-1291*

Leadership opportunities are open to all interested students. These range from the elected College Council representatives who form the Board of Directors, to appointed positions on the Finance and Facilities and Operations Committees and the ASI Executive Staff. ASI student leaders represent the student body on community, campus and regional committees.

Six student officers oversee ASI: the President (CEO), Chair of the Board, Executive Vice President, Vice Chair of the Board, Vice President for Finance, and Vice President for Operations. These officers are responsible for guiding the organization and are the recognized representatives of Cal Poly students. These positions are elected/appointed in Spring Quarter.

The Board of Directors oversees the policy development of ASI, an \$8 million nonprofit corporation. ASI collects quarterly fees, which support a wide range of campus clubs and organizations and programs.

## **Student Clubs**

There are nearly 400 active 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, multicultural organizations, and spiritually-based groups.

ASI and Student Life and Activities work together to assist students in developing new clubs, activity advising and program development. A complete list of all clubs on campus, their meeting dates, locations, and

contact people can be found in The Connection publication.

ASI fees directly support many clubs and organizations including programs in partnership with the University including Homecoming, the Multi-Cultural Center, Open House, Program Board and Student Community Services. Two of the most well-known student clubs include the Rose Float Committee and Program Board.

### Rose Float

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

The Rose Float Committee is one of best-known campus clubs. 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.

### Program Board

*Recreation Center (43), Room 113, 805 756-1112*

The Program Board is a collection of student volunteers formed as a committee that represents the diversity of Cal Poly. Charged by ASI to enhance student life on campus, the Program Board is dedicated to programming entertainment on campus by offering concerts, films, fine arts, speakers and special events. New members are always welcome.

## Programs and Services of ASI

*ASI Business Office*

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

The ASI Business Office provides administrative support and service to ASI programs and the student shareholders. Staff assist student organizations in event planning including risk assessment, contract approval and insurance policy analysis. To assist student clubs, the Business Office provides budget development instruction, club accounting of all financial transactions and purchasing assistance, Human Resources assistance, staff advocacy and student development.

ASI operates a wide variety of programs and services in three facilities, the University Union, the Recreation Center, and the ASI Children's Center.

### McPHEE UNIVERSITY UNION (UU)

**Information Desk:** *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. Facilities available include: Bishop's Lounge for television viewing, conference rooms, UU Galerie, ASI Escape Route, ASI Craft Center, Second Edition, Julian's, TravelTime, Chumash Auditorium, the Student Life and Activities Office, ASI Student Executive Office, ASI Business Office, and Chumash Challenge.



**Throwfest.** Over 1000 guests spent 24 hours throwing 2400 pounds of clay at the annual Craft Center Throwfest which raised more than \$500 for local charities.

*Photo courtesy Daren Connor.*

### Craft Center

*UU, Room 111, 805 756-1266*

The Center provides classes and services including black and white darkroom lab; ceramics area with eight electric and four kick wheels, two kilns and a damp room; a self-service bike repair room and full-service bike repair by trained mechanics; woodworking power tools; poster-making tables; and a retail store with clay, stained glass, FIMO, bike accessories and a large selection of Greek paddle supplies.

### Escape Route

*UU, Room 112, 805 756-1287*

Home of the student volunteer ASI Outings Committee, the Escape Route is the outdoor adventure and education center. Students may rent equipment such as tents, sleeping bags and cross country skis at reasonable prices. Serving as a resource center, the Escape Route is equipped with an extensive outdoor library including books, videos and topographic maps. Resources on snow camping, bicycle touring, backpacking, canoeing, rock climbing, and other activities are available. Student-guided outdoor excursions are also available.

### Galerie

*UU, Room 221, 805-756-1182*

The Galerie is an arts education facility. Contemporary and historic works of art in a variety of media are exhibited throughout the year. 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.



#### Setting up a show.

Carrie Schaefer, Art & Design junior, and Sam Torchia, Civil Engineering senior, adjust the levelness of a painting.

Photo by Michael Troxell.

#### McPhee's Games Area

UU, Room 118, 805 756-5523

The facility offers 10 bowling lanes with automatic scoring, 40 video games, and 8 full-sized billiard tables. Physical education bowling classes are offered quarterly. The games area also houses a full-service Pro Shop where all bowling equipment is expertly fitted and drilled on the premises.

#### Second Edition

UU, Room 111, 805 756-2848

Full and self-service copying, laser printing, professor publications, and full-color duplicating are available at Second Edition. All income generated helps to offset the ASI fees paid by students.

#### TravelTime

UU, Room 102, 805 544-9442

TravelTime is a full-service travel agency with staff who are available to make plane, train, or cruise arrangements plus help complete passport applications, Eurail, Britrail and Amtrak passes, American youth Hostel cards, and International ID cards.

#### CHILDREN'S CENTER

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

The Children's Center is a year-round child 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.

#### RECREATION CENTER

Recreational Sports (43), 805 756-1366

The 91,500-square-foot Center 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; sand volleyball courts; and offices. The adjacent Physical Education Building provides 26 faculty offices and other administrative spaces. Recreational Sports provides programs within the Recreation Center and throughout the campus. Members of the University community may participate in a variety of fitness, leisure and recreational activities. Recreational Sports is funded 100% by student and user fees. The program is administered by students and it exists for students, faculty, staff and alumni.

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.

#### Programs include:

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

**Intramural Sports** provides 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, innertube waterpolo and ultimate Frisbee.

**Collegiate Sport Clubs** offers a unique combination of athletic competition and leadership development opportunities. Members compete against clubs from other universities, improve their skills through instruction, and develop leadership skills through the management of their organization. Students of all skill levels are welcome!

**Fitness and Instructional** programs are designed for individuals to acquire new skills and participate in personal fitness programs in a relaxed and enjoyable setting. A few of the programs offered include an extensive aerobic schedule, massage, martial arts and sign language.

**Special Events** provides an opportunity for students to participate in individual and team activities. These include the "Up All Night" program, fun runs and tournaments.

## **CAMPUS STUDENT RELATIONS/ JUDICIAL AFFAIRS**

*Administration Building (01) Room 217, 805 756-2794*

### **Student Concerns**

Student concerns involving academic fairness, sexual or racial harassment, and other forms of discrimination may be addressed through Campus Student Relations and Judicial Affairs. Information, referral, support and advice are provided by trained staff who are available to assist students in understanding their rights and their responsibilities. Students may expect at Cal Poly a learning environment free of bias, discrimination, prejudice and harassment. In the event that a student is concerned about his or her rights, this is an office to contact immediately.

### **Investigation and Discipline of Student Conduct**

Campus Student Relations and Judicial Affairs also handles cases involving student misconduct. Staff investigate and follow up on alleged violations including academic dishonesty, cheating and plagiarism, violation of campus policies, and violation of the rights of others.

## **CAREER SERVICES**

*Student Services (24), Room 114, 805 756-2501*

A centralized service is available to all students and alumni of the University. In conjunction with the six academic colleges, Career Services assists students with obtaining the most suitable employment consistent with their preparation and experience. To this end, a full complement of programs and services is available.

### **Career Counseling**

Through individual appointments and group workshops, 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 from similar majors.

Students who are considering a change of major are particularly encouraged to utilize Career Services so that they may become better informed about future career potential. Career Services sponsors workshops and Career Events and Fairs to provide an opportunity for employers to meet with students and increase campus visibility in an open forum setting.

### **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 workshops 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 (Co-op)**

Cooperative Education is a joint partnership between employers and Cal Poly. Students leave the campus to work full-time in paid positions related to their majors. 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 gain marketable skills, develop self-confidence, and receive competitive wages, while earning academic credit. 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.

### **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, identifying, researching and contacting potential employers, preparing their resumes, and preparing for interviews.

Employer contacts may be generated through the on-campus interview program, posted vacancy announcements, career and job fairs, as well as Internet resources, 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.

The campus may furnish, upon request, information about the employment of students who graduate from Cal Poly, categorized by major. 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 graduates of the campus.

## HEALTH AND PSYCHOLOGICAL SERVICES

*Student Health Center (27), 805 756-1211*

The goal of Health and Psychological Services is to support the physical and psychological well-being of all students attending Cal Poly. A variety of services are offered for students including outpatient care, individual counseling, a pharmacy, and health education programs. Students are assisted on-campus at the Health Center to minimize class time lost because of illness, injury, or the stresses of academic life. These services are available to all students as part of the mandatory health fee.

### Health Services

*Student Health Center, (27), 805 756-2511*

**Outpatient medical services** are available Monday through Friday, year-round, 8:00 a.m. to 4:30 p.m., and includes primary physician and nursing services, men's/women's health care, laboratory and routine x-ray procedures.

**Health education** programs are provided by staff professionals and students trained as peer health educators. Programs include nutrition counseling, alcohol and drug awareness, sexuality and lifestyle wellness. Also available are self-help clinics on hay fever, colds, acne, and stress reduction.

**Additional health 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. Students are encouraged to have their own coverage for major medical, surgical and emergency expenses.

## Psychological Services

*Student Health Center (27), 805 756-2511*

Includes individual and group counseling, crisis intervention, education and outreach, and internship training. The staff are available to assist with the normal adjustments of academic and social life, and such issues as confidence and self-esteem, stress management, anxiety and depression, body image and sexuality, as well as more serious personal concerns.

## HOUSING AND RESIDENTIAL LIFE

*Housing Office (29), 805 756-1226*

Living on-campus can be a unique and rewarding experience. For the majority of all entering first-year students, it is the first experience in this new environment. Students participate in a variety of social interactions and share the same community with diverse groups of individuals.

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 hall 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 upper-division 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 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 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.

## On-Campus Housing

Cal Poly's on-campus housing allows the resident convenient access to classes, campus services and events. Students interested in living on-campus should return to the Housing Office, the Housing "Interest Card" which is found in the "Welcome" packet from the Admissions Office. Housing applications are mailed to students who return the "Interest Card." Payment materials are mailed to students on a first-come, first-served basis, determined by receipt date of the housing application and the student's notification to the University of "Intent to Register." The housing payment reserves the residence hall space for the student.

*To receive housing consideration, signed license and payment must be returned by the stated deadline as noted in the housing license.*

### 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 .....      | \$2,655 |
| <i>(academic year, double occupancy)</i> |         |
| Board .....                              | \$2,600 |
| <i>(required, academic year)</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.

## ResNet

All on-campus residence hall rooms have access to the Cal Poly Network and the Internet. Cal Poly ResNet is the residence hall networking project that provides dedicated high-speed network connections 24 hours a day. The Housing Computing Office provides this and other computing support programs for on-campus residents, including classes and workshops.

## PARENTS ASSOCIATION

*Administration Building (01) Room 209, 805 756-1521*

Behind every student is a caring parent, family member or supporter. In forming the Cal Poly Parents Association, the University aims to maintain contact with parents throughout the years. Through this Association, parents receive important news, information, key upcoming events and campus dates and deadlines.

### Parents' Helpline

The Parents Association operates a campus helpline accessible to all members. This serves as a critical vehicle for parents to assist with problem-solving, guidance to the right campus office to handle concerns, and information about events and services.

### Events and Services

Parents are invited to campus throughout the year. The main events of the Association include WOW Parents' Orientation, Parents' Appreciation Day, and the annual campus Open House Parents' program. In addition, the association provides two scholarships for students of active members.

## STUDENT ACADEMIC SERVICES

*Hillcrest (81), 805 756-2301*

Student Academic Services is a department which combines comprehensive programs offering transition and retention services to support academic excellence. These services include academic and personal advising, admissions and transition services, new student orientation courses, learning labs and study group assistance. Academic advisors 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.

Supplemental instruction, math workshops, and study groups are available for key content courses in first- and second-year curricula.

An additional emphasis of SAS is to offer support to students from backgrounds that have been traditionally underrepresented in the California State University System. The goal of SAS is to ensure that all students have equal opportunity to achieve academic success and graduation. Student Academic Services incorporates the following:

### Academic Skills Center

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

The Center provides retention programs and resources including supplemental instruction, ELM preparation, study groups, study skills and tutor referral services.

### **Assessment and Testing Center**

*Student Services (124), Room 121, 805 756-1551*

Assessment Services guides University program assessment projects focusing on student learning outcomes, helping to determine to what extent Cal Poly programs and services accomplish their goals. The Test Office administers state and national standardized admission, proficiency, and certification tests, and coordinates the administration of CSU Math tests programs.

### **Disability Resource Center**

*Student Services (124), Room 119,  
805 756-1395, voice or tty*

The Disability Resource Center provides information and assistance to students who have permanent or temporary disabilities. Supportive services include: academic advising, on-campus transportation, temporary medical parking permits, an adaptive technology lab, and provision of direct services, such as readers, note-takers, tutors and sign language interpreters. Associated with DRC is SUPPORT, a peer mentoring program that focuses on providing academic, personal, and co-curricular advising to newly-admitted students with disabilities. SUPPORT hosts social activities and informational workshops, in addition to providing one-on-one assistance to first-year students on an as-needed basis.

### **Educational Opportunity Program (EOP)**

*Hillcrest (81), 805 756-2301*

The Program provides admissions and academic support service programs for low-income, historically disadvantaged students. EOP offers academic and personal advising, study groups services, academic orientation courses, career and post-graduate advising, and referrals to campus resources.

### **Student Support Services (SSS)**

*Student Services (124), Room 119, 805 756-1395*

This federally-funded program enhances academic success and increases retention and graduation rates of low-income, first-generation, and/or physically disabled college students by providing academic advising services and assistance. Advises students on entrance into graduate and professional school programs.

### **Summer Institute**

*Hillcrest (81), 805 756-2301*

The Institute provides selected students with an abbreviated Summer Quarter experience, prior to their first quarter of enrollment. This program assists students to transition from high school to the more rigorous demands of college. Participants complete 4 units of Cal Poly course work while living on-campus

and engaging in social and academic development activities.

### **Upward Bound**

*Hillcrest (81), 805 756-2301*

A federally-funded program which provides a college preparatory program for low-income and/or potential first-generation college students. This program motivates and academically prepares local high school students for college. The academic program and residential summer school session at Cal Poly offers tutoring, career advisement, supplemental instruction, as well as cultural and recreational activities.

## **STUDENT LIFE AND ACTIVITIES**

*University Union (65), Room 217, 805 756-2476*

The mission of Student Life and Activities is to advance and encourage the learning and personal development of students as related to their ability to be effective leaders and members of task-oriented groups. This mission is achieved through a myriad of programs and services.

### **Greek Organizations**

There are seventeen national social fraternities, six national social sororities, five Greek organizations, and a number of local social, cultural, service and honorary Greek organizations on campus. Many of the social sororities and fraternities own or lease housing near the campus. Some provide lodging and meals for their members and pledges. Students interested in seeking affiliation with a fraternity or sorority are welcome to contact this office for more information.

### **Community Service Programs**

Cal Poly's Service and Learning Center represents the university's 'ommitment to education for civic responsibility and leadership. The center is dedicated to helping each individual student as well as student clubs to find meaningful and satisfying service experiences through both volunteer service and service related to academic classes.

**Volunteer service** programs include Student Community Services, Circle K Club, and Alpha Phi Omega, a coed national service fraternity. Over the years of their existence, they have served thousands of children, homeless individuals, and senior citizens as well as taken on environmental clean-up projects. The **academically-related service** program is called "Study-Service Connections". This program strives to demonstrate that integrating community involvement with classroom discourse enhances learning.

If one of these two programs does not meet a student interest, the Community Connection database of 300 community requests for help is a helpful tool. Students

can search the database according to the clientele to be served or they can review a calendar of annual service events.

Cal Poly recognizes records of outstanding service in three ways. Students can have their service hours noted on their official university transcripts. Each year, the university president presents the President's Award for Outstanding Service to an individual student and a student club. Also annually, each college presents a "Senior Recognition Award for Service to the Community" to a graduating senior who has been very involved in service.

### Multicultural Programs and Services

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

The Multi-Cultural Center (MCC) is a partnership between ASI and Student Affairs. The Center is coordinated by staff and operated by student volunteers developing cross cultural programs and events. More than 30 activities are sponsored each month at the Center. The MCC is the site of operations for the *Cultures* magazine and *Culture Talk*, a weekly student forum. All members of the campus community are welcome to participate in this program and promote a better understanding of diverse cultures.



**Dancing Dragon.** The MCC is one of the sponsors of the annual Lantern Festival held each spring.

*Photo by Michael K. Wong.*

### Week of Welcome

WOW stands for Week of Welcome – Cal Poly's unique orientation program. The program is coordinated by staff 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

*University Union (65), Room 217, 805 756-2600*

The mission of Women's Programs and Services is to create and sustain a university environment that promotes the personal, educational and professional growth of women. Students, faculty and staff work together in The Women's Center to create activities and programs which highlight women's achievements and concerns. Such campus-wide programs include: Take Back the Night, Women's History, and varied conferences on political issues. Most programs are planned and produced in collaboration with diverse campus and community groups.

### Campus Service Card

All students, faculty and staff are required to have a University photo identification card. In addition to being used for identification, the card is also used for admission to facilities and for other services and programs offered by the University. The Campus Service Card office is located in the University Union.

### Reentry Program

The Leadership and Reentry Programs office serves as an informative referral center that makes a special attempt to provide guidance and direction to reentry students. New Directions is a formal orientation program for reentry students that is offered in conjunction with the Week of Welcome. In addition, there is a reentry club, drop-in advisement and referral service and monthly reentry seminars.

### Leadership Program

The year-round leadership program provides a variety of vehicles and opportunities for students to develop and enhance their leadership skills. The leadership program is planned, developed and given direction by the Leadership Council. The Leadership Council works with students, faculty, staff, administration and community members to develop a state-of-the-art leadership program to meet the needs of students in a practical, accessible and effective manner. There are seven major components of the leadership program:

- Annual Leadership Institute
- Fall Multicultural Leadership Symposium
- Bi-weekly Leadership Seminars
- Club Management
- Spring Quarter Transition Workshop
- Ethnic Leadership Commissions
- Symposium (local high school students)

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# INTERCOLLEGIATE ATHLETICS DEPARTMENT

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

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## **John McCutcheon, Director**

|                     |                |
|---------------------|----------------|
| Kent Agler          | Peter Gunther  |
| Sheldon Blockburger | Tom Kunis      |
| Lisa Boyer          | Loretta Lamar  |
| Kevin Bromley       | Brian Loyd     |
| Alison Cone         | Eric McDowell  |
| Mark Conover        | Faith Mimnaugh |
| Pete Corkery        | Mike Oakland   |
| Lennis Cowell       | Ritch Price    |
| Terry Crawford      | Marlon Sano    |
| Alex Crozier        | Steve Schlick  |
| Chris DelConte      | Jeff Schneider |
| Sam DeRose          | Mickey Seward  |
| Kristal Emig        | Chuck Sleeper  |
| Chris Eppright      | Jason Sullivan |
| Glenn Fens          | Dan Tobias     |
| Camille Filardo     | Bill Tripp     |
| Rich Firman         | Phil Webb      |
| Marcia Foster       | Larry Welsh    |
| Wolfgang Gartner    | Steve Yoneda   |

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 Kinesiology Department.

All the teams compete at the NCAA Division I level. The football program competes as an NCAA Division 1-AA Independent. Wrestling competes in the PAC 10 Conference, and men's soccer competes in the Mountain Pacific Athletic Federation. The balance of the women's and men's programs are in the Big West Conference.

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

*Admissions*

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# CAL POLY ADMISSIONS

Office of Admissions

Administration Building (01), Room 213

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

<http://www.calpoly.edu>

Fax: (805) 756-5400

Tours/Admission Advising Sessions: 756-5734

email: [admprosp@polymail.calpoly.edu](mailto:admprosp@polymail.calpoly.edu)

## Overview

This section gives information about admissions for undergraduate programs. Prospective students are encouraged to contact the Admissions Office to receive the latest information on Cal Poly's undergraduate programs, the admissions process, and other related information.

The philosophy of the Office of Admissions is consonant with the mission of California Polytechnic State University, and is in accordance with Title 5, Chapter 1, Subchapter 3, of the California Code of Regulations. If you are unsure of these requirements, please call the Office of Admissions.

## Undergraduate Application Procedures

Cal Poly, San Luis Obispo has developed an electronic application (the "Pony Express") which is available from the Office of Admissions, or any California high school or community college. Cal Poly encourages all prospective students to contact the Admissions Office directly to receive our preferred electronic application disk, which is available in Windows, Mac, or DOS format.

Prospective students applying for undergraduate programs of study must file a complete undergraduate application.

Electronic versions of Cal Poly's undergraduate and graduate applications are also accessible on the World Wide Web at <http://www.calpoly.edu>.

An advantage of using Cal Poly's electronic disk application, the "Pony Express," is that it collects data for both the CSU Undergraduate Admission paper application and Cal Poly's Admission Supplemental Questionnaire (ASQ). CSU Undergraduate Admission paper applications are available for those applicants who are unable to complete the electronic admissions application. A \$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.

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

Cal Poly advises prospective students to supply complete and accurate information on the application for admission, residence questionnaire, and financial aid forms. Applicants must also submit, authentic, official transcripts sent directly from the issuing institution of *all previous academic work attempted* and work in progress, when requested to do so by the university. Failure to file complete, accurate, and authentic application documents may result in denial of admission, cancellation of academic credit, suspension, or expulsion (Section 41301 of Title 5, *California Code of Regulations*).

Because all majors at Cal Poly are oversubscribed, it is necessary for all applications to be 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 Office of Admissions for the latest information on applications for Winter and Spring Quarters prior to applying. 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.

## Undergraduate Admission Policy

The California Polytechnic State University, San Luis Obispo, California, admission policy is based on the California Code of Regulations for the California State University System, Title 5, Section 40600. Furthermore, as an oversubscribed CSU campus, Cal Poly, San Luis Obispo, operates under the auspices of California State University Executive Order 563 for admission to impacted campuses. Admission to Cal Poly, San Luis Obispo is selective. While applicants may meet the CSU system wide admission requirements outlined on the following pages, student applicants to Cal Poly San Luis Obispo are evaluated for admission on the competitive nature of their qualifications based on factors deemed important to our faculty.

The campus has adopted a faculty-developed Multi-Criteria Admission selection tool as its formal strategy for determining undergraduate admission. These criteria are *in addition* to CSU system wide admission requirements.

Each applicant is screened and ranked by level within a major as freshman, lower division transfer, or upper division transfer students.

Freshman candidates are evaluated in five separate categories including GPA earned in specific CSU preparatory courses, overall GPA, electives from the CSU preparatory course requirements, test scores and related work experience and extra-curricular activities.

Transfer candidates are evaluated in four categories including major-specific courses completed, general education courses completed, GPA in courses completed, and related work experience and extra-curricular activities. Beginning in Fall

1998, transfer candidates will also need to meet the general education and breadth requirements.

Each college has established a minimum score that candidates are required to meet to be qualified to proceed in the admissions process.

The top 60% of the students are offered admission solely on academic ranking. A supplemental ranking of the remaining qualified candidates determines other students offered admission through this process. Students may receive bonus points based on non-academic factors contributing to initiatives that are important to the campus.

The university community has also approved special consideration practices for admission based on other university interests deemed important to the campus.

Additionally, 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. Final selection for admission to Applied Art and Design or Music will then be determined by the major department rather than through the regular selection process.

### Admissions Options and Notification

There are two options for students wishing to apply to Cal Poly, San Luis Obispo for entry in the first-year class: Early Decision and Regular Decision. Both options are for students who will enter Cal Poly as first-year college students in the fall. We have no "mid-year" or "January" admission program for first-year students.

#### Early Decision

Early Decision is for those applicants for whom Cal Poly is a clear first choice. Early Decision applicants should have established strong and consistent academic records throughout secondary school and should have completed all the required standardized testing by October of their senior year. We anticipate about 10% of our new students will be selected under our Early Decision plan.

Candidates are reviewed on their program of study in secondary school, academic performance in classes, standardized test scores, extra-curricular activities, and/or work experience.

Early Decision candidates must be committed to attend Cal Poly. Students admitted under this plan may be released only for compelling medical or financial reasons. Students who apply for Early Decision and are not selected will be automatically reviewed under the Regular Decision Plan.

If you choose the Early Decision option:

- The student, parents, and counselor will be asked to sign a statement confirming the student's intention to enroll at Cal Poly if admitted, to not apply for Early Decision at other universities, and to withdraw applications to other institutions immediately upon admission to Cal Poly.

- The student will file the Pony Express application and a non-refundable \$55 application fee as soon as possible after the application is available (by October 31<sup>st</sup>).
- The student will be notified of the admissions decision by December 15<sup>th</sup>.
- The student's reply to an offer of admission is due by January 15<sup>th</sup>.

#### Regular Decision

This is the plan used by the vast majority of applicants.

- The student will submit the admissions application by November 30<sup>th</sup>.
- The student will be notified of the admissions decision in mid February.
- Your reply to an offer of admission is due by May 1<sup>st</sup>, if you choose to accept the offer.

#### Confirmation of Admission

Students will be selected for admission based on the competitive nature of their application as it relates to their class level and major within the overall applicant pool. Students will then receive a letter confirming their selection along with a Statement of Intent to Register (SIR), which is necessary in order to reserve a space for them. It is *mandatory* that selected students return their SIR by the date indicated (as well as any transcripts or other supporting documents requested by the Admissions Office) so that we can confirm formal admission and guarantee a registration space.

#### Statement of Intent to Register Deadlines:

|              |              |
|--------------|--------------|
| Fall .....   | May 1st      |
| Winter ..... | Not required |
| Spring ..... | Not required |
| Summer ..... | Not required |

#### Hardship Consideration

Cal Poly will give special consideration to place-bound, domiciled, upper division transfer candidates who are not able to leave the service area and have completed *all* lower division and general education courses. They must have filed an on-time application for admission, and if not selected by the Multi-Criteria Admissions Process, can be evaluated for admission based on University Interest as a Hardship Consideration. A letter that includes official transcripts must be sent to the Director of Admissions explaining the student's situation and why he or she should be reviewed for Hardship Consideration.

### Other Undergraduate 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 ..... | February 1 |

## International (Foreign) Student General Admission Requirements

### 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.

### International Application and Portfolio Completion Deadlines for Undergraduates:

|                      |              |
|----------------------|--------------|
| Fall Quarter .....   | June 1st     |
| Winter Quarter ..... | October 1st  |
| Spring Quarter ..... | February 1st |
| Summer Quarter ..... | April 1st    |

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

The CSU uses separate requirements and application filing dates in the admission of international students. Verification of English proficiency (see "TOEFL"), financial resources, and academic performance are all important considerations for admission. Academic records from foreign institutions must be on file by the above portfolio completion dates and, if not in English, must be accompanied by certified English translations.

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 course work 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; health insurance promissory note; International Education Background form; and a Test of English as a Foreign Language with a score of 550 or more. For graduate program applicants, official proof of university graduation must be sent directly by the institution, and a Test

of Written English with a score of 4.5 is also required. International applicants may also be required to submit a fee for an international credential analysis from a specified agency, which will be requested by the Admissions Office.

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.

## Undergraduate Admission Requirements of The California State University

### FRESHMAN REQUIREMENTS

Students applying to other CSU campuses can obtain electronic versions of the CSU undergraduate and graduate applications on the World Wide Web at "<http://www.calstate.edu>."

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 I). 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 I. 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 2900 using the SAT I 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 3502 (SAT I) 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 I 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.

### 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 I Score ... | 1300   | 1140 | 980  | 820  | 660  |         |

\* 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. Within the 15 units completed, up to one unit (one year) in visual and performing arts or foreign language may be missing and offset by a college preparatory course(s) in other areas. The missing unit of visual and performing arts or foreign language must be completed either prior to, or by the end of the first year, of CSU enrollment. This provision is effective through the 2000-2001 academic year.

- 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.

### Alternate Admission Criteria — UC Prepared Applicants

Beginning with the academic year 1995-96 and continuing through 1998-99, the CSU will conduct an admission

experiment that will permit campuses to admit applicants who have completed either the CSU or all of the UC college preparatory (a-f) requirements.

### 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 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, alternate college preparatory courses may be substituted for specific 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 Disability Resource Center.

Although the distribution may be slightly different from the course pattern required of other students, students qualifying for substitutions will still be held for 15 units of college preparatory study.

Students should be aware that course substitutions may limit your later enrollment in certain majors, particularly those involving mathematics. For further information and substitution forms, please call the director of Disability Resource Center.

### TRANSFER REQUIREMENTS

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

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

Applicants who graduated from high school 1988 or later:

- You have completed all subject requirements in effect when you graduated from high school (you can use both high school and college coursework) **OR**,

You have completed at least 30 semester units of college coursework with a grade of C or better *in each course* to be selected from courses in English, arts and humanities, social science, science and mathematics at a level at least equivalent to courses that meet general education

requirements. The 30 units must include all of the general education requirements in communication in the English language and critical thinking (at least 9 semester units) and the requirement in mathematics/quantitative reasoning (usually 3 semester units) **OR** the Intersegmental General Education Transfer Curriculum (IGETC) requirements in English communication and mathematical concepts and quantitative reasoning.

Applicants who graduated from high school *prior to 1988*:

- You should contact the admission office to inquire about alternative admission programs.

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

Please consult with the Office of Admissions for further information about alternative ways to satisfy the subject requirements.

### **Making Up Missing College Preparatory Subject Requirements**

Undergraduate applicants who did not complete 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.

### **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 applying to an impacted program and 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 I)**

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

### **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 Office of Admissions determines the residence status of all new and returning students for nonresident tuition purposes. Responses to the Application for Admission, Residency Questionnaire, and Reclassification Request Form, 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 Office of Admissions.

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 Office of Admissions 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 or adults, 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. This exception continues until the military personnel has resided in the state the minimum time necessary to become a resident.
6. Military personnel in active service in California for more than one year immediately prior to being discharged from the military. Eligibility for this exception runs from the date the student is discharged from the military until the student has resided in state the minimum time necessary to become a resident.
7. 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.

8. 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.
9. Certain credentialed, full-time employees of California school districts.
10. 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.
11. Certain exchange students.
12. 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 Office of Admissions. 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  
& Financial Aid*

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# FEES AND EXPENSES

## 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.

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.

## 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.

## 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.

Cal Poly registration fees **must** be paid prior to registration. To ensure that students can register at their scheduled time, payment must be received at least three working days before the scheduled registration time. Students receiving financial aid will have their registration fees deferred. If the amount awarded is insufficient to pay fees in full, students will be billed for the balance.

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

Fees and tuition are subject to change upon approval by the CSU Chancellor or Board of Trustees. Please consult the current *Class Schedule*, "Fee Payment Instructions," for the fees that are applicable to the quarter for which you are registering.

| Registration Fees per Quarter              | 0-6.0<br>units  | more than<br>6 units |
|--|-----------------|----------------------|
| State University fee .....                 | \$292.00        | \$502.00             |
| Campus Academic fee .....                  | 45.00           | 45.00                |
| Associated Students fee .....              | 26.00           | 26.00                |
| Facility fee .....                         | 2.00            | 2.00                 |
| Instructionally Related Activities fee     | 54.00           | 54.00                |
| Health Plan fee .....                      | 28.00           | 28.00                |
| University Union fee .....                 | 63.00           | 63.00                |
| Campus Services Card .....                 | 2.00            | 2.00                 |
| <b>Total registration fees per quarter</b> | <b>\$512.00</b> | <b>\$722.00</b>      |

## 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.  
 Academic year ..... \$2,579.00  
 Summer quarter..... 860.00

Meals (approximate cost)  
 19 meals per week, academic year ..... \$2,489.00  
 14 meals per week, academic year ..... 2,315.00

## Parking Fees

*Parking on campus is by paid permit (or meter) only. Parking permits are not honored in metered spaces. Campus parking and traffic regulations are enforced seven days per week throughout the year.*

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 ..... 80.00  
 Activity..... 95.00  
 Laboratory..... 120.00  
 Administrative (contract)..... 35.00  
 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

## 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*

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*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*, "Fee Payment Instructions." 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 Sections 42380 and 42381 of Title 5, *California Code of Regulations*). 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 Card 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, tickets for sports events from the Athletics Department, health services from the University Health Center, Bookstore purchases and for Extended University Programs fees. No other use of credit cards is presently 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 (*California 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  
<http://www.calpoly.edu/~finaid>

The university has a variety of grants, loans, 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 Handbook.

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. It is also available on the Web at [www.fafsa.ed.gov](http://www.fafsa.ed.gov). 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 average expenses per quarter for the 1998-99 academic year for the 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 1997-98 school year nonresident tuition was an extra \$164 per unit.

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 .....                    | 740            |
| Room and board with 14-meal ticket .....   | 1,785          |
| Books and supplies (estimated) * .....     | 216            |
| Personal expenses and transportation ..... | 762            |
| Estimated total per quarter .....          | <u>\$3,503</u> |

\* 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, *California Education Code* Section 68121. Students qualifying for these benefits are known as Alan Pattee scholars. For further information contact the Financial Aid Office, which determines eligibility.

## UNIVERSITY SCHOLARSHIPS

### General Information

Over 1100 scholarships are awarded each year by the Cal Poly Scholarship Committee and the various academic units within each college. Applications are received by the Financial Aid Office. Scholarship Committee members review each student's financial need, scholastic achievement, participation in school activities, community service, honors and organizational affiliations, and educational objectives. Some Cal Poly scholarships have additional requirements which relate to a particular concentration or field of study, geographic origin, class level, and project or design portfolios. Additional information may be obtained by writing to the Financial Aid Office for a copy of the Scholarship Brochure.

Generally, a student must have at least a 3.0 grade point average to be granted a scholarship. There are some scholarships, however, that are awarded to students with lower grade point averages if they meet donor specified criteria. Both undergraduate and graduate students are considered for scholarships.

*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 December 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, leadership abilities, interests 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**. The scholarship application is mailed to the Financial Aid Office by the same deadline.

### Scholarship Notifications

Scholarships are normally awarded during the spring and summer for the following academic year. During that time award notices are sent which include scholarship amount, disbursement and donor information. Recipients must



maintain full-time enrollment while receiving a scholarship (extended education, concurrent enrollment and other college units are excluded). Some scholarships require recipients to 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 quarterly increments. 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.

## 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 Association—Central California Chapter Scholarship  
 Cal Poly Alumni—Central Coast Chapter Scholarship  
 Cal Poly East Bay Alumni Chapter Scholarship  
 Cal Poly Parent Program Scholarships  
 California Rural Rehabilitation Scholarships  
 Felix Camacho-Betteravia Farms Scholarships  
 Josephine M. Chavez Memorial Scholarship  
 Herbert E. Collins Scholarships  
 Maurice E. Coulter Scholarship  
 CSU Graduate Equity Fellowships  
 CSU Scholarship Program for Future Scholars  
 Educational Equity Scholarships  
 Pat Elliot Memorial Award  
 Ford/EEOC Scholarships  
 Ralph V. Fullwiler Scholarships  
 Green and Gold Barbecue 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  
 Phi Kappa Phi Award  
 Rose Parade Float Award  
 Army—ROTC  
 L. Diane Ryan Scholarship  
 Helen V. Sandercock Scholarships  
 William and Adelaide Sandercock Scholarships  
 Sigma Nu Fraternity Scholarship  
 Moon Ja Minn and Paul T. Suhr Dance and Music Award  
 Sheila and Yosef Tiber Scholarships  
 Tomczak—Carter Dance Award  
 William B. Turner Scholarships  
 J. W. Van Dyke Memorial Scholarships  
 George Watte Memorial Scholarship  
 Ralph R. Wilmar Rodeo Queen Scholarship  
 Mildred and Charles Wolverton Scholarships  
 Ed J. Zuchelli Memorial Scholarship

## Agriculture

Catherine C. Adams Scholarships  
 Matt Ahlem Memorial Scholarship  
 Barling Memorial Scholarship  
 Georgia M. and Claude S. Barnett Memorial Scholarship  
 Bartlett Tree Foundation Scholarship  
 Paul L. Belveal Memorial Scholarships  
 Danny Bettencourt Memorial Scholarships  
 Harold G. Bradshaw Scholarship  
 Herbert Hopkins Burlingham and Ruth Hembree Burlingham Scholarship  
 Neal Burse Memorial Scholarship  
 California Agri-Fair Scholarships  
 California Association of Nurserymen—Peninsula Chapter Scholarship  
 California Creamery Operators Association Scholarships  
 California Dairy Industries Association Scholarships  
 California League of Food Processors Scholarships  
 California State Grange Scholarships  
 Angela Francessa and Carlo Romano Cattaneo Scholarship  
 William, Joseph and Charles Cattaneo Scholarship  
 Carl A. Cilker Scholarship  
 William H. Cilker Scholarship  
 Concord Farm Bureau Scholarship  
 Sandra Crabtree Memorial Scholarship  
 Rosario Curletti Scholarships  
 Gordon T. Davis Memorial Scholarship  
 Dr. Arnold Dean Scholarships  
 General Dillingham Produce Industry Scholarships  
 Eberle Winery Scholarship  
 Environmental Industries, Inc. Academic Award  
 Environmental Industries, Inc. Scholarship  
 Paul Etchechury Memorial Scholarship  
 Gerald H. Fairbairn Scholarship  
 Foodsters Internship  
 Max and Verda Foster Memorial Scholarship  
 Woody Frey Scholarship  
 J. Cordner Gibson Memorial Award  
 Tyler Hammond III Memorial Award  
 Ray Hansen Memorial Scholarship  
 William Randolph Hearst Foundation Scholarships  
 H. J. Heinz Endowed Scholarship  
 William (Ben) and Helen Holman Alumni Scholarship  
 Harold G. Hull Graduate Assistantships  
 Richard F. Johnson Scholarship  
 Richard D. Kaprielian Memorial Scholarship  
 Ted and Dottie Kasinak Scholarship  
 KCBX Central Coast Wine Classic Scholarship  
 Kings River Prune and Apricot Scholarships  
 Knight Brothers Scholarships  
 Doris Krull Dairy Science Scholarships  
 Lambert Scholarship  
 E. C. Loomis and Son Scholarship  
 Los Angeles County Fair Association Scholarship  
 Chester O. and Avis J. McCorkle, Sr. Memorial Scholarship  
 Neil and Dorothy McPherson Memorial Scholarship  
 Lou Merrill Scholarship  
 James F. Merson Memorial Scholarship  
 Lionel Middlecamp Memorial Scholarship  
 NAMA/West Scholarship  
 Natural Resource Management Scholarships  
 Netafim USA Precision Irrigation Scholarship

Don Nikkel Memorial Scholarship  
 Orange County Wine Society Scholarships  
 M.E. "Pappy" Painter Memorial Scholarship  
 Harry Parker Award  
 Thomas M. Parks Scholarship  
 Charles and Helen Penwell Scholarships  
 Roger B. Peters Award  
 Pi Alpha Xi-Howard C. Brown Scholarship  
 Norman Pillsbury and Timothy Plumb Oak Woodland  
 Scholarship  
 Ranchers Cotton Oil/Earl J. Cecil Scholarship  
 Dante Righetti Scholarship  
 Rodeo Club Scholarships  
 Mimi Russell Memorial Scholarship  
 Burton Douglas Salisbury Memorial  
 Jean Eddy Sander Rodeo Queen Award  
 Fred and Marian Sandercock Scholarships  
 San Luis Obispo Lions Club/ Food Industries Scholarship  
 San Marcos Grange Student Teacher Grant  
 San Marcos Grange Women's Activities Scholarship  
 Vard M. and Mildred P. Shepard Memorial Scholarship  
 Louis H. and Stella S. Soares Achievement Award  
 Sharon Spaulding Memorial Scholarship  
 Herman M. Sperber Memorial Scholarship  
 SunWest Foods Scholarships  
 Joe Terra Scholarship  
 Harmon M. Toone Scholarship  
 Eric C. Twist Memorial Scholarship  
 War Veterans Scholarship  
 Walter T. Wells Horticulture Scholarship  
 Richard A. (Alex) Wilson, Jr. Memorial Scholarship  
 Leopold Edward Wrasse Scholarships  
 Zeneca Ag Products Scholarship

### Architecture and Environmental Design

Stephen O. Anderson Memorial Scholarship  
 Austin Design Group Scholarship  
 Beavers Heavy Construction Scholarship  
 Bechtel Corporation Scholarships  
 Alfred B. and Joy G. Berghell Scholarship  
 Douglas W. Butzbach Memorial Scholarship  
 Don Chapin Company Scholarship  
 City and Regional Planning Scholarships  
 Errett Family Scholarship  
 Richard Lee Fisher Memorial Scholarship  
 Thor Gulbrand, AIA Memorial Scholarship  
 Matthew D. Hubal Award  
 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  
 Douglas James Martin Scholarship  
 Michael McDougall Urban Design Award  
 Dr. Glenn G. McRae Internships  
 Robert Hifumi Odo Memorial Scholarship  
 Oltmans Construction Company Scholarship  
 Professional Architects Scholarship  
 Robert Bein, William Frost & Associates—Sean Rogers  
 Memorial Scholarship  
 Frederick Peter Young Scholarship

### Business

American Public Works Association Scholarship  
 Andersen Consulting Accounting Scholarship  
 Andersen Consulting Outstanding Junior Management Award  
 Stephen O. Anderson Memorial Scholarship  
 David Nathan Blanco Scholarship  
 Mickie Burris Award  
 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  
 Kendall Kay Losee Scholarship  
 John S. Maher Scholarships  
 Bert W. Martin Scholarship  
 Merrill Lynch FMA Student Award  
 Phoenix Marketing Scholarships  
 Price Waterhouse Scholarship  
 Larry Ratner Scholarship  
 Owen Servatius Scholarship  
 Nelson Smith Industrial Technology Scholarship  
 Touche Ross Scholarship  
 Leopold E. Wrasse Scholarship

### Engineering

Adele and Aldo Alessio Scholarships  
 American Institute of Aeronautics and Astronautics,  
 Vandenberg Section Scholarship  
 American Public Works Association Scholarship  
 Andersen Consulting Outstanding Junior Awards in  
 Aeronautical Engineering  
 Computer Science  
 Mechanical Engineering  
 Andersen Consulting Outstanding Junior in Industrial  
 Engineering Scholarship  
 Bechtel Corporation Scholarships  
 Thomas A. Benton and John P. Benton Memorial Scholarship  
 Charles H. Black Scholarship  
 Boeing Company Senior Project Scholarships  
 Grant M. Brown Memorial Foundation Scholarship  
 Richard F. Burris  
 Don Chapin Company Scholarship  
 Chevron USA Inc. Scholarships  
 Computer Science Scholarship  
 Computer Engineering Scholarship  
 Allan R. Davis Scholarship  
 George S. Demcak Facilities Engineering Excellence Award  
 Electrical Engineering Graduate Fellowship  
 Environmental Research Foundation Award  
 Bill Evans Scholarship  
 Millard J. Fotter Scholarship  
 William Squires Fowler Scholarship  
 Harold R. Frank—Applied Magnetics Corporation Scholarships  
 Corder Gibson and Ace Smith Scholarship  
 Karl Arne Gulbrand Memorial Scholarship  
 Glenn A. Hubbard Memorial Scholarship—Experimental  
 Aircraft Association

Kimley-Horn Scholarship  
 Charles E. and Pearl P. Knott Memorial Scholarships  
 John Stephen Larson Memorial Scholarship  
 Litton Industries Scholarships  
 Lockheed Martin Skunk Works Scholarship  
 William H. McKeen Memorial Award  
 Mechanical Engineering Scholarship  
 Dragoslav M. Mistic Scholarship  
 H. Andrew Morse Memorial Scholarship  
 George and Tonny Murray Scholarship  
 Northrop Grumman Scholarships  
 Pacesetter Scholarships  
 Pacific Telesis Scholarships  
 Frank E. Pilling, Sr. Scholarship  
 Roy N. Poage Memorial Scholarships  
 Raychem Scholarships  
 Raytheon Company Scholarships  
 Reinhold Aeronautical Engineering Award  
 Doral Sandlin Aircraft Design Award  
 Snap-On Diagnostics 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 Environmental Education Scholarships  
 Dutch and Gladys Van Harreveld Scholarships  
 Varian Scholarships  
 Andrew Wacht Scholarship  
 Walter T. Wells Engineering Scholarship  
 Charles (Chuck) Peter White Scholarship  
 Ziatech Corporation Scholarship

### Liberal Arts

Cal Poly Band Scholarship  
 John Bayliss Broadcast Scholarships  
 Cellular One Scholarship  
 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 Scholarships  
 Elizabeth Hanlon Parks Memorial Scholarship  
 Robert S. Harmon Scholarship  
 Jim Hayes Journalism Scholarship  
 Greg and Jane Hind Scholarship  
 Mary Lou Hughes English Excellence Scholarship  
 Evelyn V. Johnson Scholarship in Speech  
 Janet Lee Memorial Award  
 Janet Lee Memorial Scholarship  
 Herb Kamm Journalism Scholarship  
 Kodak Professional Photography Scholarship  
 Darren E. Loyd Photography Scholarship  
 John H. Lynn Political Science Award  
 John S. Maher Scholarships  
 Lucian Morrison Memorial Scholarship  
 Music Department Memorial Award  
 Music Faculty Scholarship  
 Alice Parks Nelson Scholarship

Willard "Pete" Pederson Scholarship  
 Ronald V. Ratcliffe Award  
 Larry Ratner Scholarship  
 Beatrice A. Rice Scholarship  
 Astrid and Craig Russell Scholarship  
 J. Irving Snetsinger Memorial Award  
 Doc Stapleton Memorial Scholarship  
 Josephine Stearns Early Childhood Education Award  
 Clifton Elroy Swanson and Pauline Thompson Swanson Scholarship  
 Vard M. and Mildred P. Shepard Memorial Scholarship  
 Tag and Label Manufacturer's Institute Scholarship  
 Lloyd Tevis Award  
 Jeri Ewy Thiel Memorial Scholarship  
 Guy Thomas Memorial Award  
 Vocal Studies Scholarship  
 Carolyn and Larry Voss Music Scholarship  
 Ralph E. and Florence B. Welles Award  
 Ralph R. Wilmar Classical Piano Scholarship

### Science and Mathematics

Andersen Consulting—Outstanding Junior Math Award  
 Applegarth Biological Scholarships  
 Tri 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 Regional Medical Center Volunteers Auxiliary Scholarships  
 Mary E. Smith Memorial Marine Biology Award  
 Unocal Environmental Education Scholarships  
 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  
 Michael and Josephine Cappellotti Scholarship  
 Teacher Diversity Scholarship

## Athletics

Jon Robert Andrews Memorial Scholarship  
Mickie Burris Award  
Charles Daum Memorial Scholarship  
Berdy Harr Memorial Scholarship  
Musselman Wrestling Scholarship  
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 Educational Loans. Also available are emergency loans of small amounts 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 nine 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.

### 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. 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 Educational and Emergency Student Loans

**University Long-Term Educational 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 to assist with unanticipated 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 Educational and 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  
 Graham Nissen Agricultural 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. To apply, students mail the FAFSA to the processor.

### 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.

### Cal Poly Grant

This institutional-funded program has been implemented to provide grants to offset the increased campus Academic Fee. The Cal Poly Grant 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  
& Policies*

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# Academic Requirements and Policies

Academic Records Office and CAPTURE Information (805) 756-2531

Evaluations (805) 756-2396

Veterans Affairs (805) 756-5907

## Academic Placement

### Systemwide Tests Required of Most New Students

The CSU requires new students to be tested in English and mathematics as soon as possible after they are admitted and before enrollment. 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 exempt 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 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.
- 550 or above on the Verbal section of the College Board SAT I Reasoning Test taken **on or after April 1, 1995.** \*\*
- 470 or above on the Verbal section of the College Board SAT I Reasoning Test taken between **March 1994 and March 1995.** (If taken after March 1995, see footnote\*\*)
- 470 or above on the Verbal section of the College Board Scholastic Aptitude Test (SAT) taken prior to March 1994.
- 660 or above on the College Board SAT II Writing Test taken **on or after April 1, 1995.** \*\*
- 600 or above on the College Board SAT II Writing Test taken between **January 1994 and March 1995.** (If taken after March 1995, see footnote.) \*\*
- 600 or above on the College Board Achievement Test in English Composition with essay taken prior to January 1994. \*\*
- 25 or above on the enhanced ACT English Test taken October 1989 or later.
- 22 or above on the American College Test (ACT) English Usage Test taken prior to October 1989.
- A score on the CSU English Equivalency Examination that qualifies the student for "Pass for Credit" or "Exemption" prior to July 1993.

#### For transfer students,

completion and transfer to the CSU of a college course that satisfies the General Education requirement or the Intersegmental General Education Transfer Curriculum requirement in English composition, provided such a course was completed with a grade of C or better.

**CSU Trustee policy requires all non-exempt students to take the EPT examination after admission and before enrollment in the CSU. At Cal Poly, failure to take the EPT examination or show documented exemption before enrollment will result in a hold on registration privileges and may lead to disenrollment from the university.** In addition, students who do not demonstrate requisite competence are required to enroll in appropriate remedial or developmental programs during the first term of enrollment and each subsequent term until such time as they demonstrate competence. Students who do not make adequate progress in developing foundational skills within the first year of enrollment will face disqualification from the university.

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 requirement. 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 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).
- 560 or above on the mathematics section of the College Board SAT I Reasoning Test or on the College Board SAT II Mathematics Tests Level I, II, or IIC (Calculator) taken **on or after March 1, 1994.** \*\*
- 25 or above on the enhanced ACT Mathematics Test taken October 1989 and later.
- 560 or above on the College Board Mathematics Achievement Test Level I or Level II taken prior to March 1994. \*\*

\* 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.

\*\* The College Board SAT and Achievement Tests were replaced by SAT I and SAT II, respectively, beginning March 1994. Beginning April 1, 1995, the SAT I and SAT II exams are scored on a new scale; however, the SAT scores qualifying for exemption from the ELM remain the same.

- 560 or above on the mathematics section of the College Board SAT taken prior to March 1994.
- 24 or above on the American College Testing (ACT) Mathematics Test taken prior to October 1989.

**For transfer students,**

completion and transfer to the CSU of a college course that satisfies the General Education requirement or the Intersegmental General Education Transfer Curriculum requirement in Quantitative Reasoning, provided such a course was completed with a grade of C or better.

**CSU Trustee policy requires all non-exempt students to take the ELM examination after admission and before enrollment in the CSU. At Cal Poly, failure to take the ELM exam or show documented exemption before enrollment will result in a hold on registration privileges, and may lead to disenrollment from the university.** In addition, students who do not demonstrate requisite competence are required to enroll in appropriate remedial or developmental programs during the *first term* of enrollment and each subsequent term until such time as they demonstrate competence. Students who do not demonstrate proficiency within the first year of enrollment will face disqualification from the university.

At Cal Poly, students may not enroll in any college level mathematics or statistics course without taking the ELM examination or qualifying for an exemption from it. ELM examination results 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 may be required to retake the ELM examination before enrolling in such a course.

Information bulletins and registration material for the ELM exam will be mailed to all students subject to the requirement. The materials also may be obtained from the Test Office or the Mathematics Department Office.

## Cal Poly Mathematics Placement Examination (MAPE)

The Cal Poly Mathematics Placement Exams are a series of diagnostic exams given by the Mathematics Department to place students who have satisfied the ELM requirement in the appropriate math course. **The MAPE is not intended for all students, so please read the following information carefully.**

Students who need to take the math placement exam are expected to do so prior to enrollment. The MAPE is free and offered regularly throughout the year. For MAPE schedule information, contact the ELM/MAPE Office (756-2268) or the Math Department Office (756-2206).

**Precalculus MAPE**

Students who anticipate taking Finite Mathematics, Calculus, or Introduction to Modern Mathematics (MATH 124, 131, 141, 221, or 327) must pass the precalculus MAPE if they do not have one of the following exemptions:

- SAT (I, II or College Board Achievement) math score of 600 or above;
- Calculus Advanced Placement Exam score of 3 or above;
- ACT math score of 30 or above;

- Transferable college course equivalent to MATH 120 (Precalculus Algebra/Trig) with a grade of C or better;
- MATH 120 or equivalent completed at Cal Poly.

**Intermediate Algebra MAPE**

Students who anticipate taking Precalculus Algebra and Trigonometry (MATH 118, 119, or 120) must pass the intermediate algebra MAPE if they do not have one of the following exemptions:

*For Math 118 or 119:*

- SAT (I, II or College Board Achievement) math score of 560 or above;
- ACT math score of 25 or above;
- ELM exam score of 590 or above.

*For Math 120:*

- SAT (I, II or College Board Achievement) math score of 600 or above;
- ACT math score of 28 or above;
- ELM exam score of 610 or above.

NOTE: Students who have satisfied the ELM requirement and are planning to take MATH 112 or MATH 116 do *not* need to take the MAPE.

## 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 after 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. Copies of these agreements are available on the Cal Poly web pages through the Records Office, at the community colleges, and on the Cal Poly campus in the Reserve Room of the Library. 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.

### 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

### Other Academic Credit

#### Advanced Placement Credit—1997 Exams

Cal Poly grants credit toward its undergraduate degrees for successful completion of examinations of the Advanced Placement Program of the College Board. Students receive course and/or free elective credit based on scores received on various exams. These scores may appear on the high school transcript or on score sheets sent to us from ETS. The type of credit applied will, to some extent, depend on the student's major. All exams passed with a score of 3 result in nine (9) units of credit. If course credit is awarded, the unit value of the courses is subtracted from the nine units and any remaining units count as elective credit. Changes from the 1996 exam credit are marked with an asterisk (\*). All credit is given on a credit/no credit basis; no units are calculated into the GPA.

The exams taken in 1997 were awarded the following credit, upon transfer to Cal Poly.

To order AP scores, the student should write to AP Exams, P. O. Box 6671, Princeton, NJ 08541-6671 Phone (609) 771-7300 8 a.m. to 4 p.m. Eastern time.

| EXAM NAME  | CREDIT GIVEN  |
|--|---|
| <b>Art History</b>   | GE Area C.2 - 3 units of credit (ART 112) plus 6 units of elective credit   |
| <b>Art General</b>   | 9 units of elective credit  |
| <b>Art Studio</b>  | 9 units of elective credit  |
| <b>Biology</b><br>One of the following combinations, depending upon the requirements of the student's major: | BIO 151 for 5 units plus four units of free elective credit; <b>OR</b><br>ZOO 131 and an E.2 elective, plus 2 to 3 free elective units; <b>OR</b><br>BIO 220 credit for 4 units plus 5 free elective units; <b>OR</b><br>A B.1 Life Science for 3 units, an E.2 elective (BIO 220) for 3 units plus 3 free elective units; <b>OR</b><br>BIO 101 and 105, and an E.2 elective for 3 units, plus 2 free elective units. |
| <b>Calculus AB</b>   | Nine units of credit distributed according to the requirements of the student's major:<br>MATH 141 or 131 or 221 plus 5 free electives; <b>OR</b><br>MATH 118 or 120 AND 141 or 131 plus any remaining units in free electives, <b>OR</b><br>Up to 6 units of GE area B.2 Math credit plus 3 free elective units  |
| <b>Calculus BC</b>   | MATH 141 and 142 or 131 and 132, and one free elective unit, <b>OR</b><br>MATH 221 plus 5 free elective units; <b>OR</b><br>Up to 9 units of mathematics credit at a level lower than Math 141 (i.e., MATH 118, or 120 but not STAT); <b>OR</b><br>Up to 6 units of GE area B.2 Math credit plus 3 free elective units  |
| <b>Note:</b>   | If <b>both</b> Calculus AB and BC are taken (with a minimum score of 3): Credit is extended only for Calculus BC, since BC duplicates all of what is covered in AB)   |
| <b>Chemistry</b><br>score of 3   | CHEM 121 or 124 or 127 plus 5 units of free electives.  |
| <b>Chemistry</b><br>score of 4 or 5  | CHEM 121-122 or CHEM 124-125 or CHEM 127-128 (possible credit to be determined by the Chemistry Department)   |
| <b>Comparative Government and Politics</b>   | 9 units of free elective credit   |
| <b>Computer Science</b><br>Test A or AB  | F.1 Computer Science elective for 3 units plus 6 free electives <b>OR</b><br>CSC 118 for 4 units plus 5 free elective units.  |
| Test A and AB  | As above, plus 4.5 additional free elective units.  |

|  |   |
|--|---|
| <b>English: Language and Composition or Literature and Composition</b><br>score of 3 | Effective Fall 1986, score of 3 results in EPT exemption plus free elective credit <b>only</b> (9 units) for either Lit/Comp or Lang/Comp exams   |
| <b>English: Language and Composition</b><br>score of 4 or 5                          | ENGL 114 plus 5 free elective units   |
| <b>English: Literature &amp; Composition</b><br>score of 4 or 5                      | ENGL 114 plus 5 elective units in lower-division literature; for example, ENGL 251/252/253 (C.1 literature). Once AP credit is used for a specific course, students cannot take that same course (e.g., ENGL 251) for credit. The remaining 2 units may be applied to another lower division literature course. |
| <b>Note:</b>   | If student takes <b>both</b> Lit/Comp and Lang/Comp, only 4.5 units of credit are awarded for the second exam (the composition portion is duplicated in the second exam) for a total of 13.5 units  |
| <b>European History</b>  | HIST 102 and 103 plus 3 free elective units   |
| <b>French</b><br>score of 3:<br>score of 4 or 5:                                     | FR 201 plus 5 free elective units<br>FR 201 <b>and</b> 202 plus 1 free elective unit  |
| <b>German</b><br>score of 3:<br>score of 4 or 5:                                     | GER 201 plus 5 free elective units<br>GER 201 <b>and</b> 202 plus 1 free elective unit  |
| <b>Latin</b>   | 9 free elective units   |
| <b>Microeconomics</b>  | ECON 212 plus 6 free elective units   |
| <b>Macroeconomics</b>  | ECON 211 plus 6 free elective units   |
| <b>Music Theory</b>  | MU 101 <b>and</b> MU 104 plus 5 free elective units   |
| <b>Physics B</b><br>score of 3<br>* score of 4,5                                     | B.1 Physical Science elective (NO LAB CREDIT) for up to 4 units plus the remaining units in free electives.<br>PHYS 121-122-123   |
| <b>Physics C</b><br>(Mechanics)<br>score of 3<br>* score of 4,5                      | B.1 Physical Science elective (NO LAB CREDIT) for up to 4 units plus the remaining in free electives.<br>PHYS 131 plus any remaining units in free electives  |
| <b>Physics C</b><br>(Electricity & Magnetism)<br>score of 3<br>* score of 4,5        | B. 1 Physical Science elective (NO LAB CREDIT) for up to 4 units plus the remaining in free electives.<br>PHYS 133 plus any remaining units in free electives   |

|   |  |
|---|--|
| <b>Psychology</b><br>score of 3   | PSY 201 <b>or</b> PSY 202 plus 6 free elective units   |
| <b>*Psychology</b><br>score 4,5   | PSY 201 <b>or</b> PSY 202 <i>plus</i> 6 units of free electives <i>or</i> 6 units of advisor approved lower division concentration/ICS electives.  |
| <b>Spanish Language</b><br>score of 3:<br>score of 4,5:                                   | SPAN 201 plus 5 free elective units<br>SPAN 201 <b>and</b> 202 plus 1 free elective unit   |
| <b>Spanish Literature</b><br>score of 3:<br>score of 4:<br>score of 5                     | SPAN 201 plus 5 free elective units<br>SPAN 201 <b>and</b> 202 plus 1 free elective unit<br>SPAN 201 (1 unit), 202, <b>and</b> 233   |
| <b>*Statistics</b><br>Rev. 7-9-97<br>score of 3:<br>score of 4,5:                         | STAT 130 plus 6 free elective units<br>STAT 211 <b>or</b> STAT 217 <b>or</b> STAT 218 <b>or</b> STAT 251 plus any remaining units in free electives  |
| <b>United States Government and Politics</b> (Also listed as <i>American Government</i> ) | 9 units of elective credit. Student should complete POLS 211 for 1 unit (California government) to cover POLS 210 requirement. Once POLS 211 has been completed: 2 units for POLS 210 plus 7 free elective units |
| <b>U. S. History</b>  | HIST 201 plus 6 free elective units for History majors; <b>OR</b> HIST 204 plus 6 free elective units  |

### International Baccalaureate Exam Credit

Credit will be awarded in accordance with the following policy, after admission to Cal Poly:

In February 1990, the Academic Senate adopted a credit policy regarding the International Baccalaureate Program.

1. The International Baccalaureate Diploma shall be considered in lieu of a high school diploma for admission to the University.
2. Credit will be awarded for classes at the **Higher** level.
3. For each exam score of 5 or higher, a maximum of 8 units of **elective credit** shall be awarded.
4. Course-specific credit may be granted with the concurrence of the academic department.

All credit is given on a credit/no credit basis; no units are calculated into the GPA.

Specific credit has been recommended by the academic departments for the following exams:

## International Baccalaureate Exam Credit

| EXAM NAME   | CREDIT GIVEN   | Date Reviewed |
|---|--|---------------|
| <b>Chemistry</b>  | Chem 127-128 <b>or</b> Chem X111 plus 3 free elective units  | (5/97)        |
| <b>Computer Science</b>   | Csc 118 plus 4 free elective units   | (5/97)        |
| <b>Economics</b>  | Econ 211 plus 5 free elective units.   | (5/96)        |
| <b>English</b>  | Grade of 5: free elective units<br>Grade of 6 or 7: English 253 plus 5 free elective units   | (5/96)        |
| <b>History:<br/>(European)<br/>(American)</b>   | Hist 103 plus 5 free elective units<br>Hist 204 plus 5 free elective units   | (5/97)        |
| <b>Language<br/>A1 or A2:</b><br><b>French</b><br><b>German</b><br><b>Spanish</b><br><b>Language B:</b><br><b>French</b><br><b>German</b><br><b>Spanish</b> | French 305 plus 4 free elective units<br>German 305 plus 4 free elective units<br>Spanish 305 plus 4 free elective units<br><br>French 301 plus 4 free elective units<br>German 301 plus 4 free elective units<br>Spanish 301 plus 4 free elective units | (5/97)        |
| <b>Mathematics</b>  | Math 141 <b>or</b> Math 131 <b>or</b> Math 221 plus 4 free elective units.   | (5/96)        |
| <b>Physics</b>  | Physics 121-122-123  | (5/96)        |
| <b>Psychology</b>   | Psy 201 <b>or</b> 202 plus 5 units<br>Psychology prefix elective   | (5/96)        |

## 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 submitting evidence of satisfactory completion of basic 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 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 has ever been enrolled. 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.

## General Requirements – Bachelor's Degree

### CHOICE OF CATALOG

Cal Poly issues a new catalog every one or 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, or
- (4) as allowed by campus policy.

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 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 81).

#### 4. General Education (GE) Courses

Students must complete the GE requirements as indicated in the degree program and shown in the GE 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 **four** 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. Graduating students will receive a complimentary diploma. Additional diplomas may be ordered through El Corral Bookstore. The diploma will not be ordered until all degree requirements have been completed. The diploma will be mailed approximately four to six weeks 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 GE 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. Students, who subsequently enter a graduate program at Cal Poly, may petition to receive graduate credit for up to 9 units of such coursework, provided the courses were not used toward the baccalaureate degree. Students should verify the applicability of such credit toward their graduate objective.

### Academic 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

### 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.

## ACADEMIC 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. A major and a minor may not be taken in the same degree program.

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                             |
| Agricultural Communication.....                        | Agriculture & Liberal Arts               |
| Anthropology/Geography.....                            | Social Sciences                          |
| Art.....   | Art & Design                             |
| Biotechnology.....                                     | Science & Mathematics                    |
| Business.....  | Business                                 |
| Computer Science.....                                  | Computer Science                         |
| Construction Management.....                           | Construction Management                  |
| Crop Science.....                                      | Crop Science                             |
| Dance.....   | Theatre & Dance                          |
| Economics.....   | Economics                                |
| English.....   | English                                  |
| Ethnic Studies.....                                    | Ethnic Studies                           |
| Food Science.....                                      | Food Science & Nutrition                 |
| French.....  | Modern Languages & Literatures           |
| Fruit Science.....                                     | Crop Science                             |
| Geographic Information Systems for<br>Agriculture..... | Bioresource and Agricultural Engineering |
| German.....  | Modern Languages & Literatures           |
| Gerontology.....                                       | Psychology & 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 & Nutrition                 |
| Packaging.....   | Industrial Technology                    |
| Philosophy.....  | Philosophy                               |
| Plant Protection.....                                  | Crop Science                             |
| Poultry Management.....                                | Animal Science                           |
| Psychology.....  | Psychology & Human Development           |
| Public Administration.....                             | Political Science                        |
| Sociology.....   | Social Sciences                          |
| Spanish.....   | Modern Languages & Literatures           |
| Speech Communication.....                              | Speech Communication                     |
| Statistics.....  | Statistics                               |
| Theatre.....   | Theatre & Dance                          |
| Values, Technology and Society.....                    | Liberal Arts                             |
| Water Science.....                                     | Agriculture                              |
| Women's Studies.....                                   | Liberal Arts                             |

## General Education Requirements

**General Education (GE)** requirements in the CSU are so designed that, taken with the major program and elective units presented by the candidate for the bachelor's degree, they will assure that graduates from the several campuses in the CSU 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.
- ✓ **At least 12 units of GE shall be earned at the campus granting the degree.**
- ✓ **At least 3 General Education 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 requirements may also simultaneously satisfy requirements in any other portion of the student's curriculum.*

Courses from the student's Major department may not be used to fulfill Area C3 or Area D4b.

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.

Students should consult academic advisers and curriculum displays for specific courses which may be required in their degree program.

| <b>GENERAL EDUCATION (GE)</b> (minimum 72 units)  |  |
|---|--|
| A minimum of 72 units is required for GE. Some programs indicate specific GE courses to fulfill Major and/or Support requirements.  |  |
| ✓ <b>Minimum of 3 GE courses required at 300-400 level</b>  |  |
| <b>AREA A Communication</b> (minimum 11 units)  |  |
| Take one course from A, A2, A3:<br>A1 Expository Writing<br>A2 Critical Thinking<br>A3 Speech<br>If less than 11 units, take one additional course in:<br>A4 Argumentative Writing  |  |
| <b>AREA B Science and Mathematics</b> (minimum 15 units)  |  |
| Take one course from B1a and one from B1b; one with lab:<br>B1a Physical Science<br>B1b Life Science<br>Take two courses from B2 Mathematics and/or Statistics:<br>B2 Mathematics and/or Statistics<br>If less than 15 units, take one additional course from B1 or B2.   |  |
| <b>AREA C Arts and Humanities</b> (minimum 15 units)  |  |
| Take one course from each Area C category:<br>C1 Literature<br>C1 Philosophy<br>C2 Fine/Performing Arts<br>C3 Lit/Phil/Arts (300-400 level)<br>If less than 15 units, take one additional course from C1, C2, C3  |  |
| <b>AREA D Social, Political, Economic Inst.</b> (minimum 15 units)  |  |
| No more than one course in any Area D category.<br>Take one course from D1a and one from D1b:<br>D1a HIST 202 or HIST 204 or LS 211<br>D1b POLS 110 or LS 212<br>Take three courses from: D2, D3, D4a, D4b:<br>D2 History (300-400 level)<br>D3 Economic institutions<br>D4a Social institutions elective<br>D4b Social institutions elective (300-400 level) |  |
| <b>AREA E Life Understanding</b> (minimum 3 units)  |  |
| No more than one course in any Area E category.<br>Take one course from E1 or E2:<br>E1 Psychology<br>E2 Life understanding elective  |  |
| <b>AREA F Technology</b> (minimum 2 units)  |  |
| <b>Non-technical programs.</b> For students in the Colleges of Business, Liberal Arts, and Science and Mathematics,<br>Take one course from F1 or F2:<br>F1 Computer literacy<br>F2 Technology elective   |  |
| <b>Technical programs.</b> For students in the Colleges of Agriculture, Architecture and Environmental Design, and Engineering, and the BS Industrial Technology program,<br>Take one course from F1:<br>F1 Computer literacy   |  |
| <b>Additional GE Courses</b>  |  |
| To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per Area.   |  |

**AREA A Communication** (minimum 11 units)

Coursework 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 A1 Expository Writing before taking A2 Critical Thinking. A1 Expository Writing and A2 Critical Thinking must be completed before taking A3 Speech.

Take one course from A1, A2, A3:

**A1 Expository Writing**

ENGL 114 Writing: Exposition (4)

**A2 Critical Thinking**

ENGL 125 Critical Thinking (3)

PHIL 125 Critical Thinking (3)

SPC 125 Critical Thinking (3)

**A3 Speech**

SPC 201 Public Speaking (3)

SPC 202 Principles of Speech Communication (3)

If less than 11 units, take one additional course in:

**A4 Argumentative Writing**

ENGL 215 Writing: Argumentation (4)

ENGL 218 Professional Writing: Argumentation and Reports (4)

**AREA B Science and Mathematics** (minimum 15 units)

Coursework 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.

Take one course from B1a and one from B1b; one with a lab:

**B1a Physical Sciences**

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 137, 200, 202, 206, 256

PSC any lower division course (PSC 101 has a lab).

Any 300-level ASTR, CHEM, GEOL, PHYS or PSC course having one of the above as a prerequisite may also be selected, except CHEM 350, PHYS 357, 363.

**B1b Life Sciences**

BACT any lower division course

BIO any lower division course except 100, 207, 253.

BOT any lower division course except 238

ZOO any lower division course

Any 300-level BACT, BIO, BOT or ZOO course having one of the above as a prerequisite may also be selected, except BIO 300, 306, 322, 323, 324, 327, 342; ZOO 320, 335, 340.

Take two courses from B2:

**B2 Mathematics and/or Statistics**

MATH 112 The Nature of Modern Mathematics (3)

MATH 117 Pre-Calculus Algebra II (3)

(MATH 116 is a prerequisite for MATH 117; MATH 116 & 117 are equivalent to MATH 118, but are taught at a slower pace for those who need more review.)

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 course having one of the above as a prerequisite may also be selected except MATH 300, 327, 329, 333, 350.

STAT 130 Introduction to Statistical Reasoning (3)

STAT 211 Elementary Probability and Statistics (3)

STAT 212 Statistical Methods (3)

STAT 221 Introduction to Probability and Statistics (5)

STAT 217 Applied Statistics for the Liberal Arts (4)

STAT 218 Applied Statistics for the Life Sciences (4)

STAT 251 Statistical Inference for Management I (4)

STAT 321 Probability and Statistics for Engineers and Scientists (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.

**Area B** if less than 15 units, take additional course from B1/B2

**AREA C Arts and Humanities** (minimum 15 units)

Coursework among literature, philosophy, fine and performing arts and humanities.

Take one course from each Area C category:

**C1 Literature**

To increase students' experience in expository writing, English courses have a composition component of 2500 words.

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)

LS 211 The American Enterprise: Birth of a Nation to the 1876 Centennial (5) (2 units C1 & 3 units D1a)

LS 212 The American Enterprise: The 1876 Centennial to the 21<sup>st</sup> Century (5) (2 units C1 & 3 units D1b)

SPAN 233 Critical Reading in Hispanic Literature (4)



**C1 Philosophy** (take one course)

- PHIL 230 Philosophical Classics (3)  
PHIL 231 Philosophical Classics (3)

**C2 Fine and Performing Arts** (take one course)

- 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 (4)  
MU 120 Music Appreciation (4)  
MU 221 Jazz Styles (4)  
TH 210 Introduction to Theatre (3)

**C3 Literature, Philosophy, Arts (300-400 level)**

(take one course)

Courses offered by the student's major department cannot be counted in Area C3.

- 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)  
ART 317 Asian Art Survey (4)  
ART 318 Art History - Asian Art Topics: National, Religious and Intellectual Movements (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 (4)  
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) *USCP*  
ENGL 346 Ethnic American Literature (4) *USCP*  
ENGL 350 Modern Novel (3)  
ENGL 351 Modern Poetry (3)  
ENGL 352 Modern Drama (3)  
ENGL 353 Drama in London (4)  
ENGL 370 World Cinema (4)  
ENGL 372 Film Directors (4)  
ENGL 380 Contemporary Literary Ideas (4)  
ES 300 Chicano/a Literature (4) *USCP*  
ES 321 American Cultural Images: American Indians (3) *USCP*  
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)  
HUM 403 Ethical Issues in Cyberspace (3)  
HUM 410 Values, Media, Culture (3)  
MU 324 Music and Society (4)  
MU 328 Women in Music (4)  
MU 329 Music of the 60s: War and Peace (4) *USCP*  
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 320 Asian 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) *(USCP)\**  
PHIL 336 Ethics, Gender and Society (3) *(USCP)\**  
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)  
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) *USCP*  
SPAN 405 Hispanic Literature in English Translation (4)  
SPC 330 Classical Rhetorical Theory (4)  
TH 310 Women's Theatre (3)  
TH 320 Black Theatre (3) *USCP*  
TH 327 Theatre History and Literature (3)  
TH 328 Theatre History and Literature (3)

**Area C** If less than 15 units, take additional course from C1/2/3.

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|--|
| <b>AREA D Social, Political, Economic Institutions</b><br>(minimum 15 units) |
|--|

Coursework dealing with human social, political, and economic institutions and behavior and their historical background. Courses in Area D1 fulfill American Institutions requirement, *Title 5, Section 40404*.

No more than one course in any Area D category.

Take one course from D1a:

**D1a**

- HIST 202 American Cultures: Consensus and Conflict from the Early Republic to the Present (4) *USCP*  
HIST 204 The History of American Ideals and Institutions (3)  
LS 211 The American Enterprise: Birth of a Nation to the 1876 Centennial (5) (3 units D1 & 2 units C1)

Take one course from D1b:

**D1b**

- POLS 110 American and California Government (3)  
 LS 212 The American Enterprise: The 1876 Centennial  
 to the 21<sup>st</sup> Century (5) (3 units D1 & 2 units C1)

Take three courses from: D2, D3, D4a, D4b:

**D2 World History (300-400 level)**

- HIST 315 Modern World History (3)

**D3 Economic Institutions**

- ECON 201 Survey of Economics (3)  
 ECON 211 Principles of Economics (3)  
 ECON 222 Macroeconomics (4)

**D4a Social Institutions**

- ANT 201 Cultural Anthropology (3)  
 ES 110 Introduction to Ethnic Studies (3) *USCP*  
 ES 210 United States Cultural Heritage (3) *USCP*  
 ES 320 American Cultural Images (3) *USCP*  
 GEOG 150 Introduction to Cultural Geography (3)  
 SOC 105 Introduction to Sociology (3)

**D4b Social Institutions (300-400 level)**

*Courses offered by the student's major department cannot be counted in Area D4b.*

- ANT 360 Human Cultural Adaptation (3)  
 BUS 404 Governmental & Social Influences on Business  
 (4)  
 ECON 303 Economic Poverty, Discrimination and  
 Immigration (4) *USCP*  
 ECON 304 Comparative Economic Systems (3)  
 ECON 325 Underdevelopment and Economic Growth  
 (3)  
 ES 330 The Chinese American Experience (3) *USCP*  
 GEOG 308 Global Geography (3)  
 POLS 325 Contemporary Global Political Issues (3)  
 POLS 326 World Food Politics (3)  
 SOC 309 The World System and Its Problems (3)  
 SOC 315 Race and Ethnic Relations (3)  
 WS 411 Women in Cross-Cultural Perspective (3)

**AREA E Life Understanding (minimum 3 units)**

Coursework designed to study how to equip human beings for lifelong understanding and development of themselves as integrated physiological, social, and psychological entities.

No more than one course in any Area E category.

Take one course from E1 or E2:

**E1 Psychology**

- PSY 201 General Psychology (3)  
 PSY 202 General Psychology (3)

**E2 Life Understanding**

- BACT 221 General Bacteriology (4) (also B1b)  
 BIO 220 Physiology and Biological Adaptation (4) (also  
 B1b)  
 FSN 210 Nutrition (3)  
 FSN 250 Food & Nutrition: Customs & Culture (3) *USCP*  
 KINE 255 Personal Health: Multicultural Approach (4) *USCP*  
 PE 250 Health Education (2)  
 PSY 304 Physiological Psychology (3)  
 REC 100 Leisure Education & Lifestyle Management (2)

**AREA F Technology****(minimum 2 units)**

Area F is designed to acquaint students with an awareness of how technology influences and is influenced by today's world.

**Non-technical programs.** For students in the Colleges of Business, Liberal Arts, and Science and Mathematics, take one course from F1 or F2.

**Technical programs.** For students in the Colleges of Agriculture, Architecture and Environmental Design, and Engineering, and the BS Industrial Technology program, take one course from F1.

**Non-technical programs,** take one course from F1 or F2:

**Technical programs,** take one course from F1:

**F1 Computer Literacy**

- AG 250 Computer Application to Agriculture (3)  
 ARCH 250 Computer Applications (3)  
 CSC 101 Fundamentals of Computer Science I (4)  
 CSC 110 Computers and Computer Applications:  
 Windows (3)  
 CSC 111 Introduction to Computer Applications for the  
 Sciences (3)  
 CSC 113 Computers and Computer Applications:  
 Macintosh (3)  
 CSC 119 Principles of Business Data Processing (4)  
 CSC 231 Fortran for Engineering Students (2)  
 CSC 234 C and UNIX (3)  
 GRC 277 Computer Applications in Desktop Publishing  
 (3)  
 HUM 250 Computer Applications in the Liberal Arts (4)

**F2 Technology**

- AERO 210 History of Aviation (4)  
 AG 301 Agriculture and American Life (4)  
 BRAE 121 Agricultural Mechanics (2)  
 BRAE 340 Irrigation Water Management (4)  
 CE 221 Fundamentals of Transportation Engineering (3)  
 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 & Society (3)  
 FNR 201 Introduction to Forest Ecosystem Management  
 (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 (3)  
 IT 301 Current Technological Issues (3)  
 LA 201 Survey of Landscape Architecture (2)  
 LA 311 History of Landscape Architecture (4)  
 LA 321 Concepts in Environmental Decision Making (3)  
 ME 221 Solar Energy (3)  
 OH 230 Environmental Horticulture (4)  
 SS 121 Introductory Soils (4)  
 VGSC 230 Introduction to Vegetable Science (4)

## U.S. Cultural Pluralism Requirement

**United States 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, or Free Elective category.

The following courses fulfill the United States Cultural Pluralism requirement. Students should consult the current *Class Schedule* or their academic adviser for an up-to-date list.

\* = Courses satisfy General Education requirement

AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (4)  
 ANT 415 Native American Cultures (4)  
 ECON 303 Economic Poverty, Discrimination and Immigration (4) D4b\*  
 ENGL 345 Women Writers (4) C3\*  
 ENGL 346 Ethnic American Literature (4) C3\*  
 ES 110 Introduction to Ethnic Studies (3) D4a\*  
 ES 114 Racism in American Culture (4)  
 ES 210 U.S. Cultural Heritage (3) D4a\*  
 ES 300 Chicano/a Literature (4) C3\*  
 ES 320 American Cultural Images (3) D4a\*  
 ES 321 American Cultural Images: American Indians (3) C3\*  
 ES 325 African American Women's Experiences (3)  
 ES 330 The Chinese American Experience (3) D4b\*  
 ES 350 Asian American & African American Environments (3)  
 FSN 250 Food and Nutrition: Customs and Culture (3) E2  
 HIST 202 American Cultures: Consensus and Conflict from the Early Republic to the Present (4) GE D1  
 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 (4)  
 JOUR 290 Multicultural Journalism (4)  
 KINE 255 Personal Health: A Multicultural Approach (4) E2  
 MU 325 America's Music (4)  
 MU 329 Music of the 60s: War and Peace (4) C3\*  
 PHIL 335 Social Ethics (3) C3\*

PHIL 336 Ethics, Gender and Society (3) C3\*  
 POLS 310 Politics of Ethnicity and Gender (4)  
 POLS 323 Civil Rights in America (4)  
 SOC 316 American Ethnic Minorities (4)  
 SPAN 111, 112, 113 Elementary Hispanic Language and Culture (4) (4) (4)  
 SPAN 340 Chicano/a Authors (4) C3\*  
 SPC 316 Intercultural Communication (4)  
 TH 320 Black Theatre (3) C3\*  
 WS 301 Introduction to Women's Studies (4)  
 WS 435 American Women's History since 1870 (4)

## 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 with a written request and approval by campus officials.

#### Eligibility for All Leaves

1. 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.
2. 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.
3. 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.
4. 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.
5. A total of eight terms of leave (educational or medical) are available to each student while attending Cal Poly. No more than two leaves will be available to each student.

#### Educational Leaves:

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. 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.
3. The application for Educational Leave must be initiated and approved before the leave begins and will not be granted retroactively.
4. Application forms and information concerning Leaves of Absence may be obtained from the Office of Academic Records.

#### Medical Leaves:

1. 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 a medical doctor.
2. 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.
3. A written letter together with medical documentation is required. Information concerning Leaves of Absence may be obtained from the Office of Academic Records.

## 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.

## VISITORS WITHIN CALIFORNIA STATE UNIVERSITY (CSU)

Students enrolled at any CSU campus may transfer temporarily to another CSU campus in visitor status if they have completed 12 units with a minimum of C (2.0) grade point average at the home campus, are in good standing, and are eligible to register in continuing status. Visitors are approved for one term only, subject to space availability and registration priority policies at the host campus. Details and applications for the Visitors Program may be obtained at the Office of Academic Records, Adm. 222.

## CONCURRENT ENROLLMENT WITHIN CALIFORNIA STATE UNIVERSITY

Students enrolled in any CSU campus may enroll concurrently at another CSU campus if they have completed 12 units at the home campus with a C (2.0) grade point average and are in good standing. Concurrent enrollment is approved for a specific term, subject to space availability and registration priority policies at the host campus. Because of overlap in academic terms of campuses on semester and quarter calendars, concurrent enrollment is subject to combinations and conditions described in the Concurrent Enrollment Application Form available at the Office of Academic Records, Adm. 222.

## 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

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.

**Earned Hours** are all hours for which credit was earned (excludes grades of F, U and NC).

**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                                   | –                     |
| <b>Administrative Grading Symbols</b>          |                       |
| 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.

- a. 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.
- b. 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. NOTE: Some post-baccalaureate programs penalize students for a grade of CR.
- c. 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.
- d. Units earned in courses for which the grade was CR will count toward satisfaction of all degree requirements.
- e. Grades of CR or NC are not included in calculating grade point averages
- f. A student may elect a maximum of 16 units of Credit/No Credit grading. Up to 4 units of Credit/No Credit grading is allowed in major or support courses (subject to the approval of the student's major department) and up to 4 units of Credit/No Credit grading is allowed in General Education courses.
- g. Credit/No Credit grading will be removed for courses not meeting the above guidelines.
- h. 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.

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.

The instructor will designate terms of the contract and length of time allowed to complete work (will not exceed one year). 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 three 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 (graduate thesis converts to No Credit (NC)). 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. If the second grade is equal to or higher than the first, then 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. Each student is responsible for his or her enrollments and timely adds, drops and withdrawals following campus policy.

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.

### 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.

## 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 primarily concerned with providing "due process" for the students and faculty, particularly grade appeals based on the grievant's belief that the instructor has made a mistake, shown bad faith or incompetence, or been unfair.

Details and procedures relating to the operation of the Fairness Board may be obtained from the 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 "Code of Student Conduct, Rights and Responsibilities" 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 Conduct, 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 Campus Student Relations and 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 Campus Student Relations and 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.



**California State  
University 1997  
Student Research  
Competition Winner.**

Elizabeth Brunner,  
English graduate  
student, in the  
Shakespeare Press  
Museum.

*Photo by Brian Grandfield.*

Elizabeth Brunner, English graduate student, won first place honors for her research on Emily Dickinson titled "Dashing Genius: Emily Dickinson and the Punctuation of Cognition." The contest recognizes outstanding student accomplishments in scholarly research and creative activity throughout the 22 campuses of the CSU.

Her research argued that Emily Dickinson's "deliberate use of nonconventional dashes symbolizes typographically the analogical leaps of advanced cognition. In addition to the linguistic, rhetorical, and poetic functions of experimental punctuation, the dash indicates the mental processing of ideas as the poet confronts the overwhelming internal stimulation resulting from her intellectual gifts. The dash deliberately brackets internal conversations between the brain and the self while representing the complex branching of the thought process."

According to Ms. Brunner, at the same time Emily Dickinson used the dash to punctuate her verse, the scientific world was making strides in the area of brain research. Elizabeth theorizes that "Dickinson represents the synapse through punctuation, using the dash to connect unexpected ideas and condense the thought process."

## *Graduate Programs*

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# 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.

Agricultural Engineering Technology Specialization  
Dairy Products Technology Specialization  
Food Science and Nutrition Specialization  
General Agriculture Specialization  
International Agricultural Development  
Specialization

Architecture, M.S.

Biological Sciences, M.S.

Business Administration, M.B.A.  
Agribusiness Specialization

City and Regional Planning, M.C.R.P.

Civil and Environmental Engineering, M.S.

Computer Science, M.S.

Education, M.A.

Counseling and Guidance Specialization  
Curriculum and Instruction Specialization  
Educational Administration Specialization  
Reading Specialization  
Special Education Specialization

Electrical Engineering, M.S.

Engineering, M.S.

Biochemical Engineering Specialization  
Industrial Engineering Specialization  
Materials Engineering Specialization  
Mechanical Engineering Specialization  
Water Engineering Specialization

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 its 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's 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. Both paper and electronic versions of the application are available. The application form and official transcripts should be sent directly to the Admissions Office at Cal Poly. An on-line application can be filled out and submitted through the Cal Poly Web Site ([www.calpoly.edu/~rgp](http://www.calpoly.edu/~rgp)).

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 certified 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 applicants must submit the following documents to the Office of Admissions to establish their admission portfolio:

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

Master's and credential applicants 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.

**FILE COMPLETION DATES**

*Graduate program coordinators may select earlier file completion dates. Applicants should check with the department of interest for appropriate filing periods.*

| Quarter | Master's   | Credential |
|---------|--|------------|
| Summer  | April 1<br><i>No applications taken for Summer:<br/>MA Educ, Counseling &amp; Guidance</i> | April 1    |
| Fall    | July 1<br><i>Applications taken only for Fall:<br/>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 program coordinators for admission recommendations. The coordinators may request additional documentation to determine eligibility. The documentation may include letters of reference, GRE or GMAT scores, and/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 minimum 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 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 graduate courses for professional or personal growth, a candidate must be admitted as a postbaccalaureate unclassified student. By meeting the minimum requirements, the candidate is eligible for admission as a postbaccalaureate unclassified student. Some departments may restrict enrollment of unclassified students due to 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, and 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.

Under special circumstances graduate coordinators may recommend admission of applicants who do not meet eligibility requirements. The Dean of Research and Graduate Programs will act on these recommendations.

**Residency Status Determination**

The campus Admissions Office determines the residency 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. For detailed explanation please refer to Determination of Residence for Nonresident Tuition Purposes," page 58.

**INTERNATIONAL (FOREIGN) STUDENT ADMISSION REQUIREMENTS**

International master's and credential applicants must file an application for admission with the Office of Admissions. 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 without submitting another \$55 application fee.

**International Student File Completion Dates**

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

All master's and credential applicants must submit the following documents to establish their admission portfolio:

- Application form, Parts A and B
- \$55 application fee

- Certified transcripts from all schools attended, showing coursework. All official documents must be accompanied by a certified English translation from one of the following
  - 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
- Promissory note agreeing to purchase required health insurance
- International Educational Background form
- AACRAO credential analysis fee of \$75 in the form of a U.S. Postal Money Order or an International Money Order, made payable to "AACRAO" (American Association of Collegiate Registrars and Admissions Officers)
- TWE (Test of Written English) with a score of 4.5 or better
- All 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 for which they are applying, for scores to be received in time for full consideration in the selection process.

\*\*Both the TWE and TOEFL will be waived for the following countries:

|           |          |              |                   |
|-----------|----------|--------------|-------------------|
| Antigua   | Gambia   | Liberia      | Solomon Islands   |
| Australia | Grenada  | Malawi       | South Africa      |
| Bahamas   | Guyana   | Mauritius    | Swaziland         |
| Barbados  | India    | New Zealand  | Trinidad & Tobago |
| Barbuda   | Ireland  | Nigeria      | Uganda            |
| Belize    | Jamaica  | Pakistan     | United Kingdom    |
| Cameroon  | Kiribati | St. Lucia    | Zambia            |
| Canada    | Lesotho  | Sierra Leone | Zimbabwe          |

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 applicant's file.

The Office of Admissions will notify all applicants of the documents needed to complete their portfolios. Graduate coordinators may require additional documentation to assist them in determining an applicant's eligibility.

International applicants 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 83 for more information.

## ACADEMIC REQUIREMENTS AND RESPONSIBILITIES

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

- 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 courses in the formal program of study for the degree. 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 courses in the formal program of study for the degree.

A student who has been admitted as postbaccalaureate-classified in order to pursue a 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 the credential program.

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 college 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 that 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 judgment about the student's potential to complete the program.

### Advisement

Soon after enrollment, students should contact the department for the assignment of an adviser in their area of 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 toward a degree. College or departmental graduate study committees certify 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 advising.

### **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 one of the possible culminating experiences 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 should provide evidence of these abilities and achievement. 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 73.

### **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 college on the specific coursework to be completed in order to fulfill the requirements for 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 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 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 residency requirement. However, summer session courses, and up to 12 units taken through concurrent enrollment, can be counted as courses in residence. 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 residency 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 approved in the submission of a formal study plan. Concurrent enrollment courses are counted for "in 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 "in-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 conferring of the master's degree requires a GPA of 3.0 or more in the courses taken in the formal study plan. Repeating a failed course does not remove a lower letter grade from the overall GPA calculation.

### Graduate Courses Taken by Undergraduates for Graduate Credit

Cal Poly undergraduates who have achieved senior standing may take courses in the 400 or 500 series for graduate credit while still undergraduates. If they subsequently enter a Cal Poly master's or credential program, they may petition to have up to 12 units of such course credit applied toward their master's degree or credential program, if the units were not used 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 college dean be designated as "Graduating with Distinction."

For information on diploma regulations, see page 75.

### 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.

The Graduation Writing Requirement may be waived, at the discretion of campus authorities, in the following circumstances:

1. The requirement was satisfied by the student as an undergraduate on one of the CSU campuses and no more than seven (7) years has elapsed before entering the graduate program at Cal Poly. **Documentation to support this waiver option must include date of satisfaction.**
2. An equivalent upper-division, graduation writing requirement was satisfied at another 4-year college or university. **Official, dated documentation must be provided (i.e., transcripts, catalog description, etc.).** Again, no more than seven (7) years may elapse between meeting the requirement and beginning graduate study.
3. The student has earned an advanced degree at least equivalent to the Master's. **Supporting documentation must be presented.**

Graduate students who wish to waive the GWR should present documentation to the Writing Skills Office (Bldg. 10, Rm. 130, 756-2067) in their first quarter of residence.

### Leaves of Absence

See undergraduate section, page 82.

### 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.

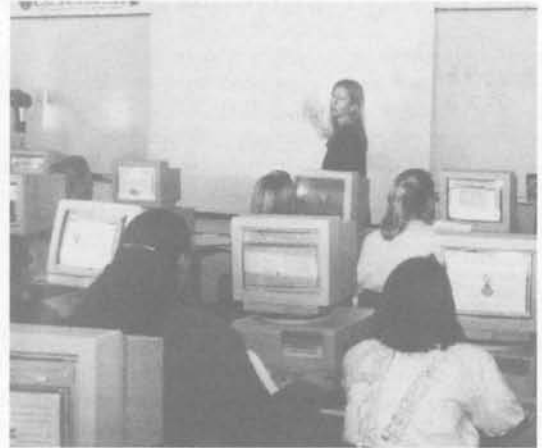
A copy of the thesis or project report must be received and reviewed by the Thesis Editor in the Graduate Programs Office. Upon completion of any required corrections, a copy ready for binding is filed with the Graduate Programs Office for submission to the University Library. These steps must be completed before the degree will be awarded.

### Time Limit for Degree

The time allowed to complete coursework in the formal study plan, including thesis and project courses, 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.



Enterprise students work to harvest their crop.



Lynn Hamilton, Assistant Professor, Agribusiness, and students utilizing hands-on computer instruction in the classroom.



The Poultry Unit opened its doors in 1995.

Our mission is to provide the highest quality agricultural education through Cal Poly's "learn by doing" philosophy. From state-of-the art production facilities and classrooms, to hands-on laboratories in the field, theoretical and practical information is applied every day.

*Photos courtesy of the College of Agriculture Advancement Office.*

College of  
*Agriculture*

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# College of Agriculture

Agricultural Sciences Bldg. (11), Room 211  
(805) 756-2161

**Joseph Jen, Dean**  
**Mark D. Shelton, Associate Dean**  
**David J. Wehner, Associate Dean**  
**Joseph E. Sabol, Director of Outreach Services**

| Department/<br>Location:                    | Program:  |
|---|---|
| College                                     | Agriculture: MS<br>Agricultural Communication:<br>Minor<br>Water Science: Minor   |
| Agribusiness                                | Agricultural Business: BS, Minor  |
| Agricultural Education<br>and Communication | Agricultural Science: BS  |
| Bioresource and<br>Agricultural Engineering | Bioresource and Agricultural<br>Engineering: BS<br>Agricultural Systems<br>Management: BS<br>Geographic Information Systems<br>for Agriculture: Minor |
| Animal Science                              | Animal Science: BS<br>Poultry Management: Minor   |
| Crop Science                                | Crop Science: BS, Minor<br>Fruit Science: BS, Minor<br>Plant Protection Science: BS,<br>Minor   |
| Dairy Science                               | Dairy Science: BS   |
| Environmental<br>Horticultural Science      | Environmental Horticultural<br>Science: BS  |
| Food Science and<br>Nutrition               | Food Science: BS, Minor<br>Nutritional Science: BS, Minor   |
| Natural Resources<br>Management             | Forestry and Natural Resources:<br>BS<br>Recreation Administration: 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 Agriculture. In partnership with the Brock Center for Agricultural Communication, the department also offers an agricultural communication 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 Environmental Horticultural Science 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.

**AGRICULTURAL COMMUNICATION MINOR**

**Brock Center for Agricultural Communication  
Agriculture Bldg. (10), Room 235  
(805) 756-6138**

The Agricultural Communication minor prepares students to become effective communicators about agriculture in the media. This interdisciplinary minor will enhance the students' ability to seek careers in dynamic professions associated with the agricultural industry, including print journalism, broadcast journalism, and public relations.

A key feature of this minor is an interdisciplinary approach. It is a cooperative effort between the College of Agriculture and the College of Liberal Arts and advised by faculty members assigned to the Brock Center for Agricultural Communication.

**Students have the opportunity to participate in the Cal Poly chapter of the national Agricultural Communicators of Tomorrow Association.**

|  | <i>Units</i> |
|--|--------------|
| <b>Required Courses (15)</b>   |              |
| JOUR 203 News Writing and Reporting .....  | 4            |
| JOUR 205 Agricultural Communications.....  | 4            |
| SPC 301 Business and Professional Communication ..   | 4            |
| AGED 404 Agricultural Leadership.....  | 3            |
| <b>Elective Area .....</b>   | <b>15</b>    |
| <i>College of Agriculture Majors:</i>  |              |
| Courses to be selected from adviser approved list.<br>A minimum of 10 units must be at 300-400 level;<br>two courses must be selected from JOUR, SPC,<br>ENGL. |              |
| <i>Journalism, Speech Communications, and other Non-<br/>agriculture Majors:</i>   |              |
| Courses to be selected from adviser approved list.<br>A minimum of 10 units must be at 300-400 level   |              |
|  | <hr/> 30     |

**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.

|  | <i>Units</i> |
|--|--------------|
| <b>Basic Core.....</b>   | <b>11</b>    |
| BRAE 340 Irrigation Water Management (4)                       |              |
| SS 121 Introductory Soil Science (4)                           |              |
| FNR 408 Water Resource Law and Policy (3)                      |              |
| <b>Select one emphasis area .....</b>                          | <b>13-16</b> |
| <i>Irrigation Emphasis (13)</i>                                |              |
| BRAE 237 Engineering Surveying (2)                             |              |
| A minimum of 11 units chosen from the following:               |              |
| BRAE 331 Irrigation Theory (3)                                 |              |
| BRAE 405 Chemigation (1)                                       |              |
| BRAE 435 Drainage (3)  |              |
| BRAE 440 Agricultural Irrigation Systems (4)                   |              |
| BRAE 492 Pumps and Pump Drivers (3)                            |              |
| <i>Watershed Management Emphasis (16)</i>                      |              |
| FNR 306 Natural Resource Ecology and Habitat<br>Management (4) |              |
| FNR 419 Watershed Management (4)                               |              |
| FNR 420 Advanced Watershed Hydrology (4)                       |              |
| SS 440 Forest and Range Soils (4)                              |              |

# 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. Graduates are prepared for:

- \* professional-level positions with private business and industry, government, and foreign service in agriculture and related fields;
- \* agricultural teaching in secondary schools or community colleges; or
- \* continued graduate work at other institutions.

### 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 MS Agriculture program includes the following specializations: Agricultural Engineering Technology, Dairy Products Technology, Food Science and Nutrition, General Agriculture, International Agriculture Development, and Soil Science. The General Agriculture Specialization provides students with the opportunity to focus their graduate study in one of several additional areas, including: Agricultural Education and Communication, Animal Science, Crop Science, Environmental Horticultural Science or Forestry Sciences. 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 Research and Graduate Programs 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 available from the Graduate Studies Coordinator.

All candidates must meet the current Graduation Writing Requirement; see page 94.

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.

**M.S. AGRICULTURE, SPECIALIZATION IN AGRICULTURAL ENGINEERING TECHNOLOGY**

|   |              |
|---|--------------|
|   | <i>Units</i> |
| <b>Core Courses</b> .....   | 12           |
| AG 599 Thesis (6)   |              |
| 400-500 level research methods course (3)   |              |
| BRAE 581 Graduate Seminar in Agric.Engineering (3)  |              |
| <b>Required in the specialization</b> .....   | 9            |
| BRAE 521 Engineering of Agricultural Systems (4)  |              |
| BRAE 522 Instrumentation Control/Microprocessors (4)  |              |
| BRAE 533 Irrigation Project Design (4)  |              |
| <b>Restricted electives</b> .....   | 18           |
| At least 9 units must be in computer related coursework; remaining units shall include at least 6 units at the 500 level. |              |
| <b>Electives</b> .....  | 6            |
| 400-500 level courses   | —            |
|   | 45           |

**M.S. AGRICULTURE, SPECIALIZATION IN DAIRY PRODUCTS TECHNOLOGY**

|  |              |
|--|--------------|
|  | <i>Units</i> |
| <b>Core Courses/Required in the Specialization</b> .....         | 27           |
| DSCI 401 Physical and Chemical Properties of Dairy Products (4)  |              |
| DSCI 522 Bioseparation Processes in Dairy Product Technology (4) |              |
| DSCI 570 Selected Topics in Dairy Science (3)                    |              |
| DSCI 571 Selected Adv. Lab in Dairy Science (3)                  |              |
| DSCI 581 Graduate Seminar in Dairy Science (3)                   |              |
| DSCI 599 Thesis (6)  |              |
| STAT 513 Applied Experimental Design and Regression Models (4)   |              |
| <b>Restricted electives may be selected from:</b> .....          | 18           |
| BRAE 427 Agricultural Process Engineering (3)                    |              |
| BRAE 522 Instrumentation Control/Microprocessors (4)             |              |
| CHEM 405 Advanced Physical Chemistry (3)                         |              |
| CHEM 439 Instrumental Analysis (5)                               |              |
| CHEM 473 Immunochemistry (4)                                     |              |
| CHEM 474 Protein Techniques Laboratory (2)                       |              |
| DSCI 402 Quality Assurance & Control Dairy Prod (4)              |              |
| DSCI 433 Dairy Plant Management and Equipment (4)                |              |
| DSCI 434 Cheese and Fermented Dairy Foods (4)                    |              |
| DSCI 435 Conc/Fract and Butter Technology (4)                    |              |
| DSCI 444 Dairy Microbiology (4)                                  |              |
| DSCI 500 Individual Study (1–6)                                  |              |
| FSN 444 Engineering Concepts in Food Processing (4)              |              |
| FSN 409 Sensory Evaluation of Food (4)                           |              |
| FSN 410 Nutritional Aspects of Food Processing (4)               |              |
| FSN 474 Advanced Food Processing (4)                             |              |
| REC 450 Grant Development and Writing (4)                        |              |
| SS 501 Research Planning (3)                                     |              |
|  | —            |
|  | 45           |

**M.S. AGRICULTURE, SPECIALIZATION IN FOOD SCIENCE AND NUTRITION**

|  |              |
|--|--------------|
|  | <i>Units</i> |
| <b>Core Courses</b> .....                            | 12           |
| FSN 599 Thesis (6)                                   |              |
| FSN 581 Graduate Seminar (3)                         |              |
| SS 501 Research Planning (3)                         |              |
| <b>Required in the specialization</b> .....          | 12           |
| AG 500 Individual Study (2–6)                        |              |
| FSN 410 Nutritional Aspects of Food Processing (3)   |              |
| FSN 501 Lipid Metabolism and Nutrition (3)           |              |
| STAT 512 Statistical Methods (4)                     |              |
| <b>Approved electives</b> .....                      | 9            |
| BRAE 521 Engineering of Agricultural Systems (4)     |              |
| BRAE 522 Instrumentation Control/Microprocessors (4) |              |
| BIO 431 Physiology I: General (4)                    |              |
| CHEM 439 Instrument Analysis (5)                     |              |
| CHEM 528 Nutritional Biochemistry (3)                |              |
| EDUC 555 Counseling and Communication (4)            |              |
| FSN 455 Product Dev. and Sensory Evaluation (5)      |              |
| FSN 437 Advanced Food Processing (4)                 |              |
| KINE 451 Nutrition for Fitness and Sport (3)         |              |
| <b>Electives</b> (400–500 level courses) .....       | 12           |
|  | —            |
|  | 45           |

**M.S. AGRICULTURE, SPECIALIZATION IN GENERAL AGRICULTURE**

The General Agriculture Specialization provides students with the opportunity to focus their graduate study in one of several areas, including: Agricultural Education and Communication, Animal Science, Crop Science, Environmental Horticultural Science or Forestry Sciences.

|  |              |
|--|--------------|
|  | <i>Units</i> |
| <b>Required Courses</b> .....  | 12/28        |
| <i>Agricultural Education and Communication (12):</i>  |              |
| AGED 539 Internship (6)  |              |
| AGED 520 Program Development in Agricultural Education (3)   |              |
| AGED 522 Instructional Programs in Agricultural Mechanics (3)  |              |
| <i>Forestry Sciences (28):</i>   |              |
| An applied sciences area of study in disciplines such as oak woodland, chaparral, Sierran forest types, watershed hydrology, and fire ecology. |              |
| FNR 530 Social Systems in Forest Resources Management (3)  |              |
| FNR 532 Forestry Applications in Biometrics and Econometrics (4)   |              |
| FNR 534 Forest Ecosystem Management and Modeling (3)   |              |
| FNR 581 Graduate Seminar in Forest Resources (2)   |              |
| FNR 599 Thesis (9)   |              |
| SS 501 Research Planning (3)   |              |
| STAT 512 Statistical Methods (4)   |              |

*Other Graduate Study Areas (12):*

- AG 599 Thesis (6)
- 400- or 500-level research methods course (3)
- Any 581 Graduate Seminar offered in College of Agriculture (3)

**Restricted electives**..... 17/33

*Agricultural Education and Communication (33):*

Any approved 400- and 500-level agriculture courses. No less than 11 units must be at the 500 level. Students are required to complete one year of successful teaching or graduate level internship prior to the final examination.

*Forestry Science (17):*

Any 400- and 500-level courses approved by the student's graduate committee.

*Other Graduate Study Areas (33):*

Any 400- and 500-level courses approved by the student's graduate committee. At least 12 units must be at the 500 level.

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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.

Units

**Core Courses**..... 26

- AG 599 Thesis (6)
- AGB 510 World Agriculture Development (3)
- AGB 515 International Agriculture Marketing (3)
- AGB 516 Program Mgt in Developing Countries (3)
- AGB 421/AGB 435/BRAE 521 (4)
- SS 453 Tropical Soils (4)
- 400-500 level research/statistical methods course (3)

**Restricted electives** ..... 10

Courses selected with adviser's approval 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.

45

**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.

Units

**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.

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**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 Bioresource and 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.



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# AGRIBUSINESS DEPARTMENT

**Agriculture Bldg. (10), Room 210**  
**(805) 756-5000**  
**(805) 756-5040 (FAX)**

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## Faculty

### Department Head, M. LeRoy Davis

|                      |                    |
|----------------------|--------------------|
| James J. Ahern       | Jay E. Noel        |
| William H. Amspacher | Nancy C. Ochs      |
| Renny J. Avey        | David J. Schaffner |
| Phillip M. Doub      | Jack F. Scott      |
| Arthur C. Duarte     | Kenneth C. Scott   |
| Douglas G. Genereux  | Robert C. Thompson |
| Lynn L. Hamilton     | Marlin D. Vix      |
| Jack J. Herlihy      | Marianne M. Wolf   |
| Robert E. McCorkle   |                    |

## 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.<sup>1</sup>

## 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, Farm Service Agency, 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.

### Individualized Course of Study

Students have the option of choosing one of the above concentrations or developing an individualized course of study (28 units) with adviser and department head approval. The agribusiness sector is changing rapidly with the evolution of biotechnology and information technology. Students are encouraged to explore these and other changes by developing a program of study that reflects individual talents and interests.

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<sup>1</sup> 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.

|  | Units |
|--|-------|
| <b>MAJOR COURSES</b>   |       |
| AGB 101 Introduction to Agribusiness .....                                       | 4     |
| AGB 202 Sales, Communication, and Leadership in Agribusiness .....               | 4     |
| AGB 212 Agricultural Economics .....   | 4     |
| AGB 213 Agricultural Economic Analysis .....                                     | 4     |
| AGB 301 Food and Fiber Marketing .....   | 4     |
| AGB 310 Agribusiness Credit and Finance.....                                     | 4     |
| AGB 312 Agricultural Policy .....  | 4     |
| AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (USCP) ..... | 4     |
| AGB 460 Research Methodology in Agribusiness .....                               | 2     |
| AGB 461 Senior Project .....   | 2     |
| Concentration courses (see below) .....  | 28    |

**64****SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |    |
|---|----|
| BUS 212 Financial Accounting for Nonbusiness Majors.....  | 4  |
| BUS 207 Business Law.....   | 4  |
| CHEM 110 World of Chemistry – Essentials (B1a) * ...  | 4  |
| Life science elective with lab (B1b*).....  | 4  |
| <sup>1</sup> ECON 222 Macroeconomics (D3)* .....  | 4  |
| <sup>2</sup> MATH 118 Pre-Calculus Algebra or MATH 221 Calculus for Business & Econ. (B2)* .... | 4  |
| STAT 221 Probability and Statistical Inference (B2)*...   | 5  |
| ASCI 231 or PM 230 or DSCI 230/231 .....  | 4  |
| SS 121 Introductory Soil Science .....  | 4  |
| FRSC 131/230/231 or CRSC 131/230 or VGSC 230 or OH 121 .....                                    | 4  |
| Agricultural science electives.....   | 16 |

16 units are to be selected in Agriculture with prefixes other than AGB, AGED, REC, MSC. AG 371 and AG 210 do not satisfy units in this area. No more than 4 units can come from courses with AG prefix, i.e., AG 243, AG 339. No more than 4 units can come from Enterprise Projects (i.e., CRSC 202, FSN 201, etc.) and Special Problems (i.e., CRSC 200, FSN 400, etc.)

**57****GENERAL EDUCATION (GE) ..... 51**

A minimum of 72 units is required for GE; 21 of these units are in Support; a minimum of 51 units is required to satisfy remaining GE requirements.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3.

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one course from:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

17 units are in Support..

- B1a Physical Sciences \*see Support
- B1b Life Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 11 units)

4 units are in Support.

No more than one course in any Area D category.

Take one course from D1a and one course from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take two courses from D2, D4a, D4b

- D2 History (300-400 level)
- D3 Economics \*see Support
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy (AG 250 recommended)

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES ..... 14****186**

<sup>1</sup> AGB 212 is the prerequisite for ECON 222 for AGB majors, not ECON 221.

<sup>2</sup> 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 or INDIVIDUALIZED COURSE OF STUDY (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, or foreign language (any level) ..... | 4  |
| <hr/>   |    |
|   | 28 |

**Agribusiness Marketing Concentration**

|   |    |
|---|----|
| AGB 318 International Trade and Agriculture .....   | 4  |
| AGB 323 Agribusiness Managerial Accounting .....  | 4  |
| AGB 405 Agribusiness Marketing Research Methods..   | 4  |
| AGB 406 Agribusiness Marketing Planning .....   | 4  |
| AGB 421 Agribusiness Operations Analysis or AGB 433 Agricultural Price Analysis .....                     | 4  |
| AGB 450 Agribusiness Strategy Formulation.....  | 4  |
| Adviser approved electives (300–400) in AGB or College of Business, or foreign language (any level) ..... | 4  |
| <hr/>   |    |
|   | 28 |

**Agribusiness Policy Concentration**

|   |    |
|---|----|
| AGB 315 Land Economics .....  | 4  |
| AGB 318 International Trade and Agriculture.....  | 4  |
| AGB 323 Agribusiness Managerial Accounting .....  | 4  |
| AGB 412 Advanced Agricultural Policy .....  | 4  |
| AGB 421 Agribusiness Operations Analysis or AGB 435 Linear Programming in Agriculture .....               | 4  |
| AGB 433 Agricultural Price Analysis .....   | 4  |
| Adviser approved electives (300–400) in AGB or College of Business, or foreign language (any level) ..... | 4  |
| <hr/>   |    |
|   | 28 |

**Farm and Ranch Management Concentration**

|  |    |
|--|----|
| AGB 321 Farm Records.....  | 4  |
| AGB 322 Principles of Farm Management .....  | 4  |
| AGB 331 Farm Accounting .....  | 4  |
| AGB 433 Agricultural Price Analysis .....  | 4  |
| AGB 435 Linear Programming in Agriculture.....   | 4  |
| AGB 456/457/458 Crop/Livestock/Dairy Management Problems .....   | 4  |
| Adviser approved electives in AGB (300–400), College of Business (300–400) or foreign language (any level) ..... | 4  |
| <hr/>  |    |
|  | 28 |

**Individualized Course of Study**

|  |    |
|--|----|
| Adviser and department head pre-approval of courses is required..... | 28 |
|--|----|

**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 110         | AG elective      |
| MATH 118/221     | AGB 202          | BUS 207          |
| AG 250           | BUS 211          | AGB 212          |
| 2nd Year         |                  |                  |
| Fall             | Winter           | Spring           |
| SS 121           | STAT 221         | ECON 222         |
| AGB 301          | AG elective      | AGB 312          |
| AGB 213          | AGB 310          |                  |
| 3rd Year         |                  |                  |
| Fall             | Winter           | Spring           |
| AG elective      | AG elective      | AG elective      |
| AGB conc. course | AGB conc. course | AGB/COB elective |
|                  | AGB conc. course | AGB conc. course |
| 4th Year         |                  |                  |
| Fall             | Winter           | Spring           |
| AGB 401          | AG elective      | AGB conc. course |
| AGB 460          | AGB 461          | AG elective      |
| AGB conc. course |                  |                  |

**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.

|  |    |       |
|--|----|-------|
| <b>Required courses</b> .....  | 20 | Units |
| AGB 212 Agricultural Economics (4)   |    |       |
| AGB 301 Food and Fiber Marketing (4)   |    |       |
| AGB 310 Agribusiness Credit and Finance (4)  |    |       |
| AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (4) (USCP)                                 |    |       |
| BUS 212 Financial Accounting for Nonbusiness Majors or AGB 321 Farm Records (4)                                |    |       |
| <b>Additional courses</b> .....  | 8  |       |
| To be selected by the student and approved <i>in advance</i> by the Agribusiness Department Minor Coordinator. |    |       |
| The student will choose eight units of other AGB courses, <b>not</b> to include AGB 101, AGB 200, or AGB 400.  |    |       |

28

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# AGRICULTURAL EDUCATION AND COMMUNICATION DEPARTMENT

Agriculture Bldg. (10), Room 244  
(805) 756-2803

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## 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
- Agricultural Supplies and Services
- Animal Production
- Ornamental Horticulture
- Plant Production

The Agricultural Education and Communication Department offers a Bachelor of Science degree in Agricultural Science with a choice of one of the seven concentrations listed above and 26/27 units of adviser approved electives which may be selected from one of three career pathways: preparation of teachers of agriculture for the public secondary schools of California, professional preparation in agricultural communication, or international agriculture.

The teaching credential program provides for early field experience and professional education coursework in the undergraduate curriculum. Specialized preprofessional and professional courses are offered for undergraduate and graduate students.

Postbaccalaureate work is required of students seeking the Single Subject in Agriculture, Home Economics and Agricultural Specialist credentials. 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. A single subject credential in Home Economics is available for Home Economics graduates or graduates from related degrees.

Student teaching is a vital part of the graduate program for agriculture and home economics credential candidates. 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.

In association with the Brock Center for Agricultural Communication, selected interdisciplinary courses in Journalism, Graphic Communications, English, Speech

Communication and Agriculture make up the Agricultural Communication minor. Career preparation includes a breadth and depth in agriculture along with foundations in journalism and an industry internship. The Brock Center for Agricultural Communication provides students the opportunity for industry linkages and professional preparation in this rapidly growing career area.

The International Agriculture Career Area includes a breadth and depth of agricultural subjects, an industry internship, and minor in International Relations to form the basis for entering the global agriculture work place. The department works with each student to provide a dynamic, intensive and practical course of study, giving graduates the knowledge and creativity to develop innovative programs and approaches to agriculture in a global society.

Agricultural Education courses taken at the graduate level 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 and Communication 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 of post harvest 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, 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 300-400 level coursework is required.

| MAJOR COURSES   | Units     |
|---|-----------|
| AGED 202 Introduction to Agricultural Education .....                                   | 2         |
| AGED 404 Agricultural Leadership .....  | 3         |
| AGED 426 Presentation Methods in Agricultural<br>Communication or                       |           |
| AGED 438 Instructional Processes in Agricultural<br>Education.....                      | 3         |
| AGED 460 Research Methodology in Agricultural<br>Education and Communication .....      | 1         |
| AGED 461 Senior Project .....   | 2         |
| AGED 462 Senior Project .....   | 2         |
| AGB 202 Communication, Leadership and<br>Management Skills for Agribusiness .....       | 4         |
| AGB 301 Food and Fiber Marketing.....   | 4         |
| AGB 401 Managing Cultural Diversity in Agricultural<br>Labor Relations (USCP) .....     | 4         |
| ASCI 231 General Animal Science.....  | 3         |
| BRAE 121 Agricultural Mechanics .....   | 2         |
| BRAE 141 Agricultural Machinery Safety .....  | 3         |
| BRAE 340 Irrigation Water Management .....  | 4         |
| CRSC 230 Agronomic Crop Production.....   | 4         |
| DSCI 230 General Dairy Husbandry .....  | 4         |
| FNR 201/FSN 230/DSCI 231 .....  | 3         |
| FRSC 230 California Fruit Growing or<br>VGSC 230 Introduction to Vegetable Science..... | 4         |
| OH 230 Environmental Horticulture.....  | 4         |
| PM 145 Introduction to Poultry Management .....   | 4         |
| SS 121 Introductory Soil Science .....  | 4         |
| Concentration courses (see below) .....   | 22        |
|   | <b>86</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |    |
|---|----|
| CHEM 110 World of Chemistry – Essentials (B1a)* ...   | 4  |
| Adviser approved restricted electives .....   | 27 |
| 12-20 units must be 300-400 level depending on concentration. Career area programs may be selected from teaching agriculture, agricultural communication, or international agriculture. |    |

31

**GENERAL EDUCATION (GE) ..... 68**

A minimum of 72 units is required for GE; 4 of these units are in Major/Support; a minimum of 68 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 11 units)

4 units in Support.

Take one course from B1b:

- B1a Physical Sciences \*see Support
- B1b Life Sciences

Take two courses from B2:

- B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES..... 9**

**192**

**CONCENTRATIONS (select one)****Agricultural Mechanics Concentration**

|  |       |
|--|-------|
| BRAE 124 Small Engines.....                    | 2     |
| BRAE 237 Engineering Surveying I.....          | 2     |
| BRAE 321 Agricultural Safety.....              | 3     |
| BRAE 335 Internal Combustion Engines .....     | 4     |
| IME 155 Industrial Welding Technology.....     | 1     |
| BRAE electives (7 units at 300–400 level)..... | 10    |
|  | <hr/> |
|  | 22    |

**Agricultural Products and Processing Concentration**

|   |       |
|---|-------|
| DSCI 231 General Dairy Manufacturing.....                   | 4     |
| FSN 211 Meats.....  | 3     |
| FRSC/VGSC 421 Postharvest Tech. Horticultural<br>Crops..... | 4     |
| DSCI/FSN electives (6 units at 300–400 level) .....         | 11    |
|   | <hr/> |
|   | 22    |

**Agricultural Resources Management Concentration**

|   |       |
|---|-------|
| BIO 227 Wildlife Conservation Biology .....                     | 4     |
| BIO 228 Wildlife Conservation Laboratory .....                  | 1     |
| FNR 202 Environmental Management.....                           | 3     |
| FNR 208 Dendrology.....   | 4     |
| FNR 306 Natural Resource Ecology and Habitat<br>Management..... | 4     |
| FNR electives (300–400 level) .....                             | 6     |
|   | <hr/> |
|   | 22    |

**Agricultural Supplies and Services Concentration**

|   |       |
|---|-------|
| AGB 212 Agricultural Economics .....                | 4     |
| AGB 302 Agricultural Associations and Cooperatives. | 3     |
| AGB 310 Agribusiness Credit and Finance.....        | 4     |
| AGB 312 Agricultural Policy .....                   | 4     |
| AGB electives .....                                 | 7     |
|   | <hr/> |
|   | 22    |

**Animal Production Concentration**

|  |       |
|--|-------|
| Select two: ASCI 141/142/143.....                                  | 4,4   |
| ASCI 220 Introduction to Animal Nutrition and<br>Feeding.....      | 4     |
| DSCI 330 Artificial Insemination and Embryo<br>Biotechnology ..... | 4     |
| ASCI/DSCI/PM electives (300–400 level) .....                       | 6     |
|  | <hr/> |
|  | 22    |

**Ornamental Horticulture Concentration**

|   |       |
|---|-------|
| OH 122 Fundamentals of Environmental Horticulture   | 4     |
| OH 123 Landscape Installation and Maintenance ..... | 4     |
| OH 324 Foliage Plant Culture .....                  | 4     |
| OH electives (6 units at 300–400 level).....        | 10    |
|   | <hr/> |
|   | 22    |

**Plant Production Concentration**

|  |       |
|--|-------|
| CRSC/FRSC/VGSC 230 (Select course not taken in<br>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     |
|  | <hr/> |
|  | 22    |

# ANIMAL SCIENCE DEPARTMENT

Agriculture Bldg. (10), Room 101  
(805) 756-2419

## Faculty

### Department Head, Kenneth C. Scotto

|                     |                      |
|---------------------|----------------------|
| Gene A. Armstrong   | William E. Plummer   |
| M. Steven Daugherty | Robert T. Rutherford |
| Michael H. Hall     | Dale A. Smith        |
| Heidi J. Hamlen     | Robert Spiller       |
| Roger M. Hunt       | Clifford A. Stokes   |
| Michael W. Lund     |                      |

### Affiliate Faculty:

Brent G. Hallock, Soil Scientist  
Rudy A. Wooten, Meat Scientist

## Programs

### B.S. Animal Science

#### Poultry Management Minor

### ANIMAL SCIENCE PROGRAM

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 their interests. 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 participate in organizing and conducting special meetings, seminars and field days sponsored by the department.

The department maintains herds of beef cattle, sheep, swine, horses and flocks of 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.

The department has an active role in the management of the Swanton-Pacific Ranch and is developing 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. Career opportunities are many and varied.

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 Poultry Management Minor is supported by a state-of-the-art poultry production facility. Cal Poly's new Poultry Unit is now considered one of the best in the Western United States; it will accommodate 14,000 layers, 7,000 replacement pullets, 7,000 broilers, 2,500 breeding hens, and 2,500 chickens/turkeys for testing and research purposes. These production facilities allow students to gain hands-on learning which complements their formal class work, and provides real-world experience.

|   |              |
|---|--------------|
|   | <i>Units</i> |
| <b>Required courses</b> .....                       | 21           |
| PM 145 Introduction to Poultry Management (4)       |              |
| 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)    |              |
| <b>Electives</b> .....                              | 7            |
| To be chosen from:                                  |              |
| AG 339; AGB 310; BUS 212; ENGL 310;                 |              |
| BUS 346; FSN 274, 333, 334, 431;                    |              |
| PM 290/490, 360                                     |              |
|   | 28           |

**B.S. ANIMAL SCIENCE**

For course prerequisites, 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 300-400 level coursework is required.

**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.....   | 4         |
| ASCI 220 Intro. Animal Nutrition and Feeding.....  | 4         |
| ASCI 304 Animal Breeding.....  | 3         |
| ASCI 401 Reproductive Physiology.....  | 4         |
| ASCI 420 Animal Nutrition.....   | 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 145 Introduction to Poultry Management.....   | 4         |
| VS 223 Anatomy and Physiology of Farm Animals.....   | 4         |
| Select two of the following: ASCI 311, 312, 313,<br>314; PM 240, 250.....  | 6         |
| Adviser approved electives.....  | 34        |
| 19 units must be 300-400 level. May be selected<br>from: livestock production, poultry<br>management, agribusiness, meats/muscle<br>science, teaching agriculture, agricultural<br>communication, resource management, and pre-<br>veterinary/graduate school. |           |
|  | <b>92</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement.

|  |     |
|--|-----|
| BIO 151 Introduction to Biology or<br>BIO 101, 105 General Biology (B1b)*.....       | 4/5 |
| BIO 302 Human Genetics or<br>BIO 303 Genetics (Area B)*.....                         | 3   |
| CHEM 111/127 Survey of Chemistry (B1a)*.....   | 5/4 |
| CHEM 212 Survey of Organic Chemistry or<br>CHEM 216 Organic Chemistry (Area B)*..... | 5/4 |

**15-18**

**GENERAL EDUCATION (GE) ..... 58**

A minimum of 72 units is required for GE; 14 of these units are in Major/Support; a minimum of 58 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 6 units)

14 units are in Support.

B1a Physical Sciences \*see Support

B1b Life Sciences \*see Support

Take two courses from B2:

B2 Mathematics and/or Statistics

Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

F1 Computer Literacy

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 18-21**



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# BIORESOURCE AND AGRICULTURAL ENGINEERING DEPARTMENT

Agricultural Engineering Bldg. (08), Room 101  
(805) 756-2378  
(805) 756-2626 (FAX)

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## Faculty

### Department Head, Kenneth H. Solomon

|                      |                       |
|----------------------|-----------------------|
| James Bermann        | Rollin D. Strohman    |
| Charles M. Burt      | Robert E. Walker      |
| Richard A. Cavaletto | Paul R. Weckler       |
| Samantha Gill        | Douglas W. Williams   |
| L. Joe Glass         | James B. Zetsche, Jr. |
| M. Stephen Kaminaka  | Mark A. Zohns         |

## Programs

### B.S. Bioresource and Agricultural Engineering

### B.S. Agricultural Systems Management

### Geographic Information Systems for Agriculture Minor

### Water Science Minor

The Bioresource and Agricultural Engineering Department offers two programs leading to a Bachelor of Science degree: Bioresource and 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 involved in a broad range of activities and services including Open House displays. The student branch of the American Society of Agricultural Engineers offers professional and extracurricular activities.

## BIORESOURCE AND AGRICULTURAL ENGINEERING MAJOR

The bioresource/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.

The main focus of the bioresource and agricultural engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a three-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

Career opportunities exist in the design, evaluation and management of systems -- irrigation, drainage, hydrology, soil conservation; farm machinery; food processing; and agricultural environments.

The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

## AGRICULTURAL SYSTEMS MANAGEMENT MAJOR

Students receive broad agricultural training with a business and management emphasis in one of the following areas: plant production, livestock production, food and fiber processing, environmental information management, water/irrigation, and processing and manufacturing. The Agricultural Systems Management program offers to students the opportunity to develop management expertise through interdisciplinary experiences in agricultural technology and business oriented coursework.

Career 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 manufacturing of agricultural machinery and equipment. The program is recognized by the American Society of Agricultural Engineers.

## GRADUATE PROGRAMS

Cal Poly offers a Master of Science degree in Agriculture with a specialization in Agricultural Engineering Technology, a closely related field. The College of Engineering and the Bioresource and 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.

**B.S. BIORESOURCE AND 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.*

**Freshman**

|  |       |
|--|-------|
| BRAE 128 Careers in Bioresource and Agricultural Engineering .....               | 2     |
| BRAE 129 Laboratory Skills and Safety .....                                      | 1     |
| BRAE 133 Engineering Design Graphics .....                                       | 3     |
| BRAE 151 CAD for Agricultural Engineering.....                                   | 1     |
| BRAE 237 Engineering Surveying I .....   | 2     |
| SS 121 Introductory Soil Science .....   | 4     |
| CSC 101/CSC 231/CSC 234 (F1).....  | 2     |
| MATH 141 Calculus I (B2) .....   | 4     |
| MATH 142 Calculus II (B2) .....  | 4     |
| MATH 143 Calculus III (Area B).....  | 4     |
| PHYS 131 General Physics (Area B) .....  | 4     |
| PHYS 132 General Physics (Area B) .....  | 4     |
| ENGL 114 Writing: Exposition (A1).....   | 4     |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2) ..                              | 3     |
| SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A3) ..... | 3     |
| ENGL 218 Professional Writing: Argumentation and Reports (A4) .....              | 4     |
|  | <hr/> |
|  | 49    |

**Sophomore**

|  |       |
|--|-------|
| BRAE 226 Introduction to Principles of Bioresource Engineering .....     | 4     |
| BRAE 232 Agricultural Structures Planning .....                          | 4     |
| BRAE 234 Introduction to Mechanical Systems in Agriculture .....         | 4     |
| BRAE 236 Principles of Irrigation .....                                  | 4     |
| ME 211 Engineering Statics .....   | 3     |
| ME 212 Engineering Dynamics .....  | 3     |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a) .....   | 4     |
| CHEM 125 General Chemistry for the Engineering Disciplines (Area B)..... | 4     |
| MATH 241 Calculus IV (Area B).....                                       | 4     |
| MATH 242 Differential Equations (Area B) .....                           | 4     |
| PHYS 133 General Physics (Area B) .....                                  | 4     |
| BIO 220/BACT 211 (B1b).....  | 4     |
| ECON 201/211 (D3).....   | 3     |
|  | <hr/> |
|  | 49    |

**Junior**

|   |       |
|---|-------|
| BRAE 312 Hydraulics .....   | 4     |
| BRAE 328 Measurements and Computer Interfacing ..                                   | 4     |
| BRAE 331 Irrigation Theory .....  | 3     |
| BRAE 403 Agricultural Systems Engineering.....                                      | 4     |
| CE 201 Strength of Materials or CE 204,205 Strength of Materials I, II (3) (2)..... | 5     |
| CE 206 Strength of Materials Lab .....  | 1     |
| EE 201 Electrical Circuit Theory .....  | 3     |
| EE 251 Electric Circuits Laboratory .....   | 1     |
| IME 314 Engineering Economics .....   | 3     |
| ME 302 Thermodynamics.....  | 3     |
| STAT 312 Statistical Methods for Engineers (B2) .....                               | 3     |
| HIST 202 or HIST 204 or LS 211 (D1a) .....  | 3     |
| POLS 110 or LS 212 (D1b) .....  | 3     |
| <sup>1</sup> PSY 201/202 (Area E) .....   | 3     |
| <sup>1</sup> Fine and performing arts elective (C2).....                            | 3     |
| <sup>1</sup> Social, political, economics institutions (Area D).....                | 3     |
|   | <hr/> |
|   | 49    |

**Senior**

|  |       |
|--|-------|
| BRAE 414 Irrigation Engineering .....  | 4     |
| BRAE 415 Hydrology .....   | 3     |
| BRAE 421 Equipment Engineering .....   | 3     |
| BRAE 422 Equipment Engineering.....  | 4     |
| BRAE 433 Agricultural Structures Design .....  | 4     |
| BRAE 460 Senior Project Organization .....   | 1     |
| BRAE 461 Senior Project.....   | 2     |
| BRAE 462 Senior Project.....   | 2     |
| <sup>1</sup> Philosophy elective (C1) .....  | 3     |
| <sup>1</sup> Literature elective (C1) .....  | 3     |
| <sup>1</sup> Literature, philosophy, arts elective (300-400) (C3)...                         | 3     |
| <sup>1</sup> Arts and humanities elective (Area C) .....                                     | 3     |
| <sup>1</sup> Social, political, economic institutions elective (300-400 level) (Area D)..... | 3     |
| Adviser approved electives .....   | 10    |
|  | <hr/> |
|  | 48    |
|  | <hr/> |
|  | 195   |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule*.

**B.S. BIORESOURCE AND AGRICULTURAL ENGINEERING**

For course prerequisites, 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 300-400 level coursework is required.

| MAJOR COURSES   | Units     |
|---|-----------|
| BRAE 128 Careers in Bioresource & Ag Engineering ...  | 2         |
| BRAE 129 Laboratory Skills and Safety.....            | 1         |
| BRAE 133 Engineering Design Graphics.....             | 3         |
| BRAE 151 CAD for Agricultural Engineering.....        | 1         |
| BRAE 226 Intro. Principles Bioresource Engineering... | 4         |
| BRAE 232 Agricultural Structures Planning .....       | 4         |
| BRAE 234 Introduction to Mechanical Systems in Ag .   | 4         |
| BRAE 236 Principles of Irrigation .....               | 4         |
| BRAE 237 Engineering Surveying I .....                | 2         |
| BRAE 312 Hydraulics .....                             | 4         |
| BRAE 328 Measurements and Computer Interfacing...     | 4         |
| BRAE 331 Irrigation Theory.....                       | 3         |
| BRAE 403 Agricultural Systems Engineering .....       | 4         |
| BRAE 414 Irrigation Engineering.....                  | 4         |
| BRAE 415 Hydrology.....                               | 3         |
| BRAE 421 Equipment Engineering.....                   | 3         |
| BRAE 422 Equipment Engineering.....                   | 4         |
| BRAE 433 Agricultural Structures Design.....          | 4         |
| BRAE 460 Senior Project Organization .....            | 1         |
| BRAE 461 Senior Project .....                         | 2         |
| BRAE 462 Senior Project .....                         | 2         |
| Adviser approved electives.....                       | 10        |
|   | <b>73</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |     |
|--|-----|
| CE 201 Strength of Materials or CE 204,205 Strength of Materials I, II (3) (2) ..... | 5   |
| CE 206 Strength of Materials Laboratory.....   | 1   |
| CHEM 124, 125 General Chemistry for the Engineering Disciplines (B1a)* .....         | 4,4 |
| CSC 101/CSC 231/CSC 234 (F1)* .....  | 2   |
| EE 201, 251 Electrical Circuit Theory and Lab .....                                  | 3,1 |
| IME 314 Engineering Economics.....   | 3   |
| MATH 141 Calculus I (B2)*.....   | 4   |
| MATH 142 Calculus II (B2)*.....  | 4   |
| MATH 143 Calculus III (Area B)*.....   | 4   |
| MATH 241 Calculus IV (Area B)* .....   | 4   |
| MATH 242 Differential Equations(Area B)* .....                                       | 4   |
| ME 211 Engineering Statics .....   | 3   |
| ME 212 Engineering Dynamics .....  | 3   |
| ME 302 Thermodynamics .....  | 3   |
| PHYS 131 General Physics (Area B)* .....   | 4   |
| PHYS 132 General Physics (Area B)* .....   | 4   |
| PHYS 133 General Physics (Area B)* .....   | 4   |

|   |   |
|---|---|
| SS 121 Introductory Soil Science.....                               | 4 |
| STAT 312 Statistical Methods for Engineers (Area B)*.               | 3 |
| ENGL 218 Professional Writing: Argumentation and Reports (A4)*..... | 4 |
| BIO 220/BACT 221 (B1b)*.....  | 4 |
| ECON 201/ECON 211 (D3)*.....  | 3 |

**82**

**GENERAL EDUCATION (GE) ..... 40**

A minimum of 72 units is required for GE; 32 of these units are in Major/Support; a minimum of 40 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.  
→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)  
1 unit is in Support.

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (no additional units required)

26 units in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 12 units)  
3 units are in Support.

No more than one course in any Area D category.

- Take one course from D1a and one from D1b
- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212
- Take two courses from D2, D4a, D4b

- D2 History (300-400 level)
- D3 Economics \*see Support
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

- Take one course from E1 or E2
- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

2 units are in Support.

- F1 Computer Literacy \*see Support

**ELECTIVES..... 0**

**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 |
| BRAE 128 Careers in Bioresource and Agricultural Engineering .....               | 2     |
| BRAE 129 Laboratory Skills and Safety .....                                      | 1     |
| BRAE 133 Engineering Design Graphics .....                                       | 3     |
| BRAE 141 Agricultural Machinery Safety .....                                     | 3     |
| BRAE 142 Agricultural Power and Machinery Management .....                       | 4     |
| SS 121 Introductory Soil Science .....   | 4     |
| CHEM 111 Survey of Chemistry (B1a) .....   | 5     |
| AG 250/CSC 110/CSC 119 (F1) .....  | 3     |
| ENGL 114 Writing: Exposition (A1) .....  | 4     |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2) ..                              | 3     |
| SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A3) ..... | 3     |
| ENGL 218 Professional Writing: Argumentation and Reports (A4) .....              | 4     |
| MATH 118 Pre-Calculus Algebra (B2) .....   | 4     |
| MATH 119 Pre-Calculus Trigonometry .....   | 3     |
|  | 46    |

**Sophomore**

|   |    |
|---|----|
| BRAE 151 CAD for Agricultural Engineers .....   | 1  |
| BRAE 201 Closed Circuit Hydraulics .....  | 3  |
| BRAE 203 Agricultural Systems Analysis .....  | 3  |
| BIO 220 Physiology and Biological Adaptation or BACT 221 General Bacteriology (B1b, E2) ..... | 4  |
| PHYS 104 Introduction to Physics (B1a) .....  | 4  |
| <sup>1</sup> PSY 201/202 General Psychology (E1) .....  | 3  |
| <sup>1</sup> Philosophy elective (C1) .....   | 3  |
| <sup>1</sup> Fine and performing arts elective (C2) .....                                     | 3  |
| <sup>1</sup> Social, political, economics institutions (Area D) .....                         | 3  |
| Animal or plant production elective .....   | 3  |
| Agribusiness electives .....  | 12 |
| Electives .....   | 4  |
|   | 46 |

**Junior**

|  |    |
|--|----|
| BRAE 324 Principles of Agricultural Electrification .... | 4  |
| BRAE 325 Agricultural Energy Systems .....               | 3  |
| BRAE 321 Agricultural Safety .....                       | 3  |
| BRAE 340 Irrigation Water Management .....               | 4  |
| Adviser approved electives .....                         | 10 |
| Agribusiness electives .....                             | 12 |
| HIST 202 or HIST 204 or LS 211 (D1a) .....               | 3  |
| POLS 110 or LS 212 (D1b) .....                           | 3  |
| <sup>1</sup> Literature elective (C1) .....              | 3  |
| Electives .....  | 3  |
|  | 48 |

**Senior**

|   |     |
|---|-----|
| BRAE 402 Agricultural Materials Science .....   | 3   |
| BRAE 425 Computer Controls for Agriculture .....  | 3   |
| BRAE 432 Agricultural Buildings .....   | 4   |
| BRAE 460 Senior Project Organization .....  | 1   |
| BRAE 461 Senior Project, .....  | 2   |
| BRAE 462 Senior Project, .....  | 2   |
| BRAE 463 Undergraduate Seminar .....  | 1   |
| <sup>1</sup> Literature, philosophy, arts elective (300-400) (C3) ...                         | 3   |
| <sup>1</sup> Social, political, economics institutions (Area D) .....                         | 3   |
| <sup>1</sup> Arts and humanities elective (Area C) .....                                      | 3   |
| <sup>1</sup> Social, political, economic institutions elective (300-400 level) (Area D) ..... | 3   |
| Adviser approved electives .....  | 9   |
| Agribusiness electives .....  | 4   |
| Additional GE courses to complete 72-unit requirement. Select courses from Area C, D, E ..... | 2   |
| Electives .....   | 3   |
|   | 46  |
|   | 186 |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule*.

**B.S. AGRICULTURAL SYSTEMS MANAGEMENT**

For course prerequisites, 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 300-400 level coursework is required.

|   | Units |
|---|-------|
| <b>MAJOR COURSES</b>  |       |
| BRAE 128 Careers in Bioresource and Agricultural Engineering .....  | 2     |
| BRAE 129 Laboratory Skills and Safety .....   | 1     |
| BRAE 133 Engineering Design Graphics .....  | 3     |
| BRAE 141 Agricultural Machinery Safety .....  | 3     |
| BRAE 142 Agricultural Power and Machinery Management .....  | 4     |
| BRAE 151 CAD for Agricultural Engineering .....   | 1     |
| BRAE 201 Closed Circuit Hydraulics .....  | 3     |
| BRAE 203 Agricultural Systems Analysis .....  | 3     |
| BRAE 321 Agricultural Safety .....  | 3     |
| BRAE 324 Principles of Agricultural Electrification .....   | 4     |
| BRAE 325 Agricultural Energy Systems .....  | 3     |
| BRAE 340 Irrigation Water Management .....  | 4     |
| BRAE 402 Agricultural Materials .....   | 3     |
| BRAE 425 Computer Controls for Agriculture .....  | 3     |
| BRAE 432 Agricultural Buildings .....   | 4     |
| BRAE 460 Senior Project Organization .....  | 1     |
| BRAE 461 Senior Project .....   | 2     |
| BRAE 462 Senior Project .....   | 2     |
| BRAE 463 Undergraduate Seminar .....  | 1     |
| 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 |       |
|   | 69    |
| <b>SUPPORT COURSES</b>  |       |
| * = Courses satisfy General Education requirement   |       |
| AG 250/CSC 110/CSC 119 (F1)* .....  | 3     |
| BIO 220 Physiology and Biological Adaptation or BACT 221 General Bacteriology (B1b)* .....  | 4     |
| CHEM 111 Survey of Chemistry (B1a)* .....   | 5     |
| ENGL 218 Professional Writing: Argumentation and Reports (A4)* .....  | 4     |
| MATH 118 Pre-Calculus Algebra (B2)* .....   | 4     |
| MATH 119 Pre-Calculus Trigonometry (B2)* .....  | 3     |
| PHYS 104 Introduction to Physics (Area B)* .....  | 4     |
| SS 121 Introductory Soil Science .....  | 4     |
| Units selected by the student and approved in advance by the Agribusiness Department Minor Coordinator .....  |       |
|   | 28    |
| Animal or plant production course .....   | 3     |

62

**GENERAL EDUCATION (GE) ..... 45**

A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.  
 →See page 77 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

4 units are in Support;  
 Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (no additional units required)

20 units in Support;  
 B1b Life Sciences \*see Support  
 B1a Physical Sciences \*see Support  
 B2 Mathematics and/or Statistics \*see Support  
 Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.  
 Take one course from D1a and one from D1b  
 D1a HIST 202 (USCP) or HIST 204 or LS 211  
 D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.  
 Take one course from E1 or E2:

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

3 units in Support.  
 F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas C, D, E. No more than one additional course per area.

**ELECTIVES ..... 10**

186

**GEOGRAPHIC INFORMATION SYSTEMS FOR AGRICULTURE MINOR**

This minor is an interdisciplinary program sponsored by three departments: Bioresource and Agricultural Engineering, Natural Resources Management, and Crop Science. New technologies of geographic information systems (GIS), global positioning systems (GPS), and orthophotography (uniform scale aerial photographs) are revolutionizing the management of resources. There are great employment opportunities for those who understand the technologies and society will benefit from improved management decisions. Students interested in this minor may come from the following majors: forestry and natural resources; crop science; soil science; landscape architecture, agricultural systems management; or animal science.

|  | <i>Units</i> |
|--|--------------|
| <b>Required courses</b> .....  | 19           |
| <i>Graphical Communication (4)</i>   |              |
| BRAE 133 Engineering Design Graphics (3) and BRAE 151 CAD for Agricultural Engineering (1)   |              |
| or CE 114 Intro. to CAD in Civil and Environmental Engineering (4)   |              |
| or LA 111 Three Dimensional Graphics for Landscape Architects (4) and LA 310 Introduction to Computing in Landscape Architecture (2) |              |
| <i>Surveying (4)</i>   |              |
| BRAE 237 Engineering Surveying I or BRAE 247 Forest Surveying (2) and BRAE 238 Engrg. Surveying II (2)                               |              |
| or BRAE 239 Engineering Surveying (4)  |              |
| <i>Photogrammetry</i>  |              |
| BRAE 345 Aerial Photogrammetry/Remote Sensing (3)  |              |
| <i>Land Modeling Software</i>  |              |
| BRAE 446 CAD for Land Modeling (TERRAMODEL) (2)  |              |
| <i>Arc/INFO</i>  |              |
| FNR/LA 318 Applications of GIS in Natural Resources (3)  |              |
| <i>Capstone Course</i>   |              |
| FNR/BRAE/LA/CRSC 470 Selected Advanced Topics (3)  |              |

|  |    |
|--|----|
| <b>Emphasis areas</b> .....  | 11 |
| Select one of the following two emphasis areas   |    |
| <i>Environmental Information</i>   |    |
| BRAE 452 Boundary Law/Data Accuracy for GIS (3)  |    |
| FNR 306 Natural Resource Ecology and Habitat Management (4) or BIO 325 General Ecology (4) |    |
| FNR 416 Environmental Impact Analysis (4)  |    |
| <i>Precision Agriculture Emphasis</i>  |    |
| CRSC 444 Precision Farming (4)   |    |
| Choose 2 of the following 7 classes:   |    |
| CRSC 405 Advanced Weed Science (4)   |    |
| CRSC 410 Crop Physiology (4)   |    |
| CRSC 421 Oil and Fiber Crops (4)   |    |
| CRSC 431 Advanced Insect Pest Management (4)   |    |
| CRSC 445 Cropping Systems (4)  |    |
| SS 433 Land Use Planning (3)   |    |
| VGSC 423 Advanced Vegetable Science (4)  |    |

**WATER SCIENCE MINOR**

This minor emphasizes one of two areas of study: irrigation or watershed management. For students interested in environment and water, the minor provides marketable skills. For more information, see the College of Agriculture section of this catalog.

# CROP SCIENCE DEPARTMENT

Agricultural Sciences Bldg. (11), Room 229  
(805) 756-1237

## Faculty

### Interim Department Head, H. Paul Fountain

|                    |                    |
|--------------------|--------------------|
| Edgar H. Beyer     | John C. Phillips   |
| J. Wyatt Brown     | Robert P. Rice     |
| Louis W. Harper    | Edwin C. Seim      |
| Robert J. McNeil   | Mark D. Shelton    |
| Wesley J. Mueller  | David L. Warfield  |
| Gene P. Offermann  | Jo Ann C. Wheatley |
| W. Keith Patterson |                    |

## Programs

**B.S. Crop Science**

**B.S. Fruit Science**

**B.S. Plant Protection Science**

**Crop Science Minor**

**Fruit Science Minor**

**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. Additional acreage on the campus farm provides 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 equipment for fruit packing and grading, seed processing and pesticide application. In addition, a pesticide rinsate recycling system and specialized laboratory equipment for the study of various crops are available. A postharvest technology lab is being developed. Field trips supplement instruction for crops not common to the San Luis Obispo area.

Cal Poly's Swanton-Pacific Ranch near Davenport, California offers internship experiences in managing not only crops but also livestock, rangeland and forests. 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 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 careers in 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. Instruction includes agronomic crops, vegetable crops, and tropical crops.

## FRUIT SCIENCE MAJOR

The Fruit Science major qualifies graduates for orchard or vineyard management or for related employment with 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.

## GEOGRAPHIC INFORMATION SYSTEMS FOR AGRICULTURE MINOR

An interdisciplinary program sponsored by three departments: Bioresource and Agricultural Engineering, Natural Resources Management, and Crop Science. New technologies of geographic information systems (GIS), global positioning systems (GPS), and orthophotography (uniform scale aerial photographs) are revolutionizing the management of resources and exciting employment opportunities are available. Students interested in this minor usually have a major from: forestry and natural resources; crop science; soil science; landscape architecture, agricultural systems management; or animal science. For more information, see the Bioresource and Agricultural Engineering Department.

**B.S. CROP SCIENCE**

For course prerequisites, 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 300-400 level coursework is required.

**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         |
| CRSC/FRSC/VGSC 300-400 level electives.....         | 12        |
|   | <b>60</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |           |
|--|-----------|
| BIO 302 Human Genetics/BIO 303 Genetics (Area B)*  | 3         |
| BOT 121 General Botany (B1b)*  | 4         |
| CHEM 111 Survey of Chemistry (B1a)* .....  | 5         |
| FRSC 230 California Fruit Growing .....  | 4         |
| MATH 118 Pre-Calculus Algebra (B2)* .....  | 4         |
| (MATH 116 &117 will substitute)  |           |
| STAT 218 Applied Statistics for the Life Sciences (B2)* .  | 4         |
| SS 121 Introductory Soil Science .....   | 4         |
| Adviser-approved electives .....   | 34        |
| Must include at least 8 units of BIO/BOT/CHEM.<br>12-15 units must be 300-400 level. Areas may include applied biotechnology, crop ecology, production mgt., post-harvest tech/marketing, crop/vegetable science. May not include Enterprise Project or Enterprise Project Management. |           |
|  | <b>62</b> |

**GENERAL EDUCATION (GE)** .....

52

A minimum of 72 units is required for GE; 20 of these units are in Major/Support; a minimum of 52 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

|                        |            |
|------------------------|------------|
| <b>ELECTIVES</b> ..... | <b>12</b>  |
|                        | <b>186</b> |

**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 111                           |                                    |
| 2nd Year                           |                                    |                                    |
| Fall                               | Winter                             | Spring                             |
| CRSC 221                           | FRSC 230                           | VGSC 232                           |
| BIO/BOT/CHEM elective              | BIO/BOT/CHEM elective              | STAT 218                           |
| CRSC/VGSC 202                      |                                    |                                    |
| 3rd Year                           |                                    |                                    |
| Fall                               | Winter                             | Spring                             |
| BIO 302/303                        | CRSC 461                           | CRSC 304                           |
| CRSC 411                           | CRSC/FRSC/VGSC 300-400 level elec. | CRSC 311                           |
| 4th Year                           |                                    |                                    |
| Fall                               | Winter                             | Spring                             |
| CRSC 462                           | CRSC 445                           | CRSC 463                           |
| CRSC/FRSC/VGSC 300-400 level elec. |                                    | CRSC/FRSC/VGSC 300-400 level elec. |



**B.S. FRUIT SCIENCE**

For course prerequisites, 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 300-400 level coursework is required.

| 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         |
| FRSC 422 Tropical/Subtropical Crop & Fruit Prod..... | 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 202/402 Enterprise Project Management.....      | 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 421 Postharvest Tech. Horticultural Crops ..... | 4         |
| FRSC/CRSC/VGSC 300-400 level elective.....           | 4         |
|  | <b>67</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |    |
|--|----|
| BIO 302 or BIO 303 Genetics (Area B)*.....                 | 3  |
| BOT 121 General Botany (B1b)* .....                        | 4  |
| CHEM 111 Survey of Chemistry (B1a)* .....                  | 5  |
| CRSC 230 or VGSC 230 .....                                 | 4  |
| MATH 118 Pre-Calculus Algebra (B2)* .....                  | 4  |
| (MATH 116 & 117 will substitute)                           |    |
| STAT 218 Applied Statistics for the Life Sciences (B2)* .. | 4  |
| SS 121 Introductory Soil Science .....                     | 4  |
| Adviser-approved electives .....                           | 29 |

8 units of BIO/BOT/CHEM. 8 units 300-400 level. Areas may include applied biotechnology, crop ecology, enology, orchard/ vineyard mgt., pomology, postharvest tech/ mktg. May not include Enterprise Project or Enterprise Project Mgt.

**57**

**GENERAL EDUCATION (GE) .....** **52**

A minimum of 72 units is required for GE; 20 of these units are in Major/Support; a minimum of 52 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy (AG 250 Recommended)

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

|                       |            |
|-----------------------|------------|
| <b>ELECTIVES.....</b> | <b>10</b>  |
|                       | <b>186</b> |

**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 111              | SS 121       |
| 2nd Year              |                       |              |
| Fall                  | Winter                | Spring       |
| FRSC 231              | FRSC 331              | FRSC 342     |
| FRSC 202/402          | FRSC 202/402          | FRSC 202/402 |
| CRSC 221              | STAT 218              | CRSC 411     |
| BIO/BOT/CHEM elective | BIO/BOT/CHEM elective | BIO 302/303  |
| 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  | CRSC 462              | CRSC 463     |

### B.S. PLANT PROTECTION SCIENCE

For course prerequisites, 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 300-400 level coursework is required.

| 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         |
| Select one of the following Production sequences .... | 16        |
| CRSC 131, 132, 133; FRSC 230                          |           |
| FRSC 131, 132, 133; CRSC/VGSC 230                     |           |
| FRSC 131, 231, 342; CRSC/VGSC 230                     |           |
| Select from: CRSC 327, 405, 431, 441 .....            | 12        |
|   | <b>60</b> |

#### SUPPORT COURSES

\* = Courses satisfy General Education requirement

|  |           |
|--|-----------|
| BIO 302 or BIO 303 Genetics (Area B)* .....              | 3         |
| BIO 325 General Ecology (B1b)* .....                     | 4         |
| BOT 121 General Botany (Area B)* .....                   | 4         |
| BOT 323 Plant Pathology .....                            | 4         |
| CHEM 111 Survey of Chemistry (B1a)* .....                | 5         |
| CHEM 212 Survey of Organic Chemistry (Area B)* ....      | 5         |
| CHEM 313 Survey of Biochemistry (Area B)* .....          | 5         |
| MATH 118 Pre-Calculus Algebra (B2)* .....                | 4         |
| (MATH 116 & 117 will substitute)                         |           |
| SS 121 Introductory Soil Science .....                   | 4         |
| STAT 218 Applied Statistics for Life Sciences (B2)* .... | 4         |
| ZOO 131 General Zoology (Area B)* .....                  | 4         |
| ZOO 335 General Entomology .....                         | 4         |
| Adviser approved electives .....                         | 9         |
|  | <b>59</b> |

#### GENERAL EDUCATION (GE) .....

A minimum of 72 units is required for GE; 20 of these units are in Major/Support; a minimum of 52 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

#### Area A Communication (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

#### Area B Science and Mathematics (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- Area B \*see Support

#### Area C Arts and Humanities (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

#### Area D Social, Political, Economic Inst. (minimum 15 units)

No more than one course in any Area D category.

- Take one course from D1a and one from D1b
- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

#### Area E Life Understanding (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

#### Area F Technology (minimum 2 units)

- F1 Computer Literacy

#### Additional GE Courses

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES** ..... **15**

**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 | Production  | Production |
| BOT 121    | ZOO 131     | CHEM 111   |
| 2nd Year   |             |            |
| Fall       | Winter      | Spring     |
| Production |             |            |
| CRSC 221   | STAT 218    | BOT 323    |
| ZOO 335    | CHEM 212    | CHEM 313   |
| 3rd Year   |             |            |
| Fall       | Winter      | Spring     |
| CRSC 311   | CRSC 405    | CRSC 304   |
| CRSC 411   | BIO 302/303 | CRSC 461   |
|            |             | SS 121     |
| 4th Year   |             |            |
| Fall       | Winter      | Spring     |
| CRSC 441   | CRSC 410    | CRSC 463   |
| CRSC 462   | CRSC 431    |            |
| BIO 325    |             |            |

**CROP SCIENCE MINOR**

The Crop Science minor is designed for students majoring in related academic disciplines who desire to seek careers in crop production or the associated industry. The minor offers a broad-based knowledge of the science and technology of agronomy and vegetable production, especially as it is practiced in California.

|  | <i>Units</i> |
|--|--------------|
| <b>Required courses</b> .....  | 14           |
| CRSC 131 Introduction to Crop Science (4)                                    |              |
| CRSC 132 Cereal Grain Production (4) or<br>CRSC 133 Row Crop Production (4)  |              |
| CRSC 201 Agricultural Chemical and Equipment<br>Safety (1)                   |              |
| CRSC 202 or VGSC 202 Enterprise Project (1)                                  |              |
| CRSC 221 Weed Science (4) or<br>VGSC 232 California Vegetable Production (4) |              |
| <b>Restricted elective courses</b> .....                                     | 16           |
| <i>Select any four courses from the following:</i>                           |              |
| BRAE 340 Irrigation Water Management (4)                                     |              |
| CRSC 304 Plant Improvement (4)   |              |
| CRSC 311 Insect Pest Management (4)  |              |
| CRSC 331 Commercial Seed Production and<br>Conditioning (4)                  |              |
| CRSC 421 Oil and Fiber Crops (4)   |              |
| CRSC 445 Cropping Systems (4)  |              |
| VGSC/FRSC 421 Postharvest Technology of<br>Horticultural Crops (4)           | —            |
|  | 30           |

**FRUIT SCIENCE MINOR**

The Fruit Science minor is designed for students majoring in related academic disciplines who desire to seek careers in fruit production or the associated industry. The minor offers a broad-based knowledge of the science and technology of pomology, viticulture, and citrus and avocado production.

|   | <i>Units</i> |
|---|--------------|
| <b>Required courses</b> .....                                 | 22           |
| FRSC 131 Pomology (4)   |              |
| FRSC 132 Pomology (4)   |              |
| FRSC 133 Pomology (4) or FRSC 231 Viticulture (4)             |              |
| FRSC 342 Citrus and Avocado Fruit Production (4)              |              |
| CRSC 201 Agricultural Chemical and Equipment<br>Safety (1)    |              |
| <sup>1</sup> FRSC 202 Enterprise Project (2)                  |              |
| <sup>1</sup> FRSC 402 Enterprise Project Management (3)       |              |
| <b>Restricted elective courses</b> .....                      | 8            |
| <i>Select any two courses from the following:</i>             |              |
| BRAE 340 Irrigation Water Management (4)                      |              |
| BOT 323 Plant Pathology (4)                                   |              |
| CRSC 311 Insect Pest Management (4)                           |              |
| CRSC 445 Cropping Systems (4)                                 |              |
| FRSC 331 Advanced Viticulture (4)                             |              |
| FRSC 332 Fruit Plant Propagation (4)                          |              |
| FRSC 421 Postharvest Technology of Horticultural<br>Crops (4) |              |
| FRSC 422 Tropical Crop, Fruit and Nut Production (4)          |              |
| FRSC 436 Advanced Production Problems (4)                     | —            |
|   | 30           |

**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.

|   | <i>Units</i> |
|---|--------------|
| <b>Required courses</b> .....   | 12           |
| <i>Advanced versions of the following courses may be substituted by production majors.</i>  |              |
| BOT 323 Plant Pathology or BOT 324 Ornamental<br>and Forest Pathology (4)   |              |
| CRSC 221 Weed Science (4)   |              |
| CRSC 311 Insect Pest Management (4)   |              |
| <b>Courses in area of emphasis</b> .....  | 16           |
| <i>For purposes of this minor, plant production majors include Crop Science, Fruit Science, Forestry and Natural Resources (Forestry Concentration) and Environmental Horticultural Science majors. Students must select an Emphasis I or Emphasis II based on their major.</i> |              |
| <u>I. Emphasis for Plant Production Majors</u> <i>Select four of the following (minimum of 16 units):</i>   |              |
| BOT 322, 325, 431; CRSC 327, 405, 410, 431, 441;<br>FNR 303; ZOO 335  |              |
| OR:   |              |
| <u>II. Emphasis for Non-Plant Production Majors</u><br>(minimum of 16 units)  |              |
| A. <i>Select one of the groups below (12 units):</i>  |              |
| CRSC 131, 132, 421  |              |
| FRSC 131, 231, 342  |              |
| CRSC 131, VGSC 232, VGSC 423  |              |
| OH 121, OH 124/243, OH 324/424  |              |
| FNR 201, 204, 208, 260  |              |
| AND   |              |
| B. <i>Select one course from Section I: Plant Production Majors (4 units)</i>   |              |
|   | —            |
|   | 28           |

<sup>1</sup> All project requirements must be met to receive full credit; some projects may require a one-year commitment.

# DAIRY SCIENCE DEPARTMENT

Dairy Science Bldg. (18-2), Room 100  
(805) 756-2560

## Faculty

Department Head (Interim), Leslie S. Ferreira

Leanne M. Berning  
Nana Y. Farkye  
William T. Gillis  
Stanley L. Henderson  
Rafael Jimenez-Flores  
Edwin H. Jaster  
Gary D. Reif  
Phillip S. Tong

## 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.

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.

## B.S. DAIRY SCIENCE

For course prerequisites, 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 300-400 level coursework is required.

### MAJOR COURSES

|  | Units     |
|--|-----------|
| DSCI 100 Enterprise Project or   |           |
| DSCI 339 Internship in Dairy Science .....   | 2         |
| DSCI 101 Dairy Feeds and Feeding .....   | 4         |
| DSCI 121 Elements of Dairying .....  | 4         |
| DSCI 134 Intro. to Dairy Products Technology .....   | 4         |
| DSCI 202 Dairy Promotion and Marketing .....   | 4         |
| DSCI 223 Frozen Dairy Foods or   |           |
| DSCI 241 Dairy Cattle Selection, Breeds, Fitting<br>and Showing .....  | 4         |
| DSCI 233 Milk Processing and Inspection .....  | 4         |
| DSCI 234 Dairy Foods Evaluation .....  | 2         |
| DSCI 301 Dairy Cattle Nutrition or   |           |
| DSCI 401 Physical and Chemical Properties of<br>Dairy Products .....   | 4         |
| DSCI 321 Lactation Physiology or   |           |
| DSCI 444 Dairy Microbiology .....  | 4         |
| DSCI 330 Artificial Insemination and Embryo<br>Biotechnology or DSCI 434 Cheese and Fermented<br>Dairy Foods .....                     | 4         |
| DSCI 333 Dairy Cattle Management, Safety and<br>Animal Well-Being or DSCI 402 Quality Assurance<br>and Control of Dairy Products ..... | 4         |
| DSCI 422 Breeding and Genetics of Dairy Cattle or<br>DSCI 435 Concentration/Fractionation and Butter<br>Technology .....               | 4         |
| DSCI 432 Advanced Dairy Herd Management or   |           |
| DSCI 433 Dairy Plant Management & Equipment  | 4         |
| DSCI 461 Senior Project .....  | 2         |
| DSCI 462 Senior Project .....  | 2         |
| DSCI 463 Undergraduate Seminar .....   | 2         |
|  | <b>58</b> |

### SUPPORT COURSES

|  |    |
|--|----|
| * = Courses satisfy General Education requirement  |    |
| BACT 221 General Bacteriology (B1b)* .....   | 4  |
| CHEM 111 Survey of Chemistry (B1a)* .....  | 5  |
| CHEM 212 Survey of Organic Chemistry or  |    |
| BIO 151 Introduction to Biology (Area B)* .....  | 5  |
| Adviser approved electives .....   | 41 |
| At least 24 units must be 300-400 level. May be<br>selected from one of the following areas: dairy<br>management, dairy industry, agriculture<br>communications, pre-grad, pre-vet, agriculture<br>education, dairy products technology, dairy<br>processing pre-graduate. |    |

55

**GENERAL EDUCATION (GE) ..... 58**

*A minimum of 72 units is required for GE; 14 of these units are in Major/Support; a minimum of 58 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

*Take one course from A1, A2, A3:*

A1 Expository Writing

A2 Critical Thinking

A3 Speech

*If less than 11 units, take one additional course in:*

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 6 units)

*14 units are in Support.*

B1a Physical Sciences \*see Support

B1b Life Sciences elective \*see Support

*Take two courses from B2:*

B2 Mathematics and/or Statistics

Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one additional course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

F1 Computer Literacy

**Additional GE Courses**

*To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.*

**ELECTIVES ..... 15**

# ENVIRONMENTAL HORTICULTURAL SCIENCE DEPARTMENT

**Agricultural Sciences Bldg. (11), Room 244**  
**(805) 756-2279 FAX (805) 756-2869**

## Faculty

### Interim Department Head, Virginia R. Walter

|                     |                     |
|---------------------|---------------------|
| Stephen F. Angley   | Robert P. Rice, Jr. |
| Thomas E. Eltzroth  | David J. Wehner     |
| David W. Hannings   | Michael D. Zohns    |
| Daniel E. Lassanske |                     |

## Program

### B.S. Environmental Horticultural Science

The Bachelor of Science degree in Environmental Horticultural Science 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 Environmental Horticultural Science 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, 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 30 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.

### 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 111 | CHEM 212 | SS 121  |
| 2nd Year |          |         |
| Fall     | Winter   | Spring  |
| OH 221   | OH 222   |         |
| OH 232   |          |         |
| SS 221   |          |         |
| 3rd Year |          |         |
| Fall     | Winter   | Spring  |
| CRSC 311 |          | BOT 324 |
| 4th Year |          |         |
| Fall     | Winter   | Spring  |
| OH 461   | OH 463   | OH 462  |
| OH 427   |          |         |

**B.S. ENVIRONMENTAL HORTICULTURAL SCIENCE**

For course prerequisites, 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 300-400 level coursework is required.

**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 .....             | 4     |
| 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. 300-400 level.....                  | 30    |

**74**

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |   |
|---|---|
| ACTG 211 Financial Accounting for Nonbusiness Majors.....   | 4 |
| BIO 302/BOT 223/PHYS 104/PSC 101 (Area B)* .....  | 3 |
| BOT 121 General Botany (B1b)* .....   | 4 |
| BOT 322 Introductory Plant Physiology (Area B)* .....   | 4 |
| BOT 324 Ornamental and Forest Pathology .....   | 4 |
| BUS 201/207 Business Law Survey .....   | 3 |
| CHEM 111 General Chemistry (B1a)* .....   | 5 |
| CHEM 212 Survey of Organic Chemistry (Area B)* ....   | 5 |
| CSC 110 Computers & Computer Applications or AG 250 Computer Appl. to Agriculture (F1)* .....     | 3 |
| CRSC 311 Insect Pest Management .....   | 4 |
| MATH 118 Pre-Calculus Algebra (B2)* .....   | 4 |
| (or MATH 116 & MATH 117)  |   |
| SPAN 111 Elementary Hispanic Language and Culture (USCP).....                                     | 4 |
| SS 121 Introductory Soil Science .....  | 4 |
| SS 221 Fertilizers .....  | 4 |
| STAT 130 Intro. to Statistical Reasoning or STAT 218 Applied Statistics for Life Sciences (B2)* . | 3 |

**58**

**GENERAL EDUCATION (GE) ..... 49**

A minimum of 72 units is required for GE; 23 of these units are in Major/Support; a minimum of 49 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 9**

**190**

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# FOOD SCIENCE AND NUTRITION DEPARTMENT

**Agricultural Sciences Bldg. (11), Room 261  
(805) 756-2660**

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## Faculty

### Department Chair, Rudy A. Wooten

|                      |                              |
|----------------------|------------------------------|
| Louise A. Berner     | Krishnakumar (Kris) S. Morey |
| Madoka Dawson        | Joseph Montecalvo, Jr.       |
| Brian C. Hampson     | O. Robert Noyes              |
| Cynthia J. Heiss     | Mary E. Pedersen             |
| Hany M. Khalil       | Robert D. Vance              |
| Kathleen A. McBurney | Paul R. Weckler              |

## 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 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. IFT scholarship eligibility may require completion of selected courses in food engineering, technical calculus, and chemistry.

## 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**

For course prerequisites, 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 300-400 level coursework is required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|  |   |
|--|---|
| FSN 125 Introduction to Food Science.....  | 5 |
| FSN 154 Basic Calculations in Food Processing .....                                  | 4 |
| FSN 204 Food Processing Operations .....   | 4 |
| FSN 209 Animal Food Products or FSN 211 Meats .....                                  | 3 |
| FSN 210 Nutrition (E2)*.....   | 3 |
| FSN 244 Cereal and Bakery Science.....   | 4 |
| FSN 274 Food Plant Sanitation and Safety .....                                       | 4 |
| FSN 325 Food Quality Control.....  | 5 |
| FSN 334 Food Packaging.....  | 3 |
| FSN 364 Food Chemistry .....   | 4 |
| FSN 374 Food Laws and Regulations.....   | 4 |
| FSN 384 Processed Meat and Poultry Products .....                                    | 4 |
| FSN 434 Food Analysis .....  | 4 |
| FSN 444 Engineering Concepts in Food Processing or<br>FSN 494 Food Engineering ..... | 4 |
| FSN 455 Product Development and Sensory<br>Evaluation .....                          | 5 |
| FSN 461 Senior Project .....   | 3 |
| FSN 462 Senior Project .....   | 3 |
| FSN 463 Undergraduate Seminar.....   | 2 |
| FSN 474 Advanced Food Processing .....   | 4 |

Units

72

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |   |
|---|---|
| AG 250 Computer Applications in<br>Agriculture (F1)*.....   | 3 |
| BACT 221 General Bacteriology (B1b)* .....  | 4 |
| BACT 421 Food Microbiology .....  | 4 |
| CHEM 111 Survey of Chemistry or<br>CHEM 127, 128 General Chemistry (B1a)* .....                       | 5 |
| CHEM 212 Survey of Organic Chemistry (Area B)* .....  | 5 |
| CHEM 313 Survey of Biochemistry and<br>Biotechnology (Area B)*.....                                   | 5 |
| <sup>1</sup> MATH 118 Pre-Calculus Algebra or MATH 131 and<br>MATH 132 Technical Calculus (B2)* ..... | 4 |
| PHYS 104 Introductory Physics (Area B)* .....   | 4 |
| STAT 218 Applied Statistics for the Life Sciences (B2)*<br>.....                                      | 4 |
| DSCI 231 General Dairy Manufacturing.....   | 4 |
| Animal science adviser approved elective.....   | 3 |
| Business adviser approved elective .....  | 3 |
| Plant science adviser approved elective .....   | 4 |

52

**GENERAL EDUCATION (GE) ..... 46**

A minimum of 72 units is required for GE; 26 of these units are in Major/Support; a minimum of 46 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.

B1b Life Sciences \*see Support

B1a Physical Sciences \*see Support

B2 Mathematics and/or Statistics \*see Support

Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

3 units are in Major.

No more than one course in any Area E category.

E2 Self Development \*see Major

**Area F Technology** (no additional units required)

3 units are in Support.

F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES ..... 16**

186

<sup>1</sup> 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. NUTRITIONAL SCIENCE**

For course prerequisites, 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 300-400 level coursework is required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   |   |
|---|---|
| FSN 101 Orientation to Nutritional Science .....                | 1 |
| FSN 121 Fundamentals of Food .....                              | 4 |
| FSN 209 Animal Food Products .....                              | 3 |
| FSN 210 Nutrition (E2)* .....                                   | 3 |
| FSN 230 Elements of Food Processing .....                       | 4 |
| FSN 250 Food and Nutrition: Customs and Culture (USCP) .....    | 3 |
| FSN 251 Food and Nutrition: Customs and Culture Laboratory..... | 1 |
| 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 Nutrition Education and Communications ...              | 4 |
| FSN 416 Community Nutrition.....                                | 4 |
| FSN 426 Food Systems Management.....                            | 3 |
| FSN 429 Clinical Nutrition I.....                               | 4 |
| FSN 430 Clinical Nutrition II .....                             | 4 |
| FSN 461 Senior Project .....                                    | 2 |
| FSN 462 Senior Project .....                                    | 2 |
| FSN 463 Undergraduate Seminar.....                              | 2 |

Units

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67**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |   |
|---|---|
| ACTG 211 Financial Accounting for Nonbusiness Majors.....                                     | 4 |
| AG 250 Computer Application to Agriculture or CSC 110 Computers and Computer Applic. (F1)* .. | 3 |
| ANT 201 Cultural Anthropology (D4a)* .....  | 3 |
| BACT 221 General Bacteriology (B1b)*.....   | 4 |
| BACT 421 Food Microbiology .....  | 4 |
| CHEM 111 General Chemistry (B1a)*.....  | 5 |
| CHEM 212 Survey of Organic Chemistry.....   | 5 |
| CHEM 313 Survey of Biochemistry & Biotechnology..   | 5 |
| ECON 201 Survey of Economics (D3)* .....  | 3 |
| <sup>1</sup> MATH 118 Pre-Calculus Algebra (B2)* .....  | 4 |
| BUS 384 Human Resources Management.....   | 4 |
| SOC 105 Introduction to Sociology .....   | 3 |
| STAT 218 Applied Statistics for Life Sciences (B2)* ....                                      | 4 |
| ZOO 131 General Zoology (Area B)* .....   | 4 |
| ZOO 240 Human Anatomy and Physiology I (Area B)*  | 5 |
| ZOO 241 Human Anatomy and Physiology II (Area B)*   | 5 |

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65**GENERAL EDUCATION (GE) .....** 40

A minimum of 72 units is required for GE; 32 of these units are in Major/Support; a minimum of 40 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.

B1b Life Sciences \*see Support

B1a Physical Sciences \*see Support

B2 Mathematics and/or Statistics \*see Support

Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 9 units)

6 units are in Support

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take one course from D2 or D4b

D2 History (300-400 level)

D3 Economics \*see Support

D4a Social Institutions \*see Support

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

3 units are in Major.

No more than one course in any Area E category.

E2 Self Development \*see Major

**Area F Technology** (no additional units required)

3 units are in Support.

F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES.....** 14

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186

<sup>1</sup> 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.

|   |             |
|---|-------------|
| <b>Required core:</b> .....   | Units<br>18 |
| FSN 125 Introduction to Food Science (5)  |             |
| FSN 204 Food Processing Operations (4)  |             |
| FSN 274 Food Plant Sanitation and Safety (4)  |             |
| FSN 325 Food Quality Control (5)  |             |
| <b>Emphasis area courses:</b> .....   | 9           |
| Select courses (9 units) from the following list to complete the requirements for the minor |             |
| FSN 154 Basic Calculations in Food Processing (4)   |             |
| FSN 209 Animal Food Products (3) or FSN 211 Meats (3)                                       |             |
| FSN 244 Cereal and Bakery Science (4)   |             |
| FSN 341 Wines and Fermented Foods (3)   |             |
| FSN 354 Packaging Function in Food Processing (4)   |             |
| FSN 364 Food Chemistry (4)  |             |
| FSN 374 Food Laws and Regulations (4)   |             |
| FSN 384 Processed Meat and Poultry Products (4)   |             |
| FSN 410 Nutritional Aspects of Food Processing (3)  |             |
| FSN 434 Food Analysis (4)   |             |
| FSN 444 Engineering Concepts in Food Processing (4)   |             |
| FSN 455 Product Development and Sensory Evaluation (5)                                      |             |
| FSN 474 Advanced Food Processing (4)  |             |
| DSCI 231 General Dairy Manufacturing (4)  |             |
| BACT 421 Food Microbiology (4)  |             |
| PM 250 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.

|   |             |
|---|-------------|
| <b>Required core:</b> .....   | Units<br>15 |
| FSN 210 Nutrition (3) (E2)  |             |
| 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)   |             |
| <b>Emphasis area courses:</b> .....   | 12          |
| Select courses (12 units) from one of the following areas to complete the requirements for the minor. |             |
| <i>Clinical Nutrition</i>   |             |
| FSN 412 Experimental Nutrition (2)  |             |
| FSN 429 Clinical Nutrition I (4)  |             |
| FSN 430 Clinical Nutrition II (4)   |             |
| CHEM 337/338 Clinical Chemistry (3)   |             |
| CHEM 377 Chemistry of Drugs and Poisons (3)   |             |
| PSY 317 Psychology of Stress (4)  |             |
| <i>Food Service Management</i>  |             |
| FSN 274 Food Plant Sanitation and Safety (4)  |             |
| FSN 343 Institutional Foodservice I (3)   |             |
| FSN 344 Institutional Foodservice II (3)  |             |
| FSN 426 Food Systems Management (3)   |             |
| FSN 374 Food Laws and Regulations (4)   |             |
| <i>Community Nutrition</i>  |             |
| FSN 250 Food and Nutrition: Customs and Culture (3) (E2) (USCP)                                       |             |
| FSN 415 Nutrition Education and Communications (4)  |             |
| FSN 416 Community Nutrition (4)   |             |
| POLS 371 World Food Politics (3)  |             |
| PSY 317 Psychology of Stress (4)  |             |
| <i>Sports Nutrition</i>   |             |
| FSN 412 Experimental Nutrition (2)  |             |
| CHEM 337/338 Clinical Chemistry (3)   |             |
| CHEM 377 Chemistry of Drugs and Poisons (3)   |             |
| KINE 303 Physiology of Exercise (4)   |             |
| KINE 451 Nutrition for Fitness and Sport (3)  |             |
| PSY 304 Physiological Psychology (3)  |             |
|   | 27          |

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# MILITARY SCIENCE DEPARTMENT

**Dexter Bldg. (34), Room 115  
(805) 756-7682**

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## Faculty

### Department Head, Lieutenant Colonel Richard Kane

Captain Kirk McIntosh  
 Captain John Bechtol  
 Captain Robert Wooldridge  
 Sergeant First Class Michael Johnson

### 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 \$150 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 \$150 a month allowance for the duration of the scholarship. Students interested in ROTC scholarship should contact the Military Science Department. 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 challenging opportunity 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 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 obligation, participation in ROTC activities is encouraged but not mandatory. Entry to 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 for attending this camp.

### 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, 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 prestigious commission in the United States Army. In return for the student's commitment, the Military Science Department will provide \$150 a month, classroom instruction, real leadership opportunities, and continuous professional development of their leadership skills. After their first year of the Advanced Phase, cadets usually attend a five-week camp where their leadership skills are further developed and assessed. 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 substantial 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)
- <sup>1</sup> 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)
- <sup>2</sup> 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)

<sup>1</sup> Basic Camp is an *optional* 6-week summer training course (1-7 units) at Fort Knox, Kentucky.

<sup>2</sup> Advanced Camp is a *required* 6-week summer training experience at Fort Lewis, Washington (6 credits).

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Military Science and other subjects.

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# NATURAL RESOURCES MANAGEMENT DEPARTMENT

**Agricultural Sciences Bldg. (11), Room 217  
(805) 756-2702**

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## Faculty

### Department Head, Norman H. Pillsbury

|                      |                     |
|----------------------|---------------------|
| Brian C. Dietterick  | Douglas D. Piirto   |
| Samantha Gill        | Carolyn B. Shank    |
| John H. Harris       | Scott Stevens       |
| William W. Hendricks | Richard P. Thompson |
| Walter R. Mark       | James R. Vilkitis   |
| Timothy G. O'Keefe   |                     |

## 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
- Natural Resources Recreation

### B.S. Recreation Administration

*Students may select Adviser Approved Electives or a Concentration in:*

- Commercial/Tourism Management
- Natural Resources 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.

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 manager.

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.

**Senior Fall Field Quarter.** Starting Fall Quarter 2000, seniors must complete a full course load at Swanton Pacific Ranch, contingent on facilities. This experience will emphasize the integration of practical field skills and independent learning, with the acquisition of knowledge about natural resources and its management, including soils, water, trees, wildlife, forage.

FNR 402, FNR 412, and FNR 416 will be taught each Fall at Swanton Pacific. It is important that students plan their class schedule in order to satisfy the prerequisites for these courses. For a fee, room and board will be available at Swanton. Prior to facility availability at Swanton, these course will be taught at Cal Poly with laboratories and field activities using Swanton Pacific and local resource areas.

Students are required to complete a period of natural resources related work experience equivalent to one quarter of full-time work. This can be accomplished by the completion of an internship, a seasonal job, volunteer work, or cooperative education course. Work experience for academic credit must be documented by work supervisor and approved by student's academic adviser.

Students are required to purchase 8 inch high field boots, hard-hats (OSHA approved), hand calculator capable of linear regression, 10X hand lens, and an engineers scale ruler prior to taking 200- or 300-level major courses. Students are strongly encouraged to purchase a laptop (preferably Macintosh) before beginning 300-level major courses.

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 3800 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 field experiences.

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 an institution accredited 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, natural resources 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.

**Natural Resources 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 111        |
| FNR 201        | MATH 120        | SS 121          |
| GEB            | GEB             | GEB             |
| 2nd Year       |                 |                 |
| Fall           | Winter          | Spring          |
| FNR 208        | FNR 260         | ENGL 218        |
| BRAE 247       | AGB 212         | STAT 218        |
| CHEM 212 or    | GEB             | BIO 227         |
| BOT 223 or --> | PHYS 121        | GEB             |
| 3rd Year       |                 |                 |
| Fall           | Winter          | Spring          |
| FNR 306        | FNR 307         | FNR 365         |
| FNR 315        | FNR 326         | SS 121          |
| FNR 318        | FNR 335         | BRAE 345        |
| GEB            | STAT 313/Calc.  | (concentration) |
| 4th Year       |                 |                 |
| Fall           | Winter          | Spring          |
| FNR 402        | FNR 414         | FNR 435         |
| FNR 412        | FNR 419         | FNR 465         |
| FNR 416        | (concentration) | (concentration) |

**GEOGRAPHIC INFORMATION SYSTEMS FOR AGRICULTURE MINOR**

This minor is an interdisciplinary program sponsored by three departments: Bioresource and Agricultural Engineering, Natural Resources Management, and Crop Science. New technologies of geographic information systems (GIS), global positioning systems (GPS), and orthophotography (uniform scale aerial photographs) are revolutionizing the management of resources. There are great employment opportunities for those who understand the technologies and society will benefit from improved management decisions. Students interested in this minor may come from the following majors: forestry and natural resources; crop science; soil science; landscape architecture, agricultural systems management; or animal science.

For more information, see the Bioresource and Agricultural Engineering Department.

**B.S. FORESTRY AND NATURAL RESOURCES**

For course prerequisites, 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 300-400 level coursework is required.

|   | Units     |
|---|-----------|
| <b>MAJOR COURSES</b>  |           |
| FNR 140 Career Development and Planning in Natural Resources Management ..... | 1         |
| FNR 201 Introduction to Forest Ecosystem Mgmt .....                           | 3         |
| FNR 208 Dendrology .....  | 4         |
| FNR 260 Harvesting and Forest Utilization .....                               | 3         |
| FNR 306 Natural Resource Ecology & Habitat Mgmt ..                            | 4         |
| FNR 307 Fire Ecology .....  | 3         |
| FNR 315 Forest Mensuration and Sampling.....                                  | 4         |
| FNR/LA 318 Appl. GIS Natural Resources .....                                  | 3         |
| FNR 326 Natural Resources Economics & Valuation ..                            | 4         |
| FNR 335 Human Resources and Conflict Management in Natural Resources.....     | 4         |
| FNR 365 Silviculture and Vegetation Management ....                           | 3         |
| FNR 402 Forest Health.....  | 4         |
| FNR 412 Forest and Natural Resources Senior Assessment Project.....           | 4         |
| FNR 414 Timber Management .....   | 4         |
| FNR 416 Environmental Impact Analysis & Mgmt. ....                            | 4         |
| FNR 419 Watershed Management .....  | 4         |
| FNR 435 Natural Resources Policy Analysis.....                                | 4         |
| FNR 465 Ecosystem Management.....   | 4         |
| Concentration courses.....  | 24        |
|   | <b>88</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |           |
|--|-----------|
| AGB 212 Agricultural Economics .....   | 4         |
| BIO 227 Wildlife Biology (Area B)* .....   | 4         |
| BOT 121 General Botany (B1b)* .....  | 4         |
| BRAE/FNR 247 Forest Surveying.....   | 2         |
| BRAE 345 Aerial Photogram. & Remote Sensing .....  | 3         |
| CHEM 111 Survey of Chemistry (B1a)* .....  | 5         |
| ENGL 218 Professional Writing: Argumentation and Reports (A4)* .....   | 4         |
| <sup>1</sup> MATH 120 Pre-Calculus Algebra and Trig. (B2)* .....   | 5         |
| SS 121 Introductory Soil Science .....   | 4         |
| STAT 218 Applied Statistics in the Life Sciences (B2)*   | 4         |
| STAT 313 or College calculus (MATH 221) (Area B)*.   | 4         |
| Adviser approved science course (AreaB)*   |           |
| BOT 223/CHEM 212/PHYS 121) .....   | 5         |
| AG 250 Computer Application to Agriculture or CSC 113 Computers and Computer Applications: Macintosh (F1)* ..... | 3         |
|  | <b>51</b> |

**GENERAL EDUCATION (GE) ..... 45**

A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

4 units are in Support.

Take one course from A1, A2, A3.

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas C, D, E. No more than one additional course per area.

**ELECTIVES..... 8**

**192**

<sup>1</sup> 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 Internship .....   | 6  |
| FNR/CRP 404 Environmental Law or FNR 408<br>Water Resource Law and Policy..... | 3  |
| FNR 425 Applied Resource Analysis .....  | 4  |
| CRP 212 Introduction to Urban Planning.....                                    | 3  |
| ENVE 330 Environmental Quality Control .....                                   | 3  |
| Restricted electives with prior written approval of<br>adviser .....           | 5  |
|  | 24 |

**Forest Resources–Management Concentration**

|  |    |
|--|----|
| FNR 434 Wood Properties and Products .....                           | 5  |
| FNR 339 Internship .....   | 6  |
| FNR 204 Resource Fire Control .....                                  | 3  |
| Restricted electives with prior written approval of<br>adviser ..... | 10 |
|  | 24 |

**Forest Resources–Urban Forestry Concentration**

|  |    |
|--|----|
| FNR 311/OH 421 .....   | 4  |
| FNR 339 Internship .....   | 6  |
| FNR 350 Urban Forestry.....  | 3  |
| FNR 355 Hardwood and Woodlot Management .....                        | 4  |
| FNR 450 Community Forestry.....                                      | 3  |
| Restricted electives with prior written approval of<br>adviser ..... | 4  |
|  | 24 |

**Forest Resources–Watershed, Chaparral, and Fire  
Management Concentration**

|   |    |
|---|----|
| FNR 204 Resource Fire Control .....                                 | 3  |
| FNR 339 Internship.....   | 6  |
| FNR 360 Survey & Mgt. of Mediter. Ecosystems .....                  | 4  |
| SS 440 Forest and Range Soils .....                                 | 4  |
| Restricted electives with prior written approval of<br>adviser..... | 7  |
|   | 24 |

**Natural Resources Recreation Concentration**

|   |    |
|---|----|
| FNR 339 Internship.....   | 6  |
| FNR 311 Environmental Interpretation.....   | 4  |
| FNR 410 Resource Recreation Management .....  | 4  |
| FNR 417 Resource Recreation Planning.....   | 3  |
| REC 101 Introduction to Recreation Parks and<br>Tourism or FNR 112 Parks and Outdoor Recreation | 3  |
| Restricted electives with prior written approval of<br>adviser.....                             | 4  |
|   | 24 |

**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, natural resources recreation or a course of study in program management that includes: special events, sport management and public non-profit recreation. 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 for 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 educators, park rangers, park naturalists, recreation related business owners, 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 positions within the 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 businesses and recreation departments. Students operate major special events and programs and conduct applied 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 cultural diversity and international understanding are developed.

**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 leisure industry entrepreneurship; relates leisure services management to economic development.

**Natural Resources Recreation**

Students interested in leisure services related to the natural environment may choose this concentration. Two areas of study are offered: recreation resource management and natural resources tourism. The former area prepares students for employment in park and recreation departments at the local, county/regional, state and federal levels in positions including park directors, managers, rangers, naturalists, interpreters, environmental education specialists, and planners. The latter area focuses on tourism enterprise and business emphasizing economic development and sustainability of natural resources such as ecotourism, agri-tourism, rural tourism, sustainable tourism, and cultural and heritage tourism.

**B.S. RECREATION ADMINISTRATION**

*For course prerequisites, 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 300-400 level coursework is required.*

**MAJOR COURSES**

|  |           |
|--|-----------|
| REC 101 Intro. to Recreation, Parks and Tourism.....                 | 3         |
| REC 110 Career Develop and Planning in Rec Admin                     | 1         |
| REC 127 Cross Cultural Dimensions of Leisure.....                    | 4         |
| REC 210 Introduction to Program Design.....                          | 4         |
| REC 252 Recreation and Special Populations.....                      | 4         |
| REC 305 Recreation Areas and Facilities Management                   | 4         |
| REC 324 Legal and Legislative Patterns in Rec Admin                  | 4         |
| REC 360 Assessment and Eval of Rec Parks & Tourism                   | 4         |
| REC 405 Management and Leadership for Rec Admin                      | 4         |
| REC 424 Financing Recreation Services .....                          | 4         |
| REC 460 Research in Recreation, Parks and Tourism .                  | 4         |
| REC 461 Senior Project.....  | 3         |
| REC 463 Pre-Internship Seminar .....                                 | 1         |
| REC 465 Internship .....   | 6         |
| BUS 384 Human Resources Management .....                             | 4         |
| Concentration courses (see below) or adviser approved electives..... | 28        |
|  | <b>82</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |           |
|---|-----------|
| BUS 212 Financial Actg for Nonbusiness Majors .....                           | 4         |
| CSC 113 Computers and Computing or<br>AG 250 Computer Applications (F1)*..... | 3         |
| ENGL 310 Corporate Communications .....                                       | 4         |
| FNR 410/OH 337/LA 363.....  | 3         |
| JOUR 312 Introduction to Public Relations .....                               | 4         |
| BUS 346 Principles of Marketing .....   | 4         |
| STAT 217 Statistical Methods (B2)*.....                                       | 4         |
|   | <b>26</b> |

**GENERAL EDUCATION (GE) ..... 65**

A minimum of 72 units is required for GE; 7 of these units are in Major/Support; a minimum of 65 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 11 units)

4 units are in Support.

Take one course from B1a and one from B1b, one with lab:

- B1a Physical Sciences
- B1b Life Sciences elective

Take one additional course from B2:

- B2 Mathematics and/or Statistics \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES ..... 13**

**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 414 Organization and Development of<br>Commercial Leisure Services..... | 4  |
| Restricted electives .....  | 17 |
|   | 28 |

**Natural Resources Recreation Concentration**

|  |       |
|--|-------|
| REC 302 Environmental and Wilderness Education or<br>REC 311 Environmental Interpretation..... | 4     |
| REC 313 Issues in Natural Resources Tourism.....   | 4     |
| REC 314 Travel and Tourism Planning or REC 417<br>Resource Recreation Planning .....           | 4/3   |
| Restricted electives .....   | 16/17 |
|  | 28    |

**Adviser Approved Electives ..... 28**

**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        | REC 127                   |
|          | CSC 113/AG 250 | MATH                      |
| 2nd Year |                |                           |
| Fall     | Winter         | Spring                    |
| REC 210  | REC 252        | REC Elective              |
| BUS 212  | STAT 217       |                           |
| 3rd Year |                |                           |
| Fall     | Winter         | Spring                    |
| REC 305  | REC 324        | REC 360                   |
| ENGL 310 | BUS 384        | FNR 410/OH<br>337/ LA 363 |
| BUS 346  | JOUR 312       | REC Elective              |
| 4th Year |                |                           |
| Fall     | Winter         | Spring                    |
| REC 405  | REC 461        | REC 465                   |
| REC 460  | REC 424        |                           |
| REC 463  |                |                           |

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## SOIL SCIENCE DEPARTMENT

Science Bldg. (52), Room C-43  
(805) 756-2261 FAX (805) 756-5412

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### Faculty

**Department Chair, Thomas J. Rice, Jr.**

|                  |                  |
|------------------|------------------|
| Gaston Amedee    | Thomas A. Ruehr  |
| Delmar D. Dingus | Terry L. Smith   |
| Brent G. Hallock | Ronald D. Taskey |

### 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, 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 300-400 level coursework is required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   |    |
|---|----|
| 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 321 Soil Morphology .....                      | 4  |
| SS 322 Soil Fertility .....                       | 4  |
| SS 345 Soil Interpretations and Managaement ..... | 4  |
| SS 422 Soil Microbiology and Biochemistry .....   | 4  |
| SS 423 Soil and Water Chemistry .....             | 5  |
| SS 431 Soil Resource Inventory .....              | 4  |
| SS 432 Soil Physics .....                         | 5  |
| SS 461 Soils Senior Project.....                  | 1  |
| SS 462 Soils Senior Project.....                  | 3  |
| SS 463 Undergraduate Soils Seminar .....          | 2  |
| BOT 121 General Botany (B1b)* .....               | 4  |
| GEOL 201 Physical Geology .....                   | 3  |
| Concentration courses (see below).....            | 28 |

Units

**87**

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |   |
|--|---|
| BRAE 340/BRAE 415/BRAE 435/BRAE 440.....   | 3 |
| AG 250 Computer Application to Agriculture or<br>CSC 111 Intro. to Computer Applications (F1)* ..... | 3 |
| BACT 221 General Bacteriology (E2)* .....  | 4 |
| CHEM 127 General Chemistry (B1a)* .....  | 4 |
| CHEM 128 General Chemistry (Area B)* .....   | 4 |
| CHEM 129 General Chemistry (Area B)* .....   | 4 |
| CHEM 313 Survey of Biochemistry (Area B)*.....   | 5 |
| <sup>1</sup> MATH 118 Pre-Calculus Algebra or<br>MATH 141 Calculus I (B2)* .....                     | 4 |
| <sup>1</sup> MATH 119 Pre-Calculus Trigonometry or<br>MATH 142 Calculus II (B2)* .....               | 3 |
| <sup>2</sup> PHYS 104/PHYS 121/PHYS 131 (Area B)* .....  | 4 |
| <sup>3</sup> Statistics: choose one of the following:<br>CRSC 411/STAT 218/STAT 221 .....            | 4 |

**43**

**GENERAL EDUCATION (GE) ..... 45**

A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Support.

- B1b Life Sciences \*see Support
- B1a Physical Sciences \*see Support
- B2 Mathematics and/or Statistics \*see Support
- Area B \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

4 units are in Support.

No more than one course in any Area E category.

- E2 Self Development \*see Support.

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 11**

**186**

<sup>1</sup> Students in the Environmental Science and Technology concentration take MATH 141 and MATH 142.

<sup>2</sup> Students in the Environmental

<sup>3</sup> Students in the Environmental Science and Technology concentration take STAT 218/STAT 221.

**CONCENTRATIONS (select one):****Land Resources Concentration**

|  |          |
|--|----------|
| CHEM 212 Organic Chemistry.....  | 5        |
| Select 7 units from: CRP 212, CRP 214, GEOL 211,<br>SS 310, SS 433, SS 444, FNR 318, LA 318, LA 451                      | 7        |
| Additional courses selected from approved list. These<br>units may be selected to apply toward an approved<br>minor..... | 16       |
|  | <hr/> 28 |

**Environmental Management Concentration**

|   |          |
|---|----------|
| CHEM 212 Organic Chemistry.....   | 5        |
| Select 6 units: FNR 202, FNR 306, FNR 311, FNR<br>416, PHIL 340, REC 302..... | 6        |
| Select 6 units: CRP 404, CRP 408, CRP 420, FNR<br>404, FNR 408, POLS 451..... | 6        |
| Additional courses selected from approved list. ....                          | 11       |
|   | <hr/> 28 |

**Environmental Science and Technology Concentration**

|  |          |
|--|----------|
| CHEM 216 Organic Chemistry.....  | 4        |
| CHEM 217 Organic Chemistry.....  | 5        |
| CHEM 231 Quantitative Analysis I.....  | 5        |
| Select 11 units: CHEM 318, CHEM 341, CHEM 342,<br>CHEM 385, CHEM 481, ENVE 325, ENVE 330,<br>ENVE 434, ENVE 436, ENVE 439, SS 442..... | 11       |
| Additional courses selected from approved list.....  | 3        |
|  | <hr/> 28 |



### ARCE 321 Timber Structural Systems

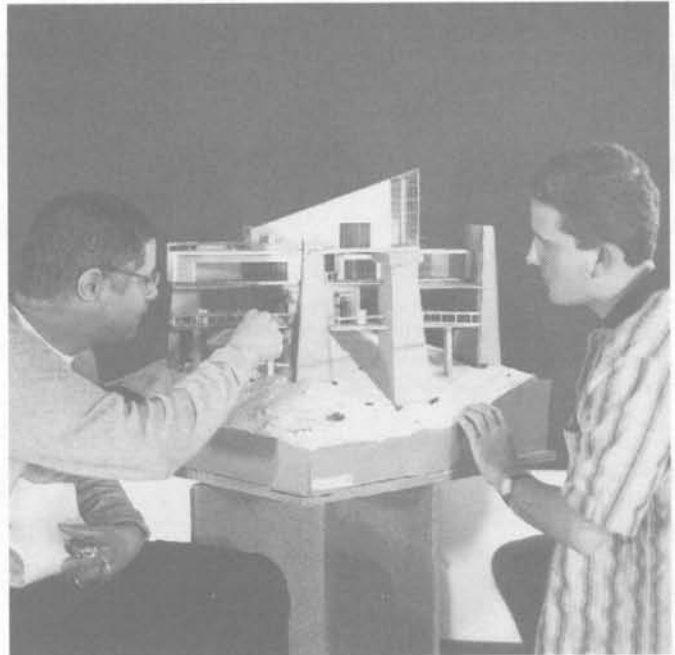
Patrick Bartlett, third year Architecture major, frames a structural system in model scale. Students build models to approximate scale and place structural members according to a schematic.

### Desk Critique

Thomas Fowler IV, Assistant Professor of Architecture, conducts a desk critique of Patrick's third year design project for ARCH 351 Architectural Design. After completing a preliminary design, Patrick built a schematic model for a one-on-one critique by Fowler. Patrick spent over 80 hours building this model within the first 5 weeks of the quarter.

The desk critique is an example of teaching methodology utilized by Cal Poly's Architecture faculty to encourage student's self-discovery. Throughout the five-year Architecture program, students are exposed to a wide range of critique sessions, from individual sessions with professors to formal juried sessions open to all interested members of the campus community. By the fifth year, students are working on complex, full-year projects.

*Photos by Josef Kasparowitz.*



# College of Architecture and Environmental Design

**Architecture and Environmental  
Design Bldg. (05), Room 212  
(805) 756-1321**

**Martin J. Harms, Dean  
K. Richard Zweifel, Associate Dean**

| <b>Department/Location:</b>    | <b>Program:</b>                                 |
|--------------------------------|---|
| Architectural Engineering      | Architectural Engineering: BS                   |
| Architecture                   | Architecture: B.Arch., MS                       |
| City and Regional Planning     | City and Regional Planning:<br>BS, MCRP         |
| with College of<br>Engineering | Transportation Planning:<br>MCRP/MS Engineering |
| Construction Management        | Construction Management: BS,<br>Minor           |
| Landscape Architecture         | Bachelor of Landscape<br>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 well-equipped 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. An active visiting lecturer program joins with faculty in all departments in providing excellent student instruction. 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 and Construction 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, Paul F. Fratessa

|                   |                  |
|-------------------|------------------|
| Mark Berrio       | Abraham C. Lynn  |
| Michael R. Botwin | Clayton Pharaoh  |
| Pamalee Brady     | Satwant S. Rihal |
| Jacob Feldman     | David Weggel     |

## 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 program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

The main focus of the architectural engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

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 Electives. Note: All ARCE majors must obtain a grade of C- or better in every ARCE course taken.

### MAJOR COURSES

|  | Units |
|--|-------|
| ARCE 221 Elementary Structures.....  | 3     |
| ARCE 222 Mechanics of Structural Members I .....   | 3     |
| ARCE 223 Mechanics of Structural Members II.....   | 4     |
| ARCE 225 Dynamics or<br>ME 212 Engineering Dynamics.....   | 3     |
| 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 351, 352, 353 Structural Computing<br>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<br>ARCE 447 Advanced Reinforced Concrete Lab.....   | 3     |
| ARCE 412 Dynamics of Framed Structures .....   | 3     |
| ARCE 421 Soil Mechanics .....  | 3     |
| ARCE 422 Foundation Design and<br>ARCE 444 Reinforced Concrete Lab .....                             | 3,3   |
| ARCE 445 Prestressed Concrete Design Laboratory or<br>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 Experimental Laboratory .....  | 1     |
| ARCE 483 Seismic Analysis and Design.....  | 4     |
| Approved technical electives.....  | 2     |

**74**

### SUPPORT COURSES

\* = Courses satisfy General Education requirements.

\*\* = One unit counts toward approved technical electives.

|  |     |
|--|-----|
| ARCH 106 Materials of Construction .....           | 3   |
| ARCH 111 Introduction to Drawing and Perspective . | 3   |
| ARCH 221, 222 Architectural Design Fundamentals .. | 3,3 |
| ARCH 231 Architectural Practice.....               | 3   |

|  |     |
|--|-----|
| ARCH 317/ARCH 318/ARCH 319 (C3)* .....   | 3,3 |
| CHEM 124 Gen Chem for the Eng Discipline (B1a)*  | 4   |
| CM 433 Economic Analysis for Engineers or<br>IME 314 Engineering Economics (3)** ..... | 2   |
| CSC 231 Fortran for Engineering Students or<br>CSC 234 C and UNIX (3) (F1)* .....      | 2   |
| CSC 342 Numerical Analysis I or approved<br>equivalent.....                            | 3   |
| EDES 101 Introduction to Architecture and<br>Environmental Design.....                 | 2   |
| EDES 113 Graphic Analysis and Communication.<br>Skills for Designers .....             | 3   |
| EE 201 Electrical Circuit Theory .....   | 3   |
| GEOL 201 Physical Geology (Area B)* .....  | 3   |
| MATH 141 Calculus I (B2)* .....  | 4   |
| MATH 142 Calculus II (B2)* .....   | 4   |
| MATH 143 Calculus III (Area B)* .....  | 4   |
| MATH 241 Calculus IV (Area B)* .....   | 4   |
| MATH 242 Differential Equations (Area B)* .....  | 4   |
| MATH 318/STAT 312/GEOL 205** (Area B)* .....   | 3   |
| ME 302 Thermodynamics .....  | 3   |
| ME 341 Fluid Mechanics .....   | 3   |
| PHYS 131 General Physics (Area B)* .....   | 4   |
| PHYS 132, 133 General Physics (Area B)*.....   | 4,4 |

84

**GENERAL EDUCATION (GE) .....** 43

A minimum of 72 units is required for GE; 29 of these units are in Major/Support; a minimum of 43 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one course from A4

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 2 units)

24 units are in Support.

Take one course from B1b:

- B1a Physical Sciences \*see Support
- B1b Life Sciences elective
- B2 Mathematics and/or Statistics \*see Support
- Area B \* see Support

**Area C Arts and Humanities** (minimum 12 units)

3 units are in Support.

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level) \*see Support

If less than 15 units, take one course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology**

2 units are in Support.

F1 Computer Literacy \*see Support

**ELECTIVES.....** 0

201

**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.

| 1 <sup>st</sup> Year                                    |  |  |
|---|--|--|
| Fall  | Winter   | Spring   |
| ARCH 111<br>EDES 101<br>MATH 141                        | ARCH 106<br>MATH 142<br>PHYS 131                               | EDES 113<br>MATH 143<br>PHYS 132                         |
| 2 <sup>nd</sup> Year                                    |  |  |
| Fall  | Winter   | Spring   |
| ARCE 221<br>ARCH 221<br>MATH 241<br>PHYS 133            | ARCE 222<br>ARCH 222<br>MATH 242<br>CSC 231<br>ARCE 225/ME 212 | ARCE 223<br>ARCE 227<br>ARCE 351<br>ARCH 231             |
| 3 <sup>rd</sup> Year                                    |  |  |
| Fall  | Winter   | Spring   |
| ARCE 302<br>ARCE 352<br>ARCE 371<br>ARCE 421<br>CSC 342 | ARCE 303<br>ARCE 306<br>ARCE 353<br>ARCE 457                   | ARCE 304<br>ARCE 305<br>ARCE 372<br>ARCE 412<br>ARCE 422 |
| 4 <sup>th</sup> Year                                    |  |  |
| Fall  | Winter   | Spring   |
| ARCE 444<br>ARCE 451<br>ARCE 483                        | ARCE 403 or 447<br>ARCE 452<br>ARCE 481<br>CM 433              | ARCE 453<br>ARCE 445 or 446                              |

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# ARCHITECTURE DEPARTMENT

**Architecture and Environmental Design Bldg. (05), Room 212A**  
**(805) 756-1316 FAX (805) 756-1500**

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## Faculty

**Director, Gilbert D. Cooke**

**Associate Director, Allan R. Cooper**

|                     |                         |
|---------------------|-------------------------|
| Joseph C. Amanzio   | Patrick D. Hill         |
| Sharad D. Atre      | George K. Ikenoyama     |
| James R. Bagnall    | Laura E. Joines-Novotny |
| William R. Benedict | Brian B. Kesner         |
| David A. Brodie     | Kenneth M. Kohlen       |
| Arthur J. Chapman   | Sandra D. Lakeman       |
| M. Polly Cooper     | John H. Lange           |
| John F. Cotton      | Karen Lange             |
| M. Bilgi Denel      | Larry H. Loh            |
| Serim Denel         | David Lord              |
| Donna P. Duerk      | Margot McDonald         |
| Thomas Fowler, IV   | Sandra D. Miller        |
| Merrill C. Gaines   | Daniel L. Panetta       |
| Bruno Giberti       | Jens G. Pohl            |
| Bradford C. Grant   | Don E. Swearingen       |
| Donald P. Grant     | Howard Weisenthal       |
| Terry C. Hargrave   | Donald S. Woolard       |
| George Hasslein     | Christopher Yip         |

## 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 Architecture Consortium**

The Washington Alexandria Consortium 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 Architecture Consortium, which is comprised of several universities including Cal Poly.

The Consortium 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*

\* = Courses satisfy General Education requirement.

|   |            |
|---|------------|
| ARCH 101 Survey of Architectural Ed 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 & Communication Skills       | 3          |
| ARCH 207 Environmental Control Systems I.....           | 4          |
| ARCH 231 Architectural Practice and Laboratory.....     | 3          |
| ARCH 250 Computer Applications (F1)*.....               | 3          |
| ARCH 251, 252, 253 Arch. Design Fund. 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 Project or         |            |
| <sup>1</sup> ARCH 521 Graduate Arch Design Project..... | 5,5,5      |
| ARCH 492 Senior Design Thesis or                        |            |
| <sup>1</sup> ARCH 592 Graduate Design Thesis.....       | 3          |
|   | <b>121</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |   |
|---|---|
| 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 Intro to Architecture and Envl Design..... | 2 |
| MATH 141 Calculus I (B2)*.....                      | 4 |
| MATH 142 Calculus II (B2)*.....                     | 4 |
| PHYS 131 General Physics (B1a)*.....                | 4 |
| PHYS 132 General Physics (Area B)*.....             | 4 |

|   |           |
|---|-----------|
| Upper division electives.....                       | 9         |
| CAED prefix professional electives.....             | 9         |
| Environment-behavior adviser approved elective..... | 3         |
| Urban context adviser approved elective.....        | 3         |
|   | <b>60</b> |

**GENERAL EDUCATION (GE)**..... **53**

*A minimum of 72 units is required for GE; 19 of these units are in Major/Support; a minimum of 53 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

*Take one course from A1, A2, A3:*

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

*If less than 11 units, take one course from A4*

- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

*16 units are in Support.*

*Take one course from B1b:*

- B1a Physical Sciences \*see Support
- B1b Life Sciences elective
- B2 Mathematics and/or Statistics \*see Support
- Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

*3 units are in Major.*

- F1 Computer Literacy \*see Major

**Additional GE Courses**

*To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.*

|                        |            |
|------------------------|------------|
| <b>ELECTIVES</b> ..... | <b>14</b>  |
|                        | <b>248</b> |

<sup>1</sup> Option for students intending to pursue a graduate degree.

**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 101                 |
| ARCH 111                 | ARCH 112                 | ARCH 113                 |
| MATH 141                 | MATH 142                 | PHYS 132                 |
|                          | PHYS 131                 |                          |
| 2nd Year                 |                          |                          |
| Fall                     | Winter                   | Spring                   |
| ARCH 250                 | ARCH 231                 | ARCH 207                 |
| ARCH 251                 | ARCH 252                 | ARCH 253                 |
| ARCE 221                 | ARCE 222                 | ARCE 226                 |
|                          |                          |                          |
| 3rd Year                 |                          |                          |
| Fall                     | Winter                   | Spring                   |
| ARCH 341                 | ARCH 307                 | ARCH 342                 |
| ARCH 351                 | ARCH 352                 | ARCH 353                 |
| ARCH 317                 | ARCH 318                 | ARCH 319                 |
| ARCE 321                 | ARCE 322                 | ARCE 323                 |
| 4th Year                 |                          |                          |
| Fall                     | Winter                   | Spring                   |
| ARCH 407                 | ARCH 441                 | ARCH 442                 |
| ARCH 451                 | ARCH 452                 | ARCH 453                 |
| ARCH 420                 | Electives                | Prof Electives           |
|                          |                          | Urban Context Electives  |
| 5th Year                 |                          |                          |
| Fall                     | Winter                   | Spring                   |
| ARCH 481/521             | ARCH 481/521             | ARCH 481/521             |
| ARCH 492/592             | 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**

|   | Units |
|---|-------|
| <b>Fall</b> .....   | 17    |
| ARCH 521 Graduate Architectural Design Project (5)<br>or adviser approved electives |       |
| ARCH 592 Graduate Design Thesis (3)   |       |
| GSB 511 Financial Accounting (4)  |       |
| GSB 512 Quantitative Analysis (4)   |       |
| GSB 513 Organizational Behavior (4)   |       |
| <b>Winter</b> .....   | 17    |
| ARCH 521 Graduate Architectural Design Project (5)<br>or adviser approved electives |       |
| GSB 521 Managerial Accounting (4)   |       |
| GSB 522 Managerial Science (4)  |       |
| GSB 523 Managerial Economics (4)  |       |
| <b>Spring</b> .....   | 17    |
| ARCH 521 Graduate Architectural Design Project (5)<br>or adviser approved electives |       |
| GSB 531 Managerial Finance (4)  |       |
| GSB 532 Information Systems (4)   |       |
| GSB 534 Production and Operations Management (4)                                    |       |

**SIXTH YEAR ARCHITECTURE/SECOND YEAR MBA**

|  |    |
|--|----|
| <b>Fall</b> .....                            | 16 |
| GSB 524 Marketing Management (4)             |    |
| GSB electives (8)                            |    |
| GSB or ARCH elective (4)                     |    |
| <b>Winter</b> .....                          | 16 |
| GSB 514 Business, Government and Society (4) |    |
| GSB electives (8)                            |    |
| GSB or ARCH elective (4)                     |    |
| <b>Spring</b> .....                          | 16 |
| GSB 533 Aggregate Economics (4)              |    |
| GSB 562 Business Strategy and Policy (4)     |    |
| GSB electives (8)                            |    |

**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.

**Graduate Study Areas**

The graduate study topics are challenging. Each is of critical importance to the architecture, engineering, and construction industry. The knowledge and experience students bring to the program are fully employed. At the same time new practices and new knowledge are acquired. These study areas are:

**Computer-Aided Design** – focusing on the development and utilization of computer systems in the architectural process, with particular emphasis on design information representation and management, the development and utilization of knowledge bases, and expert design assistants. Students are encouraged to participate in the research projects undertaken by the CAD Research Center of the College of Architecture and Environmental Design.

**Architectural Science** – focusing on the increasingly complex performance and technical aspects of architectural design and the knowledge and skills needed when designers deal with the challenges associated with such topics as energy responsive architecture acoustics, lighting, and wind-effects phenomena.

**Facility Management** – stresses the practice of coordinating the physical workplace with the people and work of an organization. It integrates the principles of business administration, architecture, and behavioral and engineering sciences. Facility management is concerned with the design, construction, maintenance, and management of physical

environments. Facility managers usually work as generalists managing teams of specialists such as architects, interior architects, interior designers, engineers, construction personnel, communication technicians, and so on.

**Part-Time Executive Masters** – oriented to full-time employed, mid-career professionals in the architecture, engineering and construction industry. Although the degree is in architecture, emphasis is placed on the development of core business skills rarely covered in professional education programs, including marketing, client relations, leadership and strategic management.

**CURRICULUM FOR M.S. ARCHITECTURE**

|  | <i>Units</i> |
|--|--------------|
| <b>Core Curriculum</b> .....   | 36           |
| ARCH 519 Theory of Architecture (3)  |              |
| ARCH 551 Architectural Design (15)   |              |
| ARCH 561 Advanced Design (9)   |              |
| ARCH 598 Master's Design Project (9) or  |              |
| ARCH 599 Master's Thesis (9)   |              |
| <b>Directed Electives</b> .....  | 9            |
| 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, William J. Siembieda

|                  |                  |
|------------------|------------------|
| Linda C. Dalton  | Ervin Martinez   |
| Linda L. Day     | Amer A. Moustafa |
| David T. Dubbink | Paul Wack        |

## 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. 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: land use planning and environmental planning.

## B.S. CITY AND REGIONAL PLANNING

Courses are displayed by Major, Support, General Education, and Electives.

### 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 460 Undergraduate Seminar .....  | 2     |
| CRP 461, CRP 462 Senior Project .....                                      | 2,2   |
| Adviser approved electives .....   | 13    |

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91

### SUPPORT COURSES

\* = Courses satisfy General Education requirement

|  |   |
|--|---|
| CSC 110 Computers and Computer Applications (F1)* .....              | 3 |
| ECON 211 Principles of Economics (D3)* .....                         | 3 |
| ECON 212 Principles of Economics.....                                | 3 |
| EDES 101 Introduction to Architecture and Environmental Design ..... | 2 |
| FNR 306 Natural Resources Ecology and Habitat Management .....       | 4 |
| GEOL 201 Physical Geology (B1a)* .....                               | 3 |
| LA 213 Site and Terrain Analysis.....                                | 4 |
| MATH 118 Pre-Calculus Algebra (B2)* .....                            | 4 |
| BUS 387/POLS 453/PSY 302.....  | 4 |
| POLS 472/471/452 .....   | 4 |
| STAT 221 Intro to Probability & Statistics (B2)*.....                | 5 |

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39

**GENERAL EDUCATION (GE)** ..... 54

A minimum of 72 units is required for GE; 18 of these units are in Major/Support; a minimum of 54 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one course from A4

- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 3 units)

12 units are in Support.

Take one course from B1b:

- B1a Physical Sciences \*see Support
- B1b Life Sciences elective
- B2 Mathematics and/or Statistics \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 12 units)

3 units are in Support.

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take two courses from D2, D4a, D4b

- D2 History (300-400 level)
- D3 Economics \*see Support
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**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<br>CRP 101   | CRP 111<br>CRP 212<br>MATH 118             | CRP 112<br>CSC 110<br>GEOL 201                                       |
| 2nd Year  |  |  |
| Fall  | Winter                                     | Spring   |
| CRP 201<br>CRP 211<br>STAT 211<br>ECON 211<br>LA 213                  | CRP 202<br>CRP 213<br>STAT 212<br>ECON 212 | CRP 203<br>CRP 214<br>CRP 216<br>FNR 306                             |
| 3rd Year  |  |  |
| Fall  | Winter                                     | Spring   |
| CRP 347<br>CRP 315<br>CRP 351<br>CRP electives                        | CRP 314<br>CRP 352<br>CRP electives        | CRP 348<br><br>CRP 353<br>CRP electives<br>POLS 472 or<br>471 or 452 |
| Summer: CRP 409   |  |  |
| 4th Year  |  |  |
| Fall  | Winter                                     | Spring   |
| CRP 460<br>CRP 451<br>CRP 420<br>BUS 387 or<br>POLS 453 or<br>PSY 302 | CRP 461<br>CRP 452<br>CRP 430              | CRP 462<br><br>CRP electives   |

**ELECTIVES** ..... 9



## 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 152).

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: Windows

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** ..... 54/56

#### 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 553 Project Planning Laboratory (4)
- 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)** ..... 11

#### Land Use Planning

- CRP 520 Feasibility Studies in Planning (4)
- CRP 548 Principles of City Design (3)
- Urban electives (4)

#### Environmental Planning

- CRP 545 Environmental Planning, Policies and Principles (4)
- Environmental electives (7)

**Adviser approved electives** ..... 7/5

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72

## 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:

- (a) 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.
- (b) 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.
- (c) 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 231 Fortran for Engineering Students
- 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:

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 results of the Graduate Record Examination (GRE) Aptitude Test to the Admissions Committee.

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 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> |
|--|--------------|
| <b>Core Courses</b> .....  | 72           |
| CE 523 Transportation System Planning (4)  |              |
| CE 528 Transportation Analysis or<br>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<br>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)  |              |
| CRP 553 Project Planning Laboratory (4)  |              |
| CSC, MATH, STAT or other approved quantitative<br>methods course (3)               |              |
| <b>Emphasis Area (select one of the following)</b> .....                           | 10           |
| <i>Urban Land Planning Emphasis</i>  |              |
| CRP 520 Feasibility Studies in Planning (4)  |              |
| CRP 548 Principles of City Design (3)  |              |
| Urban Land Planning electives (3)  |              |
| <i>Regional and Environmental Planning Emphasis</i>                                |              |
| CRP 404 Environmental Law (3) or Environmental<br>elective                         |              |
| Regional and Environmental Planning electives (7)                                  |              |
| <b>Approved CE/ENVE electives:</b> .....   | 8            |
| Electives may include: CE 422, 424, 522, 525, 527,<br>528, 529, 573; ENVE 411, 465 |              |

# CONSTRUCTION MANAGEMENT DEPARTMENT

Engineering West (21), Room 116-A  
(805) 756-1323

## Faculty

Department Head, James A. Rodger

William C. Epstein                      Carl E. Turnquist  
Harold A. Johnston                      Matthias R. Wall

## Programs

### B.S. Construction Management

#### Construction Management Minor

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 Electives.

| MAJOR COURSES   | Units |
|---|-------|
| CM 211 Construction Contract Documents.....                                     | 5     |
| 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 & Light Commercial<br>Construction Practices .....           | 3     |
| CM 342 Commercial, Institutional and Industrial<br>Construction Practices ..... | 3     |
| CM 343 Earthwork & Civil Works Constr. Practices ...                            | 3     |
| CM 352, 353 Building Support System Construction<br>Practices .....             | 4,4   |
| CM 364 Project Administration .....   | 3     |
| CM 431 Mgt. Interdisciplinary Functions in Constr. ...                          | 3     |
| CM 443 Principles of Construction Management.....                               | 3     |
| CM 444 Concrete Formwork & Temporary Struct. ....                               | 3     |
| CM 452 Project Controls .....   | 4     |
| CM 454 Building Estimating .....  | 4     |
| CM 463 Professional Practice for Senior Constructon<br>Project Managers .....   | 4     |
| 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     |
| <b>74</b>   |       |

## SUPPORT COURSES

\* = Courses satisfy General Education requirement

|   |     |
|---|-----|
| BRAE 237 Engineering Surveying I.....                                       | 2   |
| ARCE 421 Soil Mechanics .....   | 3   |
| Structural design electives .....   | 6   |
| Select two of ARCE 321/322/323  |     |
| BUS 214 Financial Accounting .....  | 5   |
| BUS 207 Business Law .....  | 4   |
| CRP 212 Introduction to Urban Planning .....                                | 3   |
| ECON 221 Microeconomics .....   | 4   |
| ECON 222 Macroeconomics (D3)*.....  | 4   |
| EDES 101 Introduction to Architecture and<br>Environmental Design .....     | 2   |
| ENGL 310 Corporate Communications.....                                      | 4   |
| GEOL 201 Physical Geology .....   | 3   |
| MATH 124 Finite Mathematics (B2)* .....                                     | 3   |
| MATH 141 Calculus I (B2)* .....   | 4   |
| PHYS 131 General Physics (B1a)* .....                                       | 4   |
| PHYS 132 General Physics (Area B)* .....                                    | 4   |
| STAT 251, 252 Statistical Inference for Management<br>I, II (Area B)* ..... | 4,4 |
| 300-400 level MGT or FIN elective .....                                     | 4   |
| <b>67</b>   |     |

## GENERAL EDUCATION (GE)

**50**

A minimum of 72 units is required for GE; 22 of these units are in Major/Support; a minimum of 50 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

### Area A Communication (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one course from A4

A4 Argumentative Writing \*see Support

### Area B Science and Mathematics (minimum 2 units)

18 units are in Support.

Take one course from B1b:

B1a Physical Sciences \*see Support

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Support

Area B \* see Support

### Area C Arts and Humanities (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 11 units)

4 units are in Support.

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take two courses from D2, D4a, D4b

D2 History (300-400 level)

D3 Economics \*see Support

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

F1 Computer Literacy (ARCH 250/CSC 110 recommended)

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES** ..... 0  
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        |
| EDES 101      | ARCH 106    | ARCH 111      |
| MATH 141      | MATH 124    | PHYS 132      |
|               | PHYS 131    |               |
| 2nd Year      |             |               |
| Fall          | Winter      | Spring        |
| ARCE 221      | BUS 214     | CM 211        |
| BRAE 237      | ECON 221    | CRP 212       |
| BUS 207       | STAT 252    | ECON 222      |
| STAT 251      |             | GEOL 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 463      | ARCE elective |
| ARCE elective | 300-MGT/FIN |               |

**CONSTRUCTION MANAGEMENT MINOR**

The Construction Management Minor provides students an introduction to the body of knowledge expected of persons pursuing careers in the construction industry. This 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 one of the professions involved in the built environment.

Enrollment in the minor is limited, and selection will be made based upon the applicant's performance in his or her major courses.

The Construction Management Minor is recommended for majors in architecture, architectural engineering, civil engineering, mechanical engineering and electrical engineering.

|   | Units |
|---|-------|
| CM 331 Construction Cost Control.....   | 3     |
| CM 332 Cost Alternatives Evaluation .....                                     | 4     |
| CM 333 Construction Contract Administration .....                             | 3     |
| Select two of the following three courses: .....                              | 6     |
| CM 341 Residential and Light Commercial<br>Construction Practices (3)         |       |
| CM 342 Commercial, Institutional and Industrial<br>Construction Practices (3) |       |
| CM 343 Earthwork and Civil Works Construction<br>Practices (3)                |       |
| CM 364 Project Administration.....  | 3     |
| CM 443 Principles of Construction Management .....                            | 3     |
| CM 452 Project Controls.....  | 4     |
| CM 454 Building Estimating.....   | 4     |

30

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# LANDSCAPE ARCHITECTURE DEPARTMENT

**Dexter Bldg.(34), Room 213  
(805) 756-1319**

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## Faculty

**Department Head, Walter D. Bremer**

|                 |                 |
|-----------------|-----------------|
| Brian A. Aviles | Alice C. Loh    |
| Gary R. Clay    | Gerald L. Smith |
| Gary C. Dwyer   | Dale A. Sutliff |
| Omar Faruque    | Walter M. Tryon |

### Affiliated Faculty:

Thomas J. Rice, Soil Science Department

## 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 Electives.*

|  | Units |
|--|-------|
| <b>MAJOR COURSES</b>   |       |
| LA 110 Graphic Comm 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 Intro to Computing in Landscape Architecture                        | 2     |
| LA 311 History of Landscape Architecture .....                             | 4     |
| LA 320 Design Theory for Landscape Architects .....                        | 3     |
| LA 321 Concepts in Environmental Decision Making .                         | 3     |
| LA 323 History of Twentieth Century Landscape Architecture.....            | 4     |
| 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 401 Research Project.....   | 1     |
| Concentration courses (see below).....                                     | 18    |

**118**

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement.

|  |     |
|--|-----|
| BRAE 237 Engineering Surveying I.....  | 2   |
| BRAE 337 Landscape Irrigation .....  | 3   |
| ARCE 311 Structures for Landscape Architects.....  | 3   |
| ARCH 317, 318, 319 History of Architecture (C3)* ...   | 3   |
| BIO 129 Natural History: Plant Communities or BOT 121 General Botany (B1b)* .....                        | 3/4 |
| BIO 227 Wildlife Conservation Biology (Area B)* .....  | 4   |
| BOT 238 Native Plant Materials or OH 381 Native Plants for California Landscapes .....                   | 3   |
| CM 325 Construction Management Practice .....  | 3   |
| CRP 212 Introduction to Urban Planning.....  | 3   |
| EDES 101 Intro Architecture & Environmental Design .   | 2   |
| MATH 118 Pre-Calculus Algebra (B2)* .....  | 4   |
| MATH 119 Pre-Calculus Trigonometry (Area B)*.....  | 3   |
| OH 231 Plant Materials .....   | 4   |
| OH 232 Plant Materials .....   | 4   |
| SS 121 Introductory Soil Science .....   | 4   |
| STAT 217 Applied Statistics for the Liberal Arts or STAT 218 Applied Stat. for the Life Sciences (B2)* . | 4   |

**51-52**

**GENERAL EDUCATION (GE) ..... 51**

*A minimum of 72 units is required for GE; 21 of these units are in Major/Support; a minimum of 51 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

*Take one course from A1, A2, A3:*

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

*If less than 11 units, take one course from A4*

- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

*18 units are in Support.*

*Take one course from B1b:*

- B1a Physical Sciences \*see Support
- B1b Life Sciences elective
- B2 Mathematics and/or Statistics \*see Support
- Area B \* see Support

**Area C Arts and Humanities** (minimum 12 units)

*3 units are in Support.*

*Take one course from each Area C category:*

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level) \*see Support

*If less than 15 units, take one course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

- F1 Computer Literacy

**Additional GE Courses**

*To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.*

**ELECTIVES..... 15-16**

**236**

**CONCENTRATIONS (select one)**

**Environmental Design**

|   |       |
|---|-------|
| LIB 302 Library Resources and Literature Searches ....  | 1     |
| LA 483 Special Studies in Landscape Architecture or<br>Upper division adviser approved electives..... | 12    |
| Adviser approved electives.....   | 5     |
|   | <hr/> |
|   | 18    |

**Recreation and Open Space**

|   |       |
|---|-------|
| LA 363 Recreation and Open Space Planning and<br>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     |
|   | <hr/> |
|   | 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     |
|  | <hr/> |
|  | 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            | MATH 119            | BIO 129/BOT 121     |
| MATH 118            |                     | SS 121              |
| 2nd Year            |                     |                     |
| Fall                | Winter              | Spring              |
| LA 251              | LA 231              | LA 253              |
| LA 201              | LA 252              | LA 310              |
| ARCH 317            | LA 311              | LA 323              |
| BIO 227             | BRAE 237            | OH 231              |
| 3rd Year            |                     |                     |
| Fall                | Winter              | Spring              |
| LA 3201             | LA 441              | LA 353              |
| LA 351              | LA 352              | LA 321              |
| ARCE 31             | BRAE 337            | CM 325              |
| OH 232              | CRP 212             | BOT 238/OH 381      |
| Summer: LA 300      |                     |                     |
| 4th Year            |                     |                     |
| Fall                | Winter              | Spring              |
| LA 451              | LA 452              | LA 442              |
|                     |                     | LA 461              |
|                     |                     | LA 401              |
|                     |                     | STAT 217/218        |
| 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 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 that have been ranked as among the best for faculty and students, and is the largest student computer lab in the CSU system.

*Photo by Jeff Goldberg/Esto Photographics*

College of  
*Business*

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# College of Business

**Business Bldg. (03), Room 455  
(805) 756-2704**

**William C. Boynton, Dean  
Walter E. Rice, Associate Dean  
Linda F. Emmick, Director of Advancement/Alumni Relations**

**Bachelor of Science Degrees:**

Business Administration, BS

*Concentrations:*

- Accounting .....
- Financial Management .....
- Human Resource Management .....
- Independent Course of Study .....
- International Business Management.....
- Management .....
- Management Information Systems ..
- Marketing Management .....

*Office*

- Accounting
- Finance
- Management
- Associate Dean
- Global Strategy and Law
- Management
- Management
- Marketing

Economics, BS .....

*Concentrations:*

- Business and Industrial Economics
- Independent Course of Study
- International Trade and Development
- Quantitative Economics

Economics

Industrial Technology, BS .....

Industrial Technology

**Minors:**

- Business .....
- Economics .....
- Integrative Technology .....
- Packaging .....

- College Advising Center
- Economics
- Industrial Technology
- Industrial Technology

**Graduate Programs:**

- Business Administration, MBA .....
- General MBA
- Agribusiness Specialization
- Architectural Management Track .....
- Bachelor of Architecture, MBA
- Engineering Management.....
- MBA & MS Engineering
- Industrial and Technical Studies, MA ..

- Graduate Management Programs
- Graduate Management Programs
- Graduate Management Programs
- Industrial Technology

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 the highest quality undergraduate program, while continually offering high quality graduate and other professional programs.
- 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 BS degree program in Business Administration and the Master of Business Administration are accredited by the AACSB—The International Association for Management Education. The BS degree program in Industrial Technology is accredited by the National Association of Industrial

Technology (NAIT). The objective of accreditation is to foster high quality in educational programs.

The college is organized into eight areas: Accounting, Economics, Finance, Global Strategy and Law, Industrial Technology, Marketing, Management and Graduate Management Programs. This organizational structure allows for programs of study that blend broad-based knowledge of the functional disciplines of Business and Economics with an in-depth study of particular discipline(s).

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.

### **Student Services Office**

**Jere Ramsey, Director**  
**Business Bldg., (03) Room 101**  
**(805) 756-1769**

The Student Services Office coordinates business student organizations, centralizes employment opportunities (co-op, internship, part-time), manages the Multicultural Business Center, counsels students with academic difficulties, organizes business student orientation programs, and provides tours for prospective students and their families.

### **Advising Center**

**Rebecca Just, Academic Adviser**  
**Edwina Baltierra, Academic Adviser**  
**Business Bldg. (03), Room 100**  
**(805) 756-2601**

The College of Business Advising Center provides academic advising services to all majors within the College of Business in conjunction with each student's faculty adviser. The Advising Center is open five days a week, eight hours per day during the quarter.

Faculty advisers provide information on course content, career planning, and specific areas of the concentration. Students may also seek information concerning graduate schools, co-ops, internships, and future jobs. Faculty advisers are assigned by the student's area office or by the student's concentration.

The Advising Center provides advice and clarification of university and college policies and procedures. Academic and administrative progress of all College of Business

students is monitored within the Advising Center. Students who are interested in the Business, Economics, or Packaging minors are also assisted here. Most student-related forms (such as curriculum substitution forms, withdrawal forms, and change of major forms) are processed in the Advising Center. Advisers are available by appointment to assist students with course scheduling. A majority of questions concerning general education and breadth and interpretation of transfer credit may be answered in the Advising Center upon the student's receipt of the initial evaluation provided to the student by the Evaluations Office.

Each College of Business student has a file in the Advising Center which is maintained in order to track the student's progress. Student evaluations, file information, and SIS+ (the Cal Poly student information database) are used for general advising purposes including: tracking student degree progress, monitoring student's grade point averages, verifying satisfaction of the Graduation Writing Requirement and United States Cultural Pluralism requirement, and on-course pre-graduation completion checks.

This office houses a wealth of information for students, including curriculum sheets and flowcharts for all College of Business majors, information on minors, articulation agreements, petitions and substitution forms, faculty directory information (including office numbers, office hours, telephone numbers, and e-mail addresses) and updates on course offerings and finals schedules. The Advising Center staff is available to answer most university and college questions or refer the student to the appropriate service on campus.

### **Transfer Students**

Transfer students to the College of Business should refer to the curricula listed for the appropriate major. Please note that all lower division courses may be completed at most California Community Colleges. Full time students who have successfully completed all lower division courses prior to transferring to the College of Business can usually anticipate graduating in six to eight quarters.

# BACHELOR OF SCIENCE DEGREE PROGRAMS

**B.S. Business Administration**

**B.S. Economics**

**B.S. Industrial Technology**

## B.S. BUSINESS ADMINISTRATION

The Business Administration degree consists of five components: Major, Concentration, Support, General Education, and Electives.

### MAJOR COURSES

|   | Units |
|---|-------|
| BUS 214 Financial Accounting .....  | 5     |
| BUS 215 Managerial Accounting.....  | 4     |
| BUS 207 Business Law.....   | 4     |
| BUS 404 Government and Social Influences<br>on Business .....   | 4     |
| BUS 391 Management Information Systems .....  | 4     |
| BUS 346 Principles of Marketing .....   | 4     |
| BUS 342 Financial Management .....  | 4     |
| BUS 371 Production and Operations Management .....  | 4     |
| BUS 387 Organizational Behavior .....   | 4     |
| <i>International business</i>   |       |
| Select one from: BUS 410, ECON 401, BUS 433,<br>BUS 402, BUS 446 (Accounting Concentration<br>students may take BUS 427)..... | 4     |
| BUS 401 Business Strategy and Policy Seminar.....   | 4     |
| BUS 461 Senior Project.....   | 2     |
| BUS 462 Senior Project.....   | 2     |
| Concentration courses (see following pages) .....   | 27-36 |

76/85

### SUPPORT COURSES

\* = Courses satisfy General Education requirement.

|   |   |
|---|---|
| CSC 119 Principles Business Data Processing (F1)*.....      | 4 |
| ECON 221 Microeconomics.....                                | 4 |
| ECON 222 Macroeconomics (D3)* .....                         | 4 |
| ECON elective (300-400 level) .....                         | 4 |
| MATH 124 Finite Mathematics (Area B)* .....                 | 3 |
| MATH 221 Calculus for Business and<br>Economics (B2)* ..... | 4 |
| STAT 251 Statistical Inference for Mgt. I (B2)* .....       | 4 |
| STAT 252 Statistical Inference for Mgt. II (Area B)* .....  | 4 |

31

## GENERAL EDUCATION (GE) ..... 49

A minimum of 72 units is required for GE; 23 of these units are in Support; a minimum of 52 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

### Area A Communication (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

### Area B Science and Mathematics (minimum 5 units)

15 units are in Major..

Take one course from B1a and one from B1b; one with lab

B1a Physical Sciences elective

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Major

Area B \* see Major

### Area C Arts and Humanities (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

### Area D Social, Political, Economic Inst. (minimum 11 units)

4 units in Support. No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take two courses from D2, D4a, D4b

D2 History (300-400 level)

D3 Economics \*see Support

D4a Social Institutions

D4b Social Institutions (300-400 level)

### Area E Life Understanding (minimum 3)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

### Area F Technology (no additional units required)

4 units are in Support.

F1 Computer Literacy \*see Support

### Additional GE Courses

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 23-30**

186

## ACCOUNTING

**Business Bldg. (03), Room 403  
(805) 756-1384**

### FACULTY

**Area Coordinator, Mary Beth Armstrong**

|                    |                         |
|--------------------|-------------------------|
| James A. Anderson  | M. Zafar Iqbal          |
| William C. Boynton | Earl C. Keller          |
| Janice L. Carr     | Charles R. (Tad) Miller |
| Douglas C. Cerf    | John C. Robison         |

The primary objectives of the Accounting Area 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.

### ACCOUNTING CONCENTRATION

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 (BUS 214 and BUS 215) 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 a variety of accounting subjects such as taxation, international accounting, and others.

|  |    |
|--|----|
| BUS 314 Tax Accounting.....              | 4  |
| BUS 321 Intermediate Accounting I .....  | 4  |
| BUS 322 Intermediate Accounting II ..... | 4  |
| BUS 323 Intermediate Accounting III..... | 4  |
| BUS 425 Auditing .....                   | 4  |
| Adviser approved electives.....          | 8  |
|  | 28 |

## FINANCE

**Business Bldg. (03), Room 402  
(805) 756-2821**

### FACULTY

**Area Coordinator, Kenneth D. Riener**

|                  |                     |
|------------------|---------------------|
| John Dobson      | Luc Soenen          |
| John R. Lindvall | Alan M. Weatherford |
| Han Shin         |                     |

The finance area prepares students for successful careers in the corporate world. In addition to dealing with the role of financial markets and institutions, the finance courses typically take a company perspective. Emphasis is placed on the role of the financial manager as it applies to a small company as a multinational firm. Students are provided with a thorough understanding and working knowledge of the many aspects related to the finance function.

### FINANCIAL MANAGEMENT CONCENTRATION

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.

|   |    |
|---|----|
| BUS 321 Intermediate Accounting I.....                | 4  |
| BUS 431 Security Analysis and Portfolio Management .. | 4  |
| BUS 433 International Business Finance Management ..  | 4  |
| BUS 443 Case Studies in Finance .....                 | 4  |
| Adviser approved electives .....                      | 11 |
|   | 27 |

## GLOBAL STRATEGY AND LAW

Business Bldg. (03), Room 406  
(805) 756-5068

### FACULTY

#### Area Coordinator, Allan Bird

|                   |                     |
|-------------------|---------------------|
| Dan Bertozzi, Jr. | Colette Frayne      |
| Lee B. Burgunder  | J. Michael Geringer |
| D. Jan Duffy      | Michael Levenhagen  |

The faculty in the Global Strategy and Law Area offers coursework in the fields of international management, business strategy and policy, and the legal, regulatory, and political environment of business. The courses offered in this Area integrate the teachings from other more functionally oriented Areas in the College of Business, with the objective of preparing students for strategic management and leadership in enterprises doing business in an increasingly global business environment.

### INTERNATIONAL BUSINESS MANAGEMENT CONCENTRATION

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.

|  |    |
|--|----|
| ECON 401 International Trade.....  | 4  |
| ECON 402 International Monetary Economics or<br>BUS 433 International Business Finance ..... | 4  |
| BUS 302 International Cross Cultural Mgmt. ....  | 4  |
| BUS 384 Human Resources Management.....  | 4  |
| BUS 403 Adv. Seminar in International Mgmt. ....   | 4  |
| BUS 446 International Marketing.....   | 4  |
| Adviser approved electives.....  | 7  |
| —  |    |
|  | 31 |

## MANAGEMENT

Business Bldg. (03), Room 405  
(805) 756-2012

### FACULTY

#### Area Coordinator, Michael W. Stebbins

|                     |                    |
|---------------------|--------------------|
| Joseph Biggs        | Eldon Y. Li        |
| Rebecca Ellis       | David A. Peach     |
| Barry Floyd         | James Sena         |
| Ray M. Haynes       | A. B. (Rami) Shani |
| Patricia A. McQuaid |                    |

The Management Area offers coursework in organization behavior, human resources management, management information systems, operations management, management science, and entrepreneurship. The Area objectives include: 1) to provide students with knowledge, skills, and competencies critical to managerial success in small and complex organizations; 2) to prepare students for initial employment and subsequent management career advancement; 3) to help professionally oriented students use theory, concepts, analytical tools, and problem solving techniques; and 4) to provide experiences that integrate functional business knowledge.

The Management Area includes the following concentrations: Human Resources Management, Management, Management Information Systems.

### HUMAN RESOURCES MANAGEMENT CONCENTRATION

This concentration prepares students for entry and advanced positions in personnel and labor relations. The concentration develops knowledge and competencies in staffing, employee training and development, compensation and benefits, union contract negotiation and administration, and related personnel subjects.

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.

|  |    |
|--|----|
| BUS 384 Human Resources Management.....        | 4  |
| BUS 471 Compensation.....                      | 4  |
| BUS 475 Staffing.....                          | 4  |
| BUS 476 Employee Training and Development..... | 4  |
| Adviser approved electives.....                | 16 |
| —  |    |
|  | 32 |

## MANAGEMENT CONCENTRATION

This concentration prepares students for supervisory and staff positions in both small and large enterprises. Students focus on small business management and entrepreneurship subjects or select a course of study tailored to their particular industry and occupational goals.

|  |    |
|--|----|
| BUS 382 Organization and Management Theory .....     | 4  |
| BUS 384 Human Resources Management.....              | 4  |
| BUS 302 International Cross Cultural Management..... | 4  |
| BUS 478 Organization Design .....                    | 4  |
| BUS 488 Small Business Management .....              | 4  |
| Adviser approved electives.....                      | 8  |
|  | 28 |

## MANAGEMENT INFORMATION SYSTEMS CONCENTRATION

The MIS concentration is a blend of computer science and business information systems knowledge. Students gain competencies in computer programming, analysis, design, and implementation of information systems. At graduation, students pursue diverse management and MIS opportunities within corporations and consulting firms.

|   |    |
|---|----|
| CSC 101 Fundamentals of Computer Science I .....            | 4  |
| CSC 102 Fundamentals of Computer Science II .....           | 4  |
| CSC 103 Fundamentals of Computer Science III.....           | 4  |
| CSC 233 COBOL Programming .....                             | 3  |
| BUS 490 Information Management and Database Systems .....   | 4  |
| BUS 493 Information Systems Analysis & Design .....         | 4  |
| BUS 496 Information Systems Design and Implementation ..... | 4  |
| Adviser approved electives.....                             | 9  |
|   | 36 |

## MARKETING

**Business Bldg. (03), Room 405  
(805) 756-1413**

### FACULTY

**Area Coordinator, Teresa (Terri) Swartz**

|               |                 |
|---------------|-----------------|
| Norm A. Borin | Lynn E. Metcalf |
| Jeffrey Danes | John C. Rogers  |
| R. Krishnan   |                 |

The objective of the Marketing Area is twofold: 1) to prepare students for rewarding careers in marketing, and 2) to provide non-marketing students with a basic understanding of marketing and its role in business. At the heart of marketing is a customer-focus; the same is true of the Area and its faculty. The marketing faculty is very student-oriented and is committed to helping students develop the skills necessary to successfully transition from the academic environment to the business world. The Area offers classes in the undergraduate and graduate degree programs offered through the College and works to tailor its courses to meet student needs.

### MARKETING MANAGEMENT CONCENTRATION

This concentration emphasizes coursework in a variety of areas including marketing research, buyer behavior, promotion, sales management, product management and services marketing. Graduates of this concentration are in demand for positions in marketing intelligence, research, advertising, product management and sales management.

|   |    |
|---|----|
| BUS 347 Marketing Research I .....  | 4  |
| BUS 348 Buyer Behavior.....   | 4  |
| BUS 455 Marketing Management.....   | 4  |
| Electives selected from: BUS 349, 446, 447, 448,<br>449, 450, 452, 453, 454, 451, 470 ..... | 16 |
|   | 28 |

## Independent Course of Study

**Business Bldg. (03), Room 455  
(805) 756-2285**

**Area Coordinator: Walter E. Rice, Associate Dean  
and Director of Undergraduate Programs**

### INDEPENDENT COURSE OF STUDY

Students have the option of choosing one of the previously mentioned concentrations or 27 units of adviser approved electives selected according to individual talents and interests. This option allows students to blend courses from a variety of areas to achieve specific career objectives.

## ECONOMICS

**Business Bldg. (03), Room 407  
(805) 756-2783**

### FACULTY

#### Area Coordinator, Artemis Papakyrizis

|                          |                      |
|--------------------------|----------------------|
| 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 Papakyrizis   |                      |

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. The Economics Area supports the concept of international education and encourages its students to investigate opportunities for overseas study.

### B.S. ECONOMICS

*Courses are displayed by Major, Support, General Education, and Electives.*

#### MAJOR COURSES

|  | Units     |
|--|-----------|
| * = Courses satisfy General Education requirement.   |           |
| BUS 214 Financial Accounting .....   | 5         |
| BUS 215 Managerial Accounting .....  | 4         |
| ECON 221 Microeconomics.....   | 4         |
| ECON 222 Macroeconomics (D3) * .....   | 4         |
| ECON 310 Quantitative Methods in Economics.....  | 4         |
| ECON 311, 312 Intermediate Microeconomics.....   | 4,4       |
| ECON 313, 314 Intermediate Macroeconomics .....  | 4,4       |
| ECON 337 Money, Banking and Credit .....   | 4         |
| ECON 417 Development of Economic Analysis .....  | 4         |
| ECON 461 Senior Project .....  | 2         |
| ECON 462 Senior Project .....  | 2         |
| MATH 221 Calculus for Business & Econ. (Area B)* .   | 4         |
| Restricted electives to be selected from: ECON 105,<br>303, 304, 306, 323, 324, 339, 401, 402, 403,<br>410, 413, 431, 432, 433, 434..... | 12        |
| Concentration courses or adviser approved electives  | 24        |
|  | <b>89</b> |

#### SUPPORT COURSES

|   |   |
|---|---|
| * = Courses satisfy General Education requirement.        |   |
| BUS 207 Business Law .....                                | 4 |
| CSC 119 Principles of Bus Data Processing (F1)* .....     | 4 |
| MATH 124 Finite Mathematics (B2)* .....                   | 3 |
| STAT 251 Statistical Inference for Mgt I (B2)* .....      | 4 |
| STAT 252 Statistical Inference for Mgt II (Area B)* ..... | 4 |

19

### GENERAL EDUCATION (GE) ..... 49

*A minimum of 72 units is required for GE; 23 of these units are in Major/Support; a minimum of 52 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

#### Area A Communication (minimum 11 units)

*Take one course from A1, A2, A3:*

A1 Expository Writing

A2 Critical Thinking

A3 Speech

*If less than 11 units, take one additional course in:*

A4 Argumentative Writing

#### Area B Science and Mathematics (minimum 5 units)

*15 units are in Major.*

*Take one course from B1a and one from B1b; one with lab*

B1a Physical Sciences elective

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Major

Area B \* see Major

#### Area C Arts and Humanities (minimum 15 units)

*Take one course from each Area C category:*

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one additional course from C1, C2, C3*

#### Area D Social, Political, Economic Inst. (minimum 11 units)

*4 units are in Support. No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

*Take two courses from D2, D4a, D4b*

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

#### Area E Life Understanding (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

E1 PSY 201/PSY 202

E2 Self Development

#### Area F Technology (no additional units required)

*4 units are in Support.*

F1 Computer Literacy \*see Support

#### Additional GE Courses

*To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.*

### ELECTIVES..... 26

**186**

**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 CONCENTRATION**

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.

|  |    |
|--|----|
| ECON 306 Applied Forecasting .....               | 4  |
| ECON 403 Industrial Organization .....           | 4  |
| ECON 413 Labor Economics .....                   | 4  |
| BUS 382 Organization and Management Theory ..... | 4  |
| Adviser approved electives.....                  | 8  |
|  | —  |
|  | 24 |

**INTERNATIONAL TRADE AND DEVELOPMENT CONCENTRATION**

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.

|  |   |
|--|---|
| 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 with BUS prefix, or any other discipline with approval of adviser.

—  
24

**QUANTITATIVE ECONOMICS CONCENTRATION**

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.

|                                    |    |
|------------------------------------|----|
| ECON 306 Applied Forecasting ..... | 4  |
| ECON 339 Econometrics .....        | 4  |
| Adviser approved electives .....   | 16 |
|                                    | —  |
|                                    | 24 |

**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.

Students select courses with adviser approval ..... 24



# INDUSTRIAL TECHNOLOGY

**Business Bldg. (03), Room 409  
(805) 756-2676**

## FACULTY

### Area Coordinator, Gerald E. Cunico

|                |                     |
|----------------|---------------------|
| Fred P. Abitia | Lezlie A. Labhard   |
| Larry W. Gay   | Lynn S. Mosher      |
| Roger L. Keep  | Anthony J. Randazzo |

The Industrial Technology Area offers the Bachelor of Science in Industrial Technology and the Master of Arts in Industrial and Technical Studies. This area also administers the Packaging and Integrative Technology Minors. The B.S. in Industrial Technology 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 technology blend the applied aspects of engineering and management. 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, marketing and training, production, quality management, facilities management, and packaging is provided through the selection of appropriate electives.

## B.S. INDUSTRIAL TECHNOLOGY

| MAJOR COURSES  | Units     |
|--|-----------|
| IT 137 Electronic Systems .....                      | 4         |
| IT 150 Mechanical Systems .....                      | 4         |
| IT 260 Manufacturing Processes .....                 | 4         |
| IT 303 Industrial Quality Management.....            | 4         |
| IT 326 Product Evaluation.....                       | 4         |
| IT 327 Plastics Technology .....                     | 4         |
| IT 330 Fundamentals of Packaging .....               | 4         |
| IT 332 Electrical Power Systems .....                | 4         |
| IT 333 Introduction to CAD and MIS.....              | 4         |
| IT 345 Applied Production Management .....           | 4         |
| IT 402 Technical and Management Presentations .....  | 4         |
| IT 410 Industrial Planning.....                      | 4         |
| IT 411 Industrial Safety and Health Management ..... | 4         |
| IT 428 Industrial Management and Strategy.....       | 4         |
| IT 461 Senior Project .....                          | 3         |
| BUS 371 Production and Operations Management ....    | 4         |
| Adviser approved electives.....                      | 12        |
|  | <b>75</b> |

## SUPPORT COURSES

\* = Courses satisfy General Education requirement.

|  |   |
|--|---|
| BUS 214 Financial Accounting .....                   | 5 |
| BUS 215 Managerial Accounting.....                   | 4 |
| BUS 404 Gov. & Social Influences on Bus. (D4b)* .... | 4 |
| CHEM 111 General Chemistry (B1a)* .....              | 5 |
| CSC 119 Princ. Business Data Processing (F1)*.....   | 4 |
| ECON 211 Principles of Economics (D3)* .....         | 3 |
| BUS 342 Financial Management .....                   | 4 |

|   |   |
|---|---|
| MATH 131/141/221 Calculus (B2)* .....                 | 4 |
| BUS 387 Organizational Behavior.....                  | 4 |
| BUS 346 Principles of Marketing .....                 | 4 |
| PHYS 121 College Physics (Area B)* .....              | 4 |
| PHYS 122 College Physics (Area B)* .....              | 4 |
| STAT 211 Elem. Probability and Statistics (B2)* ..... | 3 |

**52**

## GENERAL EDUCATION (GE) .....

**43**

*A minimum of 72 units is required for GE; 29 of these units are in Major/Support; a minimum of 43 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

### Area A Communication (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

### Area B Science and Mathematics (minimum 2 units)

18 units are in Major.

Take one course from B1b:

- B1a Physical Sciences \*see Major
- B1b Life Sciences elective
- B2 Mathematics and/or Statistics \*see Major
- Area B \* see Major

### Area C Arts and Humanities (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

### Area D Social, Political, Economic Inst. (minimum 8 units)

7 units are in Support. No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take one course from D2, D4a,

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level) \*see Support

### Area E Life Understanding (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

### Area F Technology (no additional units required)

4 units are in Support.

- F1 Computer Literacy \*see Support

### Additional GE Courses

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

## ELECTIVES.....

**16**

**186**

## ACADEMIC MINORS

### Business Economics

### Integrative Technology Packaging

#### BUSINESS MINOR

College Advising Center  
Business Bldg. (03), Room 100  
(805) 756-2601

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.

BUS 212 Financial Accounting for Nonbusiness Majors (4)  
or BUS 214 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   | Units |
|--|-------|
| <sup>1</sup> BUS 212 Financial Accounting for Nonbusiness Majors or BUS 214 Financial Accounting ..... | 4/5   |
| BUS 215 Managerial Accounting .....  | 4     |
| <sup>1</sup> BUS 207 Business Law .....  | 4     |
| BUS 342 Financial Management.....  | 4     |
| BUS 382/BUS 384/BUS 387 .....  | 4     |
| BUS 391 Management Information Systems or<br>BUS 371 Production and Operations Mgt.....                | 4     |
| BUS 346 Principles of Marketing .....  | 4     |
|  | 28/29 |

<sup>1</sup> These courses will have been taken prior to admission to the Business Minor, but will count as part of the Business Minor.

#### ECONOMICS MINOR

Economics  
Business Bldg. (03), Room 407  
(805) 756-2783

This minor is designed to give students from other majors a general competency in economics. Students are encouraged to meet with the adviser of the Economics Minor to develop a course of study that complements their major curriculum. For more information, contact the Economics Area office.

| Required courses .....   | Units |
|--|-------|
| ECON 211 Principles of Economics (3) or ECON<br>222 Macroeconomics (4) (D.3.)                    | 6-8   |
| ECON 212 Principles of Economics (3) or ECON<br>221 Microeconomics (4)                           |       |
| <b>Electives</b> .....   | 16-18 |
| Any other courses offered by the Economics Area to complete the minimum requirement of 24 units. |       |

**INTEGRATIVE TECHNOLOGY MINOR**

**Industrial Technology**  
**Business Bldg. (03), Room 409**  
**(805) 756-2676**

This minor is an interdisciplinary program. 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.

|  | <i>Units</i> |
|--|--------------|
| <b>Required courses</b> .....                                      | 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 (4)                     |              |
| <b>Management electives (select one)</b> .....                     | 3-4          |
| BUS 381 Industrial Management (4)                                  |              |
| BUS 383 Industrial Relations (3)                                   |              |
| BUS 384 Human Resources Management (4)                             |              |
| <b>Humanities electives (select one)</b> .....                     | 3            |
| HIST 306 History of American Technology (3)                        |              |
| HIST 384 Labor and Work in American History (3)                    |              |
| HUM 402 Values and Technology (3)                                  |              |
| <b>Social and Behavioral Sciences electives (select one)</b> ..... | 4            |
| BUS 404 Government and Social Influence on Business (4)            |              |
| PSY 302 Behavior in Organizations (4)                              |              |
| SPC 213 Organizational Communication (4)                           |              |
|  | 27-28        |

**PACKAGING MINOR**

**Industrial Technology**  
**Engineering West Bldg. (21), Room 126**  
**(805) 756-2058**

**Packaging Program Coordinator, Larry W. Gay**

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.

|  | <i>Units</i> |
|--|--------------|
| <b>Required courses</b> .....  | 21           |
| CHEM 111 General Chemistry (5) (B.1.a.)  |              |
| FSN 230 Elements of Food Processing (4)  |              |
| IT 327 Plastics Technology (4)   |              |
| IT 330 Fundamentals of Packaging (4)   |              |
| PHYS 104 Introductory Physics (B.1.a.) (4) or<br>PHYS 121 College Physics (B.1.a.) (4)                                   |              |
| <b>Adviser approved electives</b> .....  | 9            |
| <i>Select 9 units from the following list. Two courses must be 300-400 level to be selected with adviser's approval.</i> |              |
| FSN 154 Basic Calculations in Food Processing (4)  |              |
| FSN 230 Elements of Food Processing (4)  |              |
| FSN 332 Statistical Quality Control (3)  |              |
| FSN 334 Food Packaging (3)   |              |
| GRC 137 Packaging Graphics (3)   |              |
| GRC 437 Consumer Packaging (3)   |              |
| IT 327 Plastics Technology (4)   |              |
| IT 330 Fund of Industrial Packaging (4)  |              |
| IT 334 Materials Handling and Packaging (3)  |              |
| IT 408 Protective Packaging (3)  |              |
| IT 409 Machinery for Packaging (3)   |              |
| IT 435 Package Development Management (3)  |              |

## GRADUATE PROGRAMS

**Business Administration, M.B.A.**  
**General M.B.A.**  
**Agribusiness Specialization**  
**Architectural Management Track**

**Engineering Management, M.B.A. &  
 M.S. Engineering**  
**Industrial and Technical Studies, M.A.**

### MASTER OF BUSINESS ADMINISTRATION

**Graduate Management Programs**  
**Business Bldg. (03), Room 107**  
**(805) 756-2637**

**Director of Graduate Management Programs,**  
**David Peach**

#### 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:

- a) Successful completion of an accredited undergraduate program of study;
- b) The student's undergraduate record, with particular emphasis placed on performance during the last 90 units (or equivalent);

- c) Achievement on the Graduate Management Admission Test (GMAT); and
- d) Prior work experience.

#### 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.

*Students are encouraged to challenge first-year GSB courses based on their previous work.*

| <b>FIRST YEAR, MBA</b>                       | <i>Units</i> |
|--|--------------|
| <b>Fall</b> .....                            | 16           |
| GSB 511 Financial Accounting (4)             |              |
| GSB 512 Quantitative Analysis (4)            |              |
| GSB 513 Organization Behavior (4)            |              |
| GSB 524 Marketing Management (4)             |              |
| <b>Winter</b> .....                          | 16           |
| GSB 521 Managerial Accounting (4)            |              |
| GSB 522 Management Science (4)               |              |
| GSB 523 Managerial Economics (4)             |              |
| GSB 514 Business, Government and Society (4) |              |
| <b>Spring</b> .....                          | 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, MBA**

Students must select from: GSB 578, GSB 587, BUS 410, ECON 401, BUS 446, 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.

|  |    |
|--|----|
| <b>Fall</b> .....                        | 16 |
| GSB Electives (16)                       |    |
| <b>Winter</b> .....                      | 16 |
| GSB Electives (16)                       |    |
| <b>Spring</b> .....                      | 16 |
| GSB 562 Business Strategy and Policy (4) |    |
| GSB Electives (12)                       |    |
|  | 96 |

**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. *Students are encouraged to challenge first-year GSB courses based on their previous work.*

| <b>FIRST YEAR, MBA Specialization in Agribusiness</b>            | <i>Units</i> |
|--|--------------|
| <b>Fall</b> .....  | 16           |
| GSB 511 Financial Accounting (4)                                 |              |
| GSB 512 Quantitative Analysis (4)                                |              |
| GSB 513 Organization Behavior (4)                                |              |
| AGB 514 Agribusiness Managerial Leadership and Communication (4) |              |
| <b>Winter</b> .....  | 16           |
| GSB 521 Managerial Accounting (4)                                |              |
| GSB 522 Management Science (4)                                   |              |
| GSB 523 Managerial Economics (4)                                 |              |
| GSB 514 Business, Government and Society (4)                     |              |
| <b>Spring</b> .....  | 16           |
| GSB 531 Managerial Finance (4)                                   |              |
| GSB 532 Information Systems (4)                                  |              |
| GSB 533 Aggregate Economics (4)                                  |              |
| GSB 534 Production and Operations Mgmt. (4)                      |              |
| <b>Summer</b> .....  | 4            |
| GSB 539 Graduate Internship in Agriculture (4)                   |              |

**SECOND YEAR, MBA Specialization in Agribusiness**

Students must select from: GSB 578, BUS 410, ECON 401, BUS 446, 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.

|   |     |
|---|-----|
| <b>Fall</b> .....   | 16  |
| GSB 524 Marketing Management (4)                                    |     |
| AGB 543 Ag. Policy and Program Analysis (4)                         |     |
| GSB electives (8)   |     |
| <b>Winter</b> .....   | 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)  |     |
| <b>Spring</b> .....   | 16  |
| GSB 562 Business Strategy and Policy (4)                            |     |
| AGB 563 International Agricultural Trade and Market Development (4) |     |
| GSB electives (8)   |     |
|   | 100 |

**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.

| <b>FIFTH YEAR ARCHITECTURE/FIRST YEAR MBA</b>                   | <i>Units</i> |
|---|--------------|
| <b>Fall</b> .....   | 17           |
| <sup>1</sup> ARCH 521 Graduate Architectural Design Project (5) |              |
| GSB 511 Financial Accounting (4)                                |              |
| GSB 512 Quantitative Analysis (4)                               |              |
| GSB 513 Organizational Behavior (4)                             |              |
| <b>Winter</b> .....   | 17           |
| <sup>1</sup> ARCH 521 Graduate Architectural Design Project (5) |              |
| GSB 521 Managerial Accounting (4)                               |              |
| GSB 522 Managerial Science (4)                                  |              |
| GSB 523 Managerial Economics (4)                                |              |
| <b>Spring</b> .....   | 17           |
| <sup>1</sup> ARCH 521 Graduate Architectural Design Project (5) |              |
| GSB 531 Managerial Finance (4)                                  |              |
| GSB 532 Information Systems (4)                                 |              |
| GSB 534 Production and Operations Management (4)                |              |

<sup>1</sup> Or adviser approved electives.

| <b>SIXTH YEAR ARCHITECTURE/SECOND YEAR MBA</b> |    | Units |
|--|----|-------|
| <b>Fall</b> .....                              | 16 |       |
| GSB 524 Marketing Management (4)               |    |       |
| GSB electives (8)                              |    |       |
| GSB or ARCH elective (4)                       |    |       |
| <b>Winter</b> .....                            | 16 |       |
| GSB 514 Business, Government and Society (4)   |    |       |
| GSB electives (8)                              |    |       |
| GSB or ARCH elective (4)                       |    |       |
| <b>Spring</b> .....                            | 16 |       |
| GSB 533 Aggregate Economics (4)                |    |       |
| GSB 562 Business Strategy and Policy (4)       |    |       |
| GSB electives (8)                              |    |       |
|  | —  |       |
|  | 99 |       |

## **ENGINEERING MANAGEMENT, M.B.A. & M.S.**

**Graduate Management Programs  
Business Bldg. (03), Room 107  
(805) 756-2637**

### **Director of Graduate Management Programs, David Peach**

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.

### **FIRST YEAR, MBA & MS**

*Students are encouraged to challenge any of the following first-year GSB courses based on previous work.*

|   |       |  |
|---|-------|--|
| <b>Fall</b> .....                                 | 15-16 |  |
| GSB 511 Financial Accounting (4)                  |       |  |
| GSB 513 Organization Behavior (4)                 |       |  |
| GSB 524 Marketing Management (4)                  |       |  |
| <sup>1</sup> Technical Elective (3-4)             |       |  |
| <b>Winter</b> .....                               | 16    |  |
| GSB 521 Managerial Accounting (4)                 |       |  |
| GSB 522 Management Science (4)                    |       |  |
| GSB 523 Managerial Economics (4)                  |       |  |
| IME 557 Technological Assessment and Planning (4) |       |  |
| <b>Spring</b> .....                               | 16    |  |
| GSB 531 Managerial Finance (4)                    |       |  |
| GSB 532 Information Systems (4)                   |       |  |
| GSB 533 Aggregate Economics (4)                   |       |  |
| GSB 534 Production and Operations Management (4)  |       |  |
| <b>Summer</b> .....                               | 8     |  |
| GSB 598 Graduate Internship in Business (8)       |       |  |

### **SECOND YEAR , MBA & MS**

*Students must select from GSB 578, GSB 587, BUS 410, ECON 401, or BUS 446 to satisfy one of the following four-unit GSB electives.*

|   |       |  |
|---|-------|--|
| <b>Fall</b> .....                                     | 13-15 |  |
| IME 545 Advanced Topics in Simulation (3)             |       |  |
| <sup>1</sup> GSB elective or technical elective (3-4) |       |  |
| <sup>1</sup> GSB elective (4)                         |       |  |
| <sup>1</sup> Technical elective (3-4)                 |       |  |
| <b>Winter</b> .....                                   | 16    |  |
| GSB 514 Business Government and Society (4)           |       |  |
| IME 555 Computer Integrated Manufacturing (4)         |       |  |
| IME 558 Engineering Decision Making (4)               |       |  |
| <sup>1</sup> GSB elective (4)                         |       |  |
| <b>Spring</b> .....                                   | 15-16 |  |
| GSB 562 Business Strategy and Policy (4)              |       |  |
| IME 556 Technological Project Management (4)          |       |  |
| <sup>1</sup> GSB elective (4)                         |       |  |
| <sup>1</sup> Technical Elective (3-4)                 |       |  |
| <b>Summer</b> .....                                   | 8     |  |
| <sup>1</sup> GSB electives (4) (4)                    |       |  |
| <i>Minimum total units required</i>                   | —     |  |
|   | 107   |  |

<sup>1</sup> Technical electives to be selected with College of Engineering adviser's approval. GSB electives to be selected with College of Business adviser's approval.

## M. A. INDUSTRIAL AND TECHNICAL STUDIES

Business Bldg. (03), Room 317  
(805) 756-1618

### Anthony Randazzo, Graduate Coordinator

#### General Characteristics

The Master of Arts in Industrial and Technical Studies degree program is designed to prepare students for professional responsibilities and leadership in a broad range of positions in industry and education. It is a 45 unit degree program. The core curriculum is designed to provide a broad industrial background for the student, while the free electives allow for the student to gain an element of expertise in a selected area of interest or an area related to the student's career path.

#### Admission Requirements

In addition to the general admissions requirements of the University, specific requirements are:

- (1) Completion of a four year college course of study, and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association;
- (2) Good academic standing at the last college or university attended;
- (3) Attainment of a grade point average of at least 2.8 in the last 90 quarter units (60 semester units) attempted;
- (4) Successful completion of a screening interview conducted by the graduate coordinator; and
- (5) Satisfactory performance on the General Test of the Graduate Record Examination (GRE).

Foreign students must meet additional requirements as specified in the Graduate Studies section of this catalog.

If the student meets the general requirements for graduate and postbaccalaureate studies, the student will be considered for admission in one of two categories:

**Graduate conditionally classified** - The student may be admitted to the graduate degree program if, in the opinion of the graduate coordinator, deficiencies can be remedied by additional preparation.

**Graduate classified** - The student may be admitted to the graduate degree program unconditionally if, in the opinion of the graduate coordinator, the student meets the standards and displays potential for academic success. To pursue a graduate degree, the student will be required to fulfill all of the professional, personal, scholastic, and other standards prescribed by the Industrial and Technical Studies Graduate Program and the University.

For information pertaining to specific requirements for admission, graduate classified or graduate conditionally classified, the student should communicate with the 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, rather than the thesis or project option, 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 coursework taken to satisfy the requirements for the degree, as presented on the formal study plan. All candidates must meet the current Graduation Writing Requirement.

A student shall complete all requirements for the degree within a seven-year period. The time limit for the thesis or project is three years.

\*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.

|   | <i>Units</i> |
|---|--------------|
| <b>Required Courses</b> .....   | 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 & 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)                              |              |
| <sup>1</sup> IT 599 Industrial and Technical Studies Thesis or Project (5)                    |              |
| <b>Professional/technical electives</b> .....   | 19           |
| <i>Elective courses at the 400-500 level chosen with approval of the Graduate Coordinator</i> |              |
|   | 45           |

<sup>1</sup> The student may be permitted a nonthesis/project option by accomplishing all of the following steps: 1) Obtaining approval of the Graduate Coordinator. 2) Substituting 5 units of 500-level coursework which support the degree and are approved in advance by the area Graduate Coordinator. IT 500 Individual Study (1-6) is recommended. 3) Passing a comprehensive written examination covering the graduate program.



### **Microelectronics Processing Lab**

Materials Engineering senior, Tom Candaux, and Dr. Linda Vanasupa, Materials Engineering professor, loading a boat of silicon wafers into the oxidation furnace.

The lab was designed and built by Cal Poly engineering students under the direction of Dr. Vanasupa.

The course, MATE 435 Microelectronics Processing Laboratory, is configured like a start-up company. Students work in groups to develop processes for creating a better product while other student teams make actual products. They trade off duties throughout the quarter. By the end of the 10-week term, the students in MATE 435 have built and tested an integrated circuit.

This team-work approach has evolved from the collaborative efforts of Cal Poly's Materials Engineering faculty with their colleagues from San Jose State University in developing innovative educational paradigms.

This laboratory is made possible by Advanced Micro Devices, Hughes Electronics, Intel Corp, Valex Corp, Parker Hannafin Corp, the National Science Foundation, and Scott Miner (Class of 1995).

*Photo by Brian Grandfield.*



# 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/<br>Location:                      | Program:   |
|---|--|
| Engineering                                   | Engineering: MS  |
| Engineering/Business                          | Engineering Management,<br>MBA/MS  |
| Engineering/City &<br>Regional Planning       | Transportation Planning,<br>MCRP/MS  |
| College of Agriculture                        | Agricultural Engineering: BS*  |
| Aeronautical Engineering                      | Aeronautical Engineering: BS,*<br>MS   |
| Civil and Environmental<br>Engineering        | Civil Engineering: BS*<br>Environmental Engineering: BS*<br>Civil and Environmental<br>Engineering: MS |
| Computer Engineering                          | Computer Engineering: BS*  |
| Computer Science                              | Computer Science: BS**, MS,<br>Minor   |
| Electrical Engineering                        | Electrical Engineering: BS*, MS  |
| General Engineering                           | General Engineering: BS  |
| Industrial and Manufac-<br>turing Engineering | Industrial Engineering: BS*<br>Manufacturing Engineering: BS*<br>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.

\*\* BS Computer Science program accredited by the Computing Sciences Accreditation Commission of the Computer Science Accreditation Board.

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 main focus of the engineering and computer science programs at Cal Poly is to prepare graduates for practice in professional engineering and computer science. Thus, our "learn by doing" philosophy is emphasized in the curricula by the large number of design-centered laboratories, integrating design throughout the curricula, and the senior project capstone design experience.

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 Report of the ACM/IEEE-CS Joint Curriculum Task Force, Computing Curricula 1991. 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

Web site: <http://www.ee.calpoly.edu/CENGAC/>

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.

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 on the WWW as well as other information that pertains to new and continuing students at Cal Poly. The Advising Center verifies that all full-time engineering students have completed (with passing grades) 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. Part-time students should see the Advising Center staff.

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 with strict adherence to procedures developed with the Department Heads/Chairs and the Dean and Associate Deans. 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 questions are handled 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.

*Faculty Advisers* are responsible for providing academic content and 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.

### 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<br/>in Terms of Cal Poly Courses</i> | <i>Qtr.<br/>Units</i> | <i>Aero</i> | <i>AE</i> | <i>CE</i> | <i>CpE</i> | <i>CSc</i> | <i>EE</i> | <i>Engr</i> | <i>EnvE</i> | <i>IE</i> | <i>MfgE</i> | <i>MatE</i> | <i>ME</i> |
|--|-----------------------|-------------|-----------|-----------|------------|------------|-----------|-------------|-------------|-----------|-------------|-------------|-----------|
| <b>Maximum Transfer Units</b>  |                       | 105         | 105       | 105       | 105        | 105        | 105       | 105         | 105         | 105       | 105         | 105         | 105       |
| <b>Mathematics</b>   |                       |             |           |           |            |            |           |             |             |           |             |             |           |
| 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         |
| <b>Physics</b>   |                       |             |           |           |            |            |           |             |             |           |             |             |           |
| 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         |             |             |           |             |             |           |
| <b>Chemistry</b>   |                       |             |           |           |            |            |           |             |             |           |             |             |           |
| 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           |           |             |             |           |
| <b>Engineering, Computer Science<br/>&amp; Supporting Courses</b>    |                       |             |           |           |            |            |           |             |             |           |             |             |           |
| Engineering Graphics,<br>CAD/CAM, Design                             | –                     | 4           | 4         | 4         | 0          | 0          | 0         | 2           | 4           | 4         | 4           | 2           | 4         |
| Digital Computer Science   | –                     | 2           | 2         | 2         | 10         | 10         | 3         | 3           | 2           | 3         | 3           | 2           | 2         |
| Manufacturing Processes  | –                     | 0           | 4         | 0         | 0          | 0          | 0         | 4           | 0           | 4         | 5           | 2           | 5         |
| Engineering Strength of<br>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         |
| Engineering Circuits and<br>Electronics                              |                       | 4           | 4         | 4         | 8          | 0          | 8         | 4           | 4           | 4         | 4           | 4           | 4         |
| 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         |
| <b>General Education–Breadth</b>                                     |                       |             |           |           |            |            |           |             |             |           |             |             |           |
| Courses vary. See appropriate<br>curriculum.                         |                       |             |           |           |            |            |           |             |             |           |             |             |           |

**Cal Poly Majors:**

Aero = Aeronautical Engineering  
 AE = Agricultural Engineering  
 CE = Civil Engineering  
 CpE = Computer Engineering

CSc = Computer Science  
 EE = Electrical Engineering  
 Engr = General Engineering  
 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**  
**Integrated Technology Management**  
**Industrial Engineering**  
**Materials Engineering**  
**Mechanical Engineering**  
**Water Engineering**

**B.S. + M.S., Accelerated "4 +1" Program**  
**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:

- Provide preparation for further study in engineering, leading to the Doctor of Engineering or Ph.D. degree.
- Provide an empowering terminal professional degree for students who intend to become practicing engineers. A degree which not only retains the strong laboratory emphasis and industrial interaction found in the B.S. curriculum, but which also provides an attractive, efficient educational option to undergraduate students.
- Provide job-entry education for the more complex and evolving interdisciplinary areas of engineering, such as research and development, innovative design, systems analysis and design, bio-engineering, manufacturing, mechatronics and engineering management.
- Update and upgrade opportunities for practicing engineers.
- 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.

#### Program of Study

Graduate students must file formal study plans 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.

Participants in the "4 + 1" Program should submit a tentative study plan, developed in conjunction with their adviser, to the Dean of the College of Engineering at the end of the second quarter of their junior year.

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.

#### Requirements

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.

#### 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.

#### 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.

## B.S. + M.S. Engineering, Accelerated "4 + 1" Program

The "4 + 1" Program is an accelerated route to the professional degree. In many evolving technical areas, four years is not enough time for the formal education of an engineer about to enter a lifelong career of professional practice, even when the individual is committed to life long learning.

The college offers an accelerated program for directed and motivated students. The "4 + 1" program allows General Engineering students to progress toward the terminal applied masters degree in bioengineering, mechatronics or manufacturing, as offered under the MS Engineering, while still undergraduates. The program enables students to earn both a B.S. and an M.S. degree in five calendar years.

### Prerequisites for the Accelerated 4 + 1 Program

Students are formally eligible to apply to this program after the first quarter of their junior year. Participation in the program is based on prior academic performance and other measures of professional promise. Students are selected by interdisciplinary faculty committee, chosen on the basis of the student's area of interest. Students are awarded their B.S. degree and their M.S. degree at the completion of the program, when all requirements for both degrees have been met. The thesis serves to complete the senior project requirement in addition to fulfilling the requirement for the M.S. degree, reducing total unit requirements. The program allows the student to complete a more meaningful capstone experience, linking the classroom experience to thesis work. Furthermore, this arrangement increases a student's possibilities for industrial interaction in their professional program.

In addition, the General Engineering "4 + 1" student is allowed to earn graduate credit for several of their senior electives, effectively decreasing the summed unit requirement for the two degrees. The scheduling flexibility provided by the "4 + 1" program enables students to complete their degree in the most efficient manner. An example "4 + 1" curriculum is provided on the following pages.

Additional information may be obtained from the College of Engineering.

### Example Curriculum for "4 + 1" Program

In this example, a student chose to focus on biomaterials aspects of the field.

| 1st Year                         |                                  |                                  |
|----------------------------------|----------------------------------|----------------------------------|
| Fall (15 units)                  | Winter (15 units)                | Spring (15 units)                |
| ENGR 110 Intro<br>Engr Science 1 | ENGR 111 Intro<br>Engr Science 2 | ENGR 112 Intro<br>Engr Science 3 |
| CHEM 124                         | CHEM 125                         | Life science ge                  |
| Area A ge                        | Area A ge                        | Area A ge                        |
| MATH 141                         | MATH 142                         | MATH 143                         |
|                                  | PHYS 131                         | PHYS 132                         |
| 2nd Year                         |                                  |                                  |
| Fall (17 units)                  | Winter (17 units)                | Spring (18 units)                |
| EE 201                           | CE 204                           | MATE 210                         |
| ME 211                           | ME 212                           | MATE 215                         |
| Area D ge                        | Area D ge                        | CSC 101                          |
| MATH 241                         | MATH 242                         | HIST 204 ge                      |
| PHYS 133                         | CHEM 305*                        | MATH 317*                        |
| 3rd Year                         |                                  |                                  |
| Fall (17 units)                  | Winter (15 units)                | Spring (16units)                 |
| ME 302                           | ME 313                           | ME 341                           |
| IME 314                          | ME 328 tech                      | MATE 424 tech                    |
| MATE 230 tech                    | CHEM 328 elec                    | CSC 342 tech                     |
| POLS 110 ge                      | Area E ge                        | Area C ge                        |
| CHEM 326 elec                    | Area C ge                        | Area C ge                        |
| 4th Year                         |                                  |                                  |
| Fall (16units)                   | Winter (14 units)                | Spring (13)                      |
| MATE 440 tech                    | CSC 480 tech                     | IME 319 tech                     |
| MATE 425 tech                    |                                  | EE 321 tech                      |
| CSC 103 tech                     | ENGR 581 tech*                   | MATE 570 tech*                   |
| Area D                           | Area C ge                        | Area D                           |
| 5th Year                         |                                  |                                  |
| Fall (15 units)                  | Winter (11 units)                | Spring (11 units)                |
| STAT 512                         | ENGR 590                         | ENGR 591                         |
| ENGR 582                         | EE 500-level                     | MATE 400-level                   |
| MATE 530                         |                                  |                                  |
| Thesis 599 tech*                 | Thesis 599 tech*                 | Thesis 599 tech*                 |
| <b>Total Units = 231</b>         |                                  |                                  |

|       |   |
|-------|---|
| ge    | General Education                       |
| *     | Math & Science Elective                 |
| elec  | Elective                                |
| tech  | Technical Elective                      |
| tech* | Shared B.S. and M.S. Technical Elective |

**M.S. ENGINEERING WITH SPECIALIZATION IN BIOCHEMICAL ENGINEERING**

|  |    |
|--|----|
| <b>Core Courses</b> .....                                  | 9  |
| Analytical methods for engineering (6)                     |    |
| Advanced mathematics (3)                                   |    |
| <b>Required Courses in Specialization</b> .....            | 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)                   |    |

|                                 |           |
|---------------------------------|-----------|
| <b>Approved Electives</b> ..... | 8         |
|                                 | <u>45</u> |

**M.S. ENGINEERING WITH SPECIALIZATION IN INTEGRATED TECHNOLOGY MANAGEMENT**

|   |    |
|---|----|
| <b>Core Courses</b> .....                       | 7  |
| IME 501 Graduate Survey (3)                     |    |
| IME 556 Technological Project Management (4)    |    |
| <b>Required Courses in Specialization</b> ..... | 26 |
| IME 555 Computer-Integrated Manufacturing (4)   |    |
| IME 557 Technological Assessment & Planning (4) |    |
| IME 599 Design Project (Thesis) (4)             |    |
| IME 595 Cooperative Education Experience (6)    |    |

|   |   |
|---|---|
| <b>Approved Engineering Electives</b> ..... | 9 |
|---|---|

|                                 |           |
|---------------------------------|-----------|
| <b>Approved Electives</b> ..... | 6         |
|                                 | <u>48</u> |

**M.S. ENGINEERING WITH SPECIALIZATION IN INDUSTRIAL ENGINEERING**

|                                    |    |
|------------------------------------|----|
| <b>Core Courses</b> .....          | 12 |
| Analytical methods for engineering |    |

|  |    |
|--|----|
| <b>Required Courses in Specialization</b> .....            | 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 541 Advanced Operations Research (3)                   |    |
| IME 542 Reliability Engineering (3)                        |    |
| IME 543 Advanced Human Factors (4)                         |    |
| IME 544 Adv.Topics in Engineering Economy (3)              |    |
| IME 545 Advanced Topics in Simulation (3)                  |    |
| IME 555 Computer Integrated Manufacturing (4)              |    |

|                                 |           |
|---------------------------------|-----------|
| <b>Approved electives</b> ..... | 9         |
|                                 | <u>45</u> |

**M.S. ENGINEERING WITH SPECIALIZATION IN MATERIALS ENGINEERING**

|                                  |   |
|----------------------------------|---|
| <b>Core Courses</b> .....        | 8 |
| MATE 570 Advanced Materials (4)  |   |
| STAT 512 Statistical Methods (4) |   |

|   |    |
|---|----|
| <b>Required Courses in Specialization</b> ..... | 27 |
| MATE 599 Design Project (Thesis) (2) (2) (5)    |    |
| <i>Select 18 units from the following:</i>      |    |
| MATE 410 Materials Engineering (4)              |    |
| MATE 440 Joining (5)                            |    |
| MATE 530 Biomaterials (4)                       |    |
| MATE 562 Mechanical Behavior of Materials (4)   |    |
| MATE 580 Fracture Mechanics (3)                 |    |
| MATE 590 Densification Processing (4)           |    |

|                                 |           |
|---------------------------------|-----------|
| <b>Approved Electives</b> ..... | 10        |
|                                 | <u>45</u> |

**M.S. ENGINEERING WITH SPECIALIZATION IN MECHANICAL ENGINEERING**

|   |   |
|---|---|
| <b>Core Courses</b> .....                   | 9 |
| Analytical methods for engineering/advanced |   |
| mathematics                                 |   |

|  |    |
|--|----|
| <b>Required Courses in Specialization</b> .....            | 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)                     |    |

|                                 |           |
|---------------------------------|-----------|
| <b>Approved electives</b> ..... | 9         |
|                                 | <u>45</u> |

**M.S. ENGINEERING WITH SPECIALIZATION IN WATER ENGINEERING**

|  |   |
|--|---|
| <b>Core Courses</b> .....                    | 9 |
| To be selected with approval of the graduate |   |
| committee                                    |   |
| Analytical methods for engineering (6)       |   |
| Advanced Mathematics                         |   |

|  |       |
|--|-------|
| <b>Required Courses in Specialization</b> .....  | 26-27 |
| ECON 410 Public Fin. & Cost-Benefit Analysis (4) |       |
| BRAE 435/BRAE 414/BRAE 440                       |       |
| BRAE 533 Irrigation Project Design (4)           |       |
| CE 533 Advanced Water Resources Engineering (3)  |       |
| CE 573 Public Works Administration (3)           |       |

BRAE 599/CE 599 (Thesis - 9 units) or 9 units of coursework approved by committee, and written oral comprehensive exams.

|   |      |
|---|------|
| <b>Approved Elective Courses</b> .....                            | 9-10 |
| To be selected from the following list with committee's approval: |      |
| BRAE 414 Irrigation Systems (4)                                   |      |
| BRAE 437 Conservation Engineering (3)                             |      |
| BRAE 440 Agricultural Irrigation Systems (4)                      |      |
| BRAE 492 Pumps and Pump Drivers (3)                               |      |
| BRAE 531 Water Wells (3)  |      |
| CE 434 Groundwater Hydraulics and Hydrology (3)                   |      |
| CE 440 Hydraulic Systems Engineering (3)                          |      |
| CM 533 Case Histories Construction Management (3)                 |      |
| ENVE 438 Water and Wastewater Treatment Des (3)                   |      |
| ENVE 439 Solid Waste Management (3)                               |      |
| ENVE 535 Advanced Wastewater Treatment                            |      |

45

### Joint MBA/MS 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.

### FIRST YEAR

Students are encouraged to challenge any of the following first-year GSB courses based on previous work.

|   |       |
|---|-------|
| <b>Fall</b> .....                                 | 15-16 |
| GSB 511 Financial Accounting (4)                  |       |
| GSB 513 Organization Behavior (4)                 |       |
| GSB 514 Business Government and Society (4)       |       |
| <sup>1</sup> Technical Elective (3-4)             |       |
| <b>Winter</b> .....                               | 16    |
| GSB 521 Managerial Accounting (4)                 |       |
| GSB 522 Management Science (4)                    |       |
| GSB 523 Managerial Economics (4)                  |       |
| IME 557 Technological Assessment and Planning (4) |       |
| <b>Spring</b> .....                               | 16    |
| GSB 531 Managerial Finance (4)                    |       |
| GSB 532 Information Systems (4)                   |       |
| GSB 533 Aggregate Economics (4)                   |       |
| GSB 534 Production and Operations Management (4)  |       |
| <b>Summer</b> .....                               | 8     |
| GSB 598 Graduate Internship in Business (8)       |       |

### SECOND YEAR

Students must select from GSB 578, GSB 587, BUS 410, ECON 401, or BUS 446 to satisfy one of the following four-unit GSB electives.

|   |           |
|---|-----------|
| <b>Fall</b> .....                                     | 13-15     |
| IME 545 Advanced Topics in Simulation (3)             |           |
| <sup>1</sup> GSB elective or technical elective (3-4) |           |
| <sup>1</sup> GSB elective (4)                         |           |
| <sup>1</sup> Technical elective (3-4)                 |           |
| <b>Winter</b> .....                                   | 16        |
| GSB 524 Marketing Management (4)                      |           |
| IME 555 Computer Integrated Manufacturing (4)         |           |
| IME 558 Engineering Decision Making (4)               |           |
| <sup>1</sup> GSB elective (4)                         |           |
| <b>Spring</b> .....                                   | 15-16     |
| GSB 562 Business Strategy and Policy (4)              |           |
| IME 556 Technological Project Management (4)          |           |
| <sup>1</sup> GSB elective (4)                         |           |
| <sup>1</sup> Technical Elective (3-4)                 |           |
| <b>Summer</b> .....                                   | 8         |
| <sup>1</sup> GSB electives (4) (4)                    |           |
| <i>Minimum total units required</i>                   | <hr/> 107 |

<sup>1</sup> 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:

- (a) 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.
- (b) 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.
- (c) 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 231 Fortran for Engineering Students
- 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:

- 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 results of the Graduate Record Examination (GRE) Aptitude Test to the Admissions Committee.
- 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 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> |
|--|--------------|
| <b>Core Courses</b> .....  | 68           |
| CE 523 Transportation System Planning (4)  |              |
| CE 528 Transportation Analysis or<br>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<br>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<br>methods course (3)               |              |
| <b>Emphasis Area (select one of the following)</b> .....                           | 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 404 Environmental Law (3)  |              |
| CRP 545 Environmental Planning, Policies &<br>Principles (4)                       |              |
| CRP 554 Regional Planning and Analysis (4)   |              |
| Regional and Environmental Planning electives (3)                                  |              |
| <b>Approved CE/ENVE electives:</b> .....   | 8            |
| Electives may include: CE 422, 424, 522, 525, 527,<br>528, 529, 573; ENVE 411, 465 |              |



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# AERONAUTICAL ENGINEERING DEPARTMENT

**Aeronautical Engineering Department Office**  
**Engineering Bldg. (13), Room 260**  
**(805) 756-2562 FAX: (805) 756-2376**

**College of Engineering Advising Center**  
**Computer Science Bldg. (14), Room 240**  
**(805) 756-1461**

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## Faculty

### Department Chair, Jin Tso

|                     |                     |
|---------------------|---------------------|
| Daniel J. Biezad    | Faysal A. Kolkailah |
| Russell M. Cummings | Ruben Rojas-Oviedo  |
| Jon A. Hoffmann     |                     |

## 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, flight simulation, and design 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.

The main focus of the aeronautical engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a three-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

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 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.

### HONORS PROGRAM FOR JOINT BACHELOR OF SCIENCE AND MASTER OF SCIENCE DEGREE IN AERONAUTICAL ENGINEERING

In many evolving technical areas, four years are not enough time for the formal education of an engineer about to enter a lifelong career of professional practice, even when the individual is committed to life long learning.

The department offers an accelerated program for directed and motivated students. The "4 + 1" Honors Program allows Aeronautical Engineering students to progress toward the terminal applied masters degree while still undergraduates. The program enables students to earn a B.S. and an M.S. in five calendar years.

#### Prerequisites

Students are formally eligible to apply to the accelerated "4 + 1" Honors Program after the first quarter of their junior year. Participation in the program is based on prior academic performance and other measures of professional promise, with a minimum GPA of 3.0 required. Students are selected by a faculty committee. Students are awarded their B.S. degree and their M.S. degree at the completion of the program, when all requirements for both degrees have been met. The thesis serves to complete the senior project requirement in addition to fulfilling the requirement for the M.S. degree, reducing total unit requirements. The program allows students to complete more meaningful capstone experiences, linking the

classroom experience to thesis work. Furthermore, this arrangement increases students possibilities for industrial interaction in their professional programs.

In addition, Aeronautical Engineering "4 + 1" Honors students are allowed to earn graduate credit for several of their senior electives, effectively decreasing the summed unit requirement for the two degrees. The scheduling flexibility provided by the "4 + 1" Honors Program enables students to complete their degree in the most efficient manner.

Additional information may be obtained from the Aeronautical Engineering Department.

**Program of Study**

Participants in the "4 + 1" Honors Program should submit a tentative study plan, developed in conjunction with their adviser, to the Chair of the Aeronautical Engineering Department at the end of the second quarter of their junior year. The formal program of study must include a minimum of 45 units (at least 23 of which must be at the 500 level).

**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 |
|--|-------|
| <b>Freshman</b>  |       |
| AERO 121 Aerospace Fundamentals .....  | 2     |
| IME 144 Introduction to Design and Manufacturing ..                              | 4     |
| <sup>1</sup> Life Sciences elective (B1b) .....                                  | 2     |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a) .....           | 4     |
| CSC 231 Fortran for Engineering Students (F1) .....                              | 2     |
| ENGL 114 Writing: Exposition (A1) .....  | 4     |
| ENGL/PHIL/SPC 125 Critical Thinking (A2) .....                                   | 3     |
| SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A3) ..... | 3     |
| MATH 141 Calculus I (B2) .....   | 4     |
| MATH 142 Calculus II (B2) .....  | 4     |
| MATH 143 Calculus III .....  | 4     |
| PHYS 131 General Physics (B1a) .....   | 4     |
| PHYS 132 General Physics .....   | 4     |
| <sup>1</sup> Life Understanding elective (GE Area E) .....                       | 3     |
|  | —     |
|  | 47    |
| <b>Sophomore</b>   |       |
| AERO 215 Introduction to Aerospace Design .....                                  | 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     |

|  |     |
|--|-----|
| ENGL 218 Professional Writing: Argumentation and Reports (A4) .....                            | 4   |
| PHYS 133 General Physics (B1a) .....   | 4   |
| MATH 241 Calculus IV .....   | 4   |
| MATH 242 Differential Equations .....  | 4   |
| CSC 341 Numerical Engineering Analysis .....   | 4   |
| <sup>1</sup> Literature elective (C.1.) .....  | 3   |
| <sup>1</sup> Philosophy elective (C.1.) .....  | 3   |
| <sup>1</sup> Fine and performing arts elective (C.2.) .....                                    | 3   |
| <sup>1</sup> Social, Political, Economic Institutions electives (Area D) .....                 | 3   |
|  | —   |
|  | 50  |
| <b>Junior</b>  |     |
| AERO 301 Aerothermodynamics .....  | 5   |
| AERO 302 Aerothermodynamics .....  | 5   |
| AERO 303 Aerothermodynamics and AERO 304 Experimental. Aerothermodynamics..                    | 5,2 |
| AERO 306 Aerodynamics and Flight Performance .....   | 4   |
| AERO 307 Wind Tunnel and Flight Test Laboratory ..   | 2   |
| AERO 315 Aerospace Engineering Analysis .....  | 4   |
| AERO 320 Fundamentals of Guidance and Control ..   | 4   |
| AERO 330 Aerospace Structural Analysis .....   | 4   |
| EE 321, 361 Electronics and Lab .....  | 3,1 |
| MATE 210 Materials Engineering .....   | 3   |
| HIST 202 (4) (USCP) or HIST 204 (3) (D.1.) .....   | 3   |
| POLS 110 American and California Govt (D.1.) .....   | 3   |
| <sup>1</sup> Social, political, economic institutions electives (Area D) .....                 | 3   |
|  | —   |
|  | 51  |
| <b>Senior</b>  |     |
| AERO 401 Propulsion Systems .....  | 4   |
| AERO 420 Stability and Control of Aerospace Vehicles .....                                     | 4   |
| AERO 430 Advanced Composite Structures Analysis and Design .....                               | 4   |
| AERO 461 Senior Project .....  | 2   |
| AERO 462 Senior Project .....  | 3   |
| <sup>1</sup> Arts and humanities elective (Area C) .....                                       | 3   |
| <sup>1</sup> Literature, philosophy, arts elective (300–400 level) (C.3) .....                 | 3   |
| <sup>1</sup> Social, Political, Economics institutions elective (300–400 level) (Area D) ..... | 3   |
| Required and elective courses to complete concentration .....                                  | 22  |
|  | —   |
|  | 48  |
|  | —   |
|  | 196 |

<sup>1</sup> For selection of GEB electives, see page 77 or current Class Schedule.

**B.S. AERONAUTICAL ENGINEERING**

Courses are displayed by Major, Support, Concentration, General Education, and Electives.

|  | Units     |
|--|-----------|
| <b>MAJOR COURSES</b>                                 |           |
| AERO 121 Aerospace Fundamentals .....                | 2         |
| AERO 215 Introduction to Aerospace Design .....      | 2         |
| AERO 301 Aerothermodynamics .....                    | 5         |
| AERO 302 Aerothermodynamics .....                    | 5         |
| AERO 303 Aerothermodynamics and                      |           |
| AERO 304 Experimental Aerothermodynamics .....       | 5,2       |
| AERO 306 Aerodynamics and Flight Performance .....   | 4         |
| AERO 307 Wind Tunnel and Flight Test Laboratory      | 2         |
| AERO 315 Aerospace Engineering Analysis .....        | 4         |
| AERO 320 Fundamentals of Guidance and Control ...    | 4         |
| AERO 330 Aerospace Structural Analysis .....         | 4         |
| AERO 401 Propulsion Systems .....                    | 4         |
| AERO 420 Stability and Control of Aerospace          |           |
| Vehicles .....                                       | 4         |
| AERO 430 Advanced Composite Structures Analysis      |           |
| and Design.....                                      | 4         |
| 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       |
| Concentration courses (see below).....               | 22        |
|  | <b>88</b> |
| <b>SUPPORT COURSES</b>                               |           |
| * = Courses satisfy General Education requirement    |           |
| CHEM 124 General Chemistry for the Engineering       |           |
| Disciplines (B1a)* .....                             | 4         |
| CSC 231 Fortran for Engineering Students (F1)* ..... | 2         |
| CSC 341 Numerical Engineering Analysis .....         | 4         |
| EE 321, 361 Electronics and Lab .....                | 3,1       |
| ENGL 218 Professional Writing: Argumentation and     |           |
| Reports (A4)* .....                                  | 4         |
| IME 144 Introduction to Design and Manufacturing ... | 4         |
| MATE 210 Materials Engineering .....                 | 3         |
| MATH 141 Calculus I (B2)* .....                      | 4         |
| MATH 142 Calculus II (B2)* .....                     | 4         |
| MATH 143 Calculus III (Area B)* .....                | 4         |
| MATH 241 Calculus IV (Area B)* .....                 | 4         |
| MATH 242 Differential Equations (Area B)* .....      | 4         |
| ME 211 Engineering Statics .....                     | 3         |
| ME 212 Engineering Dynamics .....                    | 3         |
| PHYS 131 General Physics (B1a)* .....                | 4         |
| PHYS 132 General Physics (Area B)* .....             | 4         |
| PHYS 133 General Physics (Area B)* .....             | 4         |

**63****GENERAL EDUCATION (GE) ..... 45**

A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

1 unit is in Support

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

24 units are in Support.

Take one course from B1b:

B1a Physical Sciences \*see Support

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Support

Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

2 units are in Support.

F1 Computer Literacy \*see Support

**ELECTIVES..... 0****196**

**CONCENTRATIONS (select one)**

**Aeronautics Concentration**

|  |    |
|--|----|
| AERO 405 Supersonic and Hypersonic Aerodynamics... | 4  |
| AERO 443 Aircraft Design .....                     | 2  |
| AERO 444 Aircraft Design .....                     | 4  |
| AERO 445 Aircraft Design .....                     | 4  |
| Aeronautics electives .....                        | 8  |
|  | 22 |

**Astronautics Concentration**

|                                    |    |
|------------------------------------|----|
| AERO 451 Orbital Mechanics I ..... | 4  |
| AERO 447 Spacecraft Design .....   | 2  |
| AERO 448 Spacecraft Design .....   | 4  |
| AERO 449 Spacecraft Design .....   | 4  |
| Astronautics electives .....       | 8  |
|                                    | 22 |

**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**

|  | <i>Units</i> |
|--|--------------|
| <b>Required Courses</b> .....                                      | 25           |
| AERO 520 Theoretical Aerodynamics (4)                              |              |
| AERO 535 Advanced Aerospace Structural Analysis (4)                |              |
| AERO 540 Elements of Rocket Propulsion (4)                         |              |
| AERO 550 Analysis and Design of Flight Control Systems (4)         |              |
| AERO 599 Design Project (Thesis) (3) (3) (3)                       |              |
| <b>Adviser approved electives</b> .....                            | 8            |
| <b>Advanced Mathematics/Analytical Methods for Engineers</b> ..... | 12           |
| MATH 501, MATH 502 Methods of Applied Mathematics I and II (4) (4) |              |
| AERO 515 Continuum Mechanics (4)                                   |              |
|  | 45           |

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# CIVIL AND ENVIRONMENTAL ENGINEERING DEPARTMENT

**Civil and Environmental Engineering**  
**Department Office**  
**Engineering Bldg. (13), Room 263**  
**(805) 756-2947**

**College of Engineering Advising Center**  
**Computer Science Bldg. (14), Room 240**  
**(805) 756-1461**

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## Faculty

### Department Chair, Edward C. Sullivan

|                         |                        |
|-------------------------|------------------------|
| Alypios E. Chatziioanou | Stuart E. Larsen       |
| Harold M. Cota          | Kurt C. K. Lo          |
| Jay S. DeNatale         | H. Mallareddy          |
| Gregg L. Fiegel         | Sara Moazzami          |
| Rakesh K. Goel          | Nirupam Pal            |
| Stephen L. M. Hockaday  | Jeffrey G. Sczechowski |
| Carl C. F. Hsieh        | S. Somayaji            |
| Eric P. Kasper          | Samuel A. Vigil        |
| Robert J. Lang          |                        |

## 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 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.

Students of the program learn to solve practical engineering problems and design civil engineering facilities and systems using traditional and state-of-the-art techniques. Extensive experience is gained through the use of modern, well-equipped laboratories. The program focuses on the preparation of graduates for immediate entry into the profession; however, adequate scientific depth is maintained throughout the curriculum so that graduates are readily accepted into graduate programs in civil engineering.

The main focus of the civil engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

Graduates of the program accept a wide variety of positions in local, state and federal government service or with private engineering firms. Typically, graduates are immediately involved in the planning, design, and construction of civil engineering projects.

The Civil Engineering curriculum includes broad coverage of the engineering sciences and basic sciences, mathematics, social sciences, and humanities. Essential training is given in each of the principal civil engineering emphasis areas: environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering. Flexibility within the curriculum allows students to take 29 units of upper division civil engineering technical electives. A student may choose to use these technical elective units to study topics related to one or more of the five principal civil engineering emphasis areas listed above. Suggested emphasis area curricula are available from the department. In lieu of choosing a particular emphasis area, students have the opportunity to design a curriculum of their own, allowing for a broad range of civil engineering interests.

The Society of Civil Engineers (SCE) student organization is recognized as one of the nation's premiere student chapters. The 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).

## 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 main focus of the environmental engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

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. In scheduling your courses each quarter, consult with your academic adviser. Obtain flow chart at department office. Courses listed below are shown by year.*

| Freshman  | Units |
|---|-------|
| CE 111 Introduction to Civil Engineering .....  | 1     |
| CE 114 Intro. to CAD in Civil and Environ. Engr. ....   | 4     |
| CHEM 124 Gen Chemistry for Engineering (B1a).....   | 4     |
| CHEM 125 Gen Chemistry for Engineering (B1a) ...  | 4     |
| ENGL 114 Writing: Exposition (A1).....  | 4     |
| ENGL/PHIL/SPC 125 Critical Thinking (A2).....   | 3     |
| SPC 201 Public Speaking or SPC 202 Principles of<br>Speech Communication (A3).....            | 3     |
| MATH 141 Calculus I (B.2.).....   | 4     |
| MATH 142 Calculus II (B2).....  | 4     |
| MATH 143 Calculus III (B2).....   | 4     |
| PHYS 131 General Physics (B1a).....   | 4     |
| PHYS 132 General Physics (B1a).....   | 4     |
| CSC 231 Fortran for Engineering Students or<br>CSC 234 C and UNIX (F1).....                   | 2     |
| <sup>1</sup> Literature elective (C1).....  | 3     |
| <sup>1</sup> Social, political, economic institutions (Area D) .....                          | 3     |
|   | 51    |
| <b>Sophomore</b>  |       |
| CE 201 Strength of Materials (5) or CE 204, CE 205<br>Strength of Materials I, II (3)(2)..... | 5     |
| CE 206 Strength of Materials Laboratory.....  | 1     |
| CE 221, 222 Fund Transportation Engr and Lab .....  | 3,2   |

|  |     |
|--|-----|
| CE 259 Civil Engineering Materials .....                             | 2   |
| BRAE 239 Engineering Surveying .....                                 | 4   |
| EE 201 Electric Circuits Theory .....                                | 3   |
| ENGL 218 Professiona Writing: Argumentation and<br>Reports (A4)..... | 4   |
| GEOL 201 Physical Geology (B1a).....                                 | 3   |
| MATE 210, 215 Materials Engineering and Lab .....                    | 3,1 |
| MATH 241 Calculus IV (B2) .....                                      | 4   |
| MATH 242 Differential Equations (B2) .....                           | 4   |
| ME 211 Engineering Statics.....                                      | 3   |
| ME 212 Engineering Dynamics.....                                     | 3   |
| PHYS 133 General Physics (B1a) .....                                 | 4   |
| POLS 110 American and California Govt (D1) .....                     | 3   |
|  | 52  |

### Junior

|   |     |
|---|-----|
| CE 336 Water Resources Engineering.....                               | 4   |
| CE 337 Hydraulics Laboratory .....                                    | 1   |
| CE 351 Structural Analysis .....                                      | 5   |
| CE 355 Reinforced Concrete Design .....                               | 3   |
| CE 381, 382 Geotechnical Engineering and Lab .....                    | 4,1 |
| ENVE 331 Intro to Environmental Engineering.....                      | 4   |
| ME 302 Thermodynamics.....  | 3   |
| ME 341 Fluid Mechanics.....   | 3   |
| CSC 341 Numerical Analysis or IME 314 EngR Econ .                     | 3   |
| <sup>1</sup> Life sciences elective (B1b)                             | 2   |
| HIST 202 (4) (USCP) or HIST 204 (3) (D1).....                         | 3   |
| <sup>1</sup> Life understanding elective .....                        | 3   |
| <sup>1</sup> Social, political, economic institutions (Area D).....   | 3   |
| <sup>1</sup> Social, political, econ. inst (300-400 level) (Area D) . | 3   |
| <sup>1</sup> Philosophy elective (C1) .....                           | 3   |
| <sup>1</sup> Fine and performing arts elective (C2).....              | 3   |
|   | 51  |

### Senior

|   |     |
|---|-----|
| CE 453 Structural Steel Design .....  | 3   |
| CE 407 Structural Dynamics .....  | 4   |
| CE 461 Senior Project.....  | 2   |
| CE 462 Senior Project .....   | 2   |
| STAT 312 Statistical Methods for Engineers (B2) .....   | 3   |
| <sup>1</sup> Arts and humanities elective (Area C).....   | 3   |
| <sup>1</sup> Literature, phil, arts elective (300-400 level) (C3).....  | 3   |
| <sup>2</sup> Adviser approved emphasis area to be selected<br>from: general civil, geotechnical, structural,<br>transportation, or water resources engineering..... | 14  |
| <sup>2,3</sup> Adviser approved technical electives.....  | 14  |
|   | 48  |
|   | 202 |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule*.

<sup>2</sup> To be selected in accordance with the A.B.E.T. 24-unit Engineering Design requirement, after consultation with your academic adviser.

<sup>3</sup> No more than 4 units of coursework other than CE/ENVE may be used to satisfy the Civil Engineering degree requirement.

**B.S. CIVIL ENGINEERING**

*Courses are displayed by Major, Support, GE and Electives.*

**MAJOR COURSES**

|   | <i>Units</i> |
|---|--------------|
| CE 111 Civil Introduction to Civil Engineering.....   | 1            |
| CE 114 Intro CAD in Civil & Environmental Engr .....  | 4            |
| CE 201 Strength of Materials (5) or CE 204, CE 205<br>Strength of Materials I, II (3)(2).....   | 5            |
| CE 206 Strength of Materials Laboratory.....  | 1            |
| CE 221, 222 Fund of Transportation Engr and Lab.....  | 3,2          |
| CE 259 Civil Engineering Materials .....  | 2            |
| CE 336 Water Resources Engineering .....  | 4            |
| CE 337 Hydraulics Laboratory .....  | 1            |
| CE 351 Structural Analysis .....  | 5            |
| CE 355 Reinforced Concrete Design.....  | 3            |
| CE 381, 382 Geotechnical Engineering and Lab .....  | 4,1          |
| CE 407 Structural Dynamics.....   | 4            |
| CE 453 Structural Steel Design.....   | 3            |
| CE 461 Senior Project .....   | 2            |
| CE 462 Senior Project .....   | 2            |
| <sup>2</sup> Adviser approved emphasis area to be selected from:<br>general civil, geotechnical, structural,<br>transportation, or water resources engineering..... | 14           |
| <sup>2,3</sup> Adviser approved technical electives .....   | 14           |
|   | <b>75</b>    |

**SUPPORT COURSES**

\* = Course satisfy General Education requirement

|  |     |
|--|-----|
| BRAE 239 Engineering Surveying .....   | 4   |
| CHEM 124 Gen Chemistry for Engineering (B1a)* .....                          | 4   |
| CHEM 125 Gen Chemistry for Engineering (Area B)* .....                       | 4   |
| CSC 231 Fortran for Engineering Students or<br>CSC 234 C and UNIX (F1)*..... | 2   |
| CSC 341 Numerical Analysis or<br>IME 314 Engineering Economics .....         | 4/3 |
| EE 201 Electric Circuits Theory.....   | 3   |
| ENGL 218 Professional Writing: Argumentation and<br>Reports (A4)* .....      | 4   |
| ENVE 331 Intro to Environmental Engineering .....                            | 4   |
| GEOL 201 Physical Geology (Area B)*.....                                     | 3   |
| MATE 210 Materials Engineering .....   | 3   |
| MATE 215 Materials Engineering Laboratory .....                              | 1   |
| MATH 141 Calculus I (B2)* .....  | 4   |
| MATH 142 Calculus II (B2)*.....  | 4   |
| MATH 143 Calculus III (Area B)*.....   | 4   |
| MATH 241 Calculus IV (Area B)* .....   | 4   |
| MATH 242 Differential Equations (Area B)* .....                              | 4   |
| ME 211 Engineering Statics .....   | 3   |
| ME 212 Engineering Dynamics .....  | 3   |
| ME 302 Thermodynamics .....  | 3   |
| ME 341 Fluid Mechanics .....   | 3   |
| PHYS 131 General Physics (Area B)* .....                                     | 4   |
| PHYS 132 General Physics (Area B)* .....                                     | 4   |
| PHYS 133 General Physics (Area B)* .....                                     | 4   |
| STAT 312 Statistical Methods for Engineers (Area B)* .....                   | 3   |

**82**

**GENERAL EDUCATION (GE) ..... 45**

*A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.*

*→See page 77 for complete GE course listing.*

*→Minimum 3 GE courses required at the 300-400 level.*

**Area A Communication** (minimum 10 units)

*1 unit is in Support*

*Take one course from A1, A2, A3:*

A1 Expository Writing

A2 Critical Thinking

A3 Speech

A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

*24 units are in Support.*

*Take one course from B1b:*

B1a Physical Sciences \*see Support

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Support

Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

*2 units are in Support.*

F1 Computer Literacy \*see Support

**ELECTIVES..... 0**

**202**

**B.S. ENVIRONMENTAL ENGINEERING**

*Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section. In scheduling your courses each quarter, consult with your academic adviser. Obtain flow chart at department office. Courses listed below are shown by year.*

| <b>Freshman</b>   | <i>Units</i> |
|---|--------------|
| CE 114 Intro CAD in Civil & Environmental Engr .....                                | 4            |
| BACT 221 General Bacteriology (B1b, E2) .....                                       | 4            |
| CHEM 124 General Chemistry for the Engineering<br>Disciplines (B1a) .....           | 4            |
| CHEM 125 General Chemistry for the Engineering<br>Disciplines (B1a) .....           | 4            |
| CHEM 129 General Chemistry .....  | 4            |
| ENGL 114 Writing: Exposition (A1) .....   | 4            |
| ENGL/PHIL/SPC 125 Critical Thinking (A2) .....                                      | 3            |
| SPC 201 Public Speaking or SPC 202 Principles of<br>Speech Communication (A3) ..... | 3            |
| MATH 141 Calculus I (B2) .....  | 4            |
| MATH 142 Calculus II (B2) .....   | 4            |
| MATH 143 Calculus III (B2) .....  | 4            |
| PHYS 131 General Physics (B1a) .....  | 4            |
| PHYS 132 General Physics (B1a) .....  | 4            |

50

**Sophomore**

|  |   |
|--|---|
| CE 201 Strength of Materials (5) or CE 204, CE 205<br>Strength of Materials I, II (3)(2) ..... | 5 |
| CE 221 Fundamentals Transportation Engineering .....   | 3 |
| ENGL 218 Professional Writing: Argumentation and<br>Reports (A4) .....                         | 4 |
| ME 211 Engineering Statics .....   | 3 |
| ME 212 Engineering Dynamics .....  | 3 |
| ME 302 Thermodynamics .....  | 3 |
| CHEM 212 Survey of Organic Chemistry (B1a) .....   | 5 |
| MATH 241 Calculus IV (B2) .....  | 4 |
| MATH 242 Differential Equations (B2) .....   | 4 |
| PHYS 133 General Physics (B1a) .....   | 4 |
| CSC 231 Fortran for Engineering Students or<br>CSC 234 C and UNIX (F1) .....                   | 2 |
| POLS 110 American and Calif. Government (D1) .....   | 3 |
| STAT 312 Statistical Methods for Engineers (B2) .....  | 3 |
| <sup>1</sup> Social, political, economic institutions electives (Area<br>D) .....              | 6 |

52

**Junior**

|   |   |
|---|---|
| CE 336 Water Resources Engineering .....                    | 4 |
| CE 337 Hydraulics Laboratory .....                          | 1 |
| CE 381 Geotechnical Engineering .....                       | 4 |
| 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 Intro to Environmental Engineering .....           | 4 |
| ENVE 426 Air Quality Measurements .....                     | 3 |
| EE 201 Electric Circuit Theory .....                        | 3 |
| EE 251 Electric Circuit Laboratory .....                    | 1 |
| ME 313 Heat Transfer .....                                  | 3 |
| ME 341 Fluid Mechanics .....                                | 3 |
| HIST 202 (4) (USCP) or HIST 204 (3) (D.1.) .....            | 3 |
| <sup>1</sup> Life understanding elective (Area E) .....     | 3 |
| <sup>1</sup> Literature elective (C1) .....                 | 3 |
| <sup>1</sup> Philosophy elective (C.1.) .....               | 3 |
| <sup>1</sup> Fine and performing arts elective (C.2.) ..... | 3 |

52

**Senior**

|  |     |
|--|-----|
| CE 434 Groundwater Hydraulics and Hydrology .....  | 3   |
| ENVE 411 Air Pollution Control .....   | 3   |
| ENVE 421 Mass Transfer Operations .....  | 3   |
| ENVE 434 Water Quality Measurements .....  | 2   |
| ENVE 436 Intro Hazardous Waste Management .....  | 3   |
| ENVE 438 Water & Wastewater Treatment Design ....  | 3   |
| ENVE 439 Solid Waste Management .....  | 3   |
| ENVE 442 Advanced System Design .....  | 3   |
| ENVE 461, ENVE 462 Senior Project .....  | 2,2 |
| ME 456 Ventilation Principles and Design .....   | 4   |
| <sup>1</sup> Arts and humanities elective (Area C) .....   | 3   |
| <sup>1</sup> Literature, phil, arts elective (300–400 level) (C3) .....                            | 3   |
| <sup>1</sup> Social, political, economics institutions elective (300–<br>400 level) (Area D) ..... | 3   |
| <sup>2</sup> Adviser approved technical electives .....  | 11  |

51

205

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule*.

<sup>2</sup> To be selected in accordance with the A.B.E.T. 24-unit Engineering Design requirement, in consultation with your academic adviser



**B.S. ENVIRONMENTAL ENGINEERING**

Courses are displayed by Major, Support, General Education and Electives.

**MAJOR COURSES**

|   | Units     |
|---|-----------|
| CE 114 Intro CAD in Civil and Environmental Engr....  | 4         |
| CE 201 Strength of Materials (5) or CE 204, CE 205<br>Strength of Materials I, II (3)(2)..... | 5         |
| CE 221 Fundamentals Transportation Engineering .....  | 3         |
| CE 336 Water Resources Engineering .....  | 4         |
| CE 337 Hydraulics Laboratory .....  | 1         |
| CE 381 Geotechnical Engineering.....  | 4         |
| CE 434 Groundwater Hydraulics and Hydrology.....  | 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 Intro to Environmental Engineering .....   | 4         |
| 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 Intro to Hazardous Waste Management ....   | 3         |
| ENVE 438 Water & Wastewater Treatment Design ....   | 3         |
| ENVE 439 Solid Waste Management .....   | 3         |
| ENVE 442 Advanced System Design .....   | 3         |
| ENVE 461 Senior Project .....   | 2         |
| ENVE 462 Senior Project .....   | 2         |
| <sup>1</sup> Adviser approved technical electives.....  | 11        |
|   | <b>77</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |   |
|---|---|
| BACT 221 General Bacteriology (B1b, E2)*.....                                 | 4 |
| CHEM 124 General Chemistry for the Engineering<br>Disciplines (B1a)* .....    | 4 |
| CHEM 125 General Chemistry for the Engineering<br>Disciplines (Area B)* ..... | 4 |
| CHEM 129 General Chemistry (Area B)* .....                                    | 4 |
| CHEM 212 Survey of Organic Chemistry (B1a)*.....                              | 5 |
| CSC 231 Fortran for Engineering Students or<br>CSC 234 C and UNIX (F1)* ..... | 2 |
| EE 201 Electric Circuit Theory.....   | 3 |
| EE 251 Electric Circuit Laboratory.....                                       | 1 |
| ENGL 218 Professional Writing: Argumentation and<br>Reports (A4)* .....       | 4 |
| MATH 141 Calculus I (B2)* .....   | 4 |
| MATH 142 Calculus II (B2)* .....  | 4 |
| MATH 143 Calculus III (Area B)*.....  | 4 |
| MATH 241 Calculus IV (Area B)* .....  | 4 |
| MATH 242 Differential Equations (Area B)* .....                               | 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 |
| ME 456 Ventilation Principles and Design .....                                | 4 |

|   |           |
|---|-----------|
| PHYS 131 General Physics (Area B)* .....                | 4         |
| PHYS 132 General Physics (Area B)* .....                | 4         |
| PHYS 133 General Physics (Area B)* .....                | 4         |
| STAT 312 Statistical Methods for Engineers (Area B)* .. | 3         |
|   | <b>85</b> |

**GENERAL EDUCATION (GE) .....** **43**

A minimum of 72 units is required for GE; 29 of these units are in Major/Support; a minimum of 43 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

1 unit is in Support

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (no additional units required)

26 units are in Support.

B1a Physical Sciences \*see Support

B1b Life Sciences elective \*see Support

B2 Mathematics and/or Statistics \*see Support

Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

2 units are in Support.

F1 Computer Literacy \*see Support

**ELECTIVES.....** **0**

**205**

<sup>1</sup> To be selected in accordance with the A.B.E.T. 24-unit Engineering Design requirement, in consultation with your academic adviser.

## 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 that 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 11 units as required;
- b) a minimum of 25 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**

|  | <i>Units</i> |  |
|--|--------------|--|
| <b>Required Courses</b> .....  | 11           |  |
| CE 591 Graduate Seminar (2)  |              | CE 583 Geotechnical Earthquake Engineering (4)                     |
| 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.              |              | CE 584 Lateral Support Systems (4)                                 |
| <b>Adviser approved analysis and design CE and ENVE electives</b> (to be selected from the following list after consultation with your academic adviser and the CE/ENVE graduate coordinator): ..... | 25           | CE 585 Slope Stability Analysis (4)                                |
| <b>Adviser approved analysis electives outside the major</b> (to be selected after consultation with your academic adviser and the CE/ENVE Graduate Coordinator). .....                              | 9            | CE 586 Analysis and Design of Deep Foundations (4)                 |
|  | —            | CE 599 Design Project Thesis (9)                                   |
|  | 45           | ENVE 411 Air Pollution Control (3)                                 |
|  |              | ENVE 421 Mass Transfer Operations (3)                              |
| <b>Analysis and design CE and ENVE electives:</b>  |              | ENVE 434 Water Quality Measurements (2)                            |
| CE 405 Advanced Strength of Materials (3)  |              | ENVE 436 Introduction to Hazardous Waste Management (3)            |
| CE 407 Structural Dynamics (4)   |              | ENVE 438 Water and Wastewater Treatment Design (3)                 |
| CE 421 Traffic Engineering (4)   |              | ENVE 439 Solid Waste Management (3)                                |
| CE 422 Highway Geometrics and Design (4)   |              | ENVE 465 Environmental Management and Urban Systems (2)            |
| CE 424 Public Transportation (4)   |              | ENVE 534 Advanced Design of Pollution Control Systems (3)          |
| CE 431 Coastal Hydraulics (3)  |              | ENVE 535 Advanced Wastewater Treatment (3)                         |
| CE 432 Coastal Engineering (3)   |              | ENVE 536 Biological Wastewater Treatment Processes Engineering (3) |
| CE 434 Ground Water Hydraulics and Hydrology (3)   |              | ENVE 541 Resource and Energy Recovery (3)                          |
| CE 440 Hydraulic Systems Engineering (3)   |              | ENVE 551 Environmental Unit Operations (4)                         |
| CE 453 Structural Steel Design (3)   |              |  |
| CE 454 Structural Design (4)   |              |  |
| CE 481 Analysis & Design of Shallow Foundations (4)  |              |  |
| CE 482 Conventional Subsurface Exploration (4)   |              |  |
| CE 483 Environmental Geotechnology (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 528 Transportation Analysis (4)   |              |  |
| CE 529 Modeling and Simulation in Transportation (4)   |              |  |
| CE 533 Advanced Water Resources Engineering (3)  |              |  |
| CE 535 Water Resources System Planning and Analysis (3)  |              |  |
| CE 537 Groundwater Contamination (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 (4)  |              |  |
| CE 571 Selected Advanced Laboratory (1-3)  |              |  |
| CE 573 Public Works Administration (3)   |              |  |
| CE 574 Computer Applications in Civil Engineering (3)  |              |  |
| CE 581 Advanced Geotechnical Engineering (4)   |              |  |
| CE 582 Advanced Geotechnical Testing (4)   |              |  |

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# COMPUTER ENGINEERING PROGRAM

**Computer Engineering Program Office**  
**Engineering East Building (20), Room 215**  
**(805) 756-1229**

**College of Engineering Advising Center**  
**Computer Science Bldg. (14), Room 240**  
**(805) 756-1461**

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## Faculty

### Director, Joseph E. Grimes

|                   |                     |
|-------------------|---------------------|
| James L. Beug     | Martin E. Kaliski   |
| David B. Braun    | C. Arthur MacCarley |
| Fred W. DePiero   | Chris J. Scheiman   |
| James G. Harris   | Joy S. Shetler      |
| Lewis D. Hitchner | Clinton A. Staley   |
| John Y. Hsu       | 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 tradeoffs among these components of design.

The main focus of the computer engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

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 Student Branch.

**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 |
|---|-------|
| <b>Freshman</b>   |       |
| CPE 100 Computer Engineering Orientation .....                                      | 1     |
| CSC 101 Fundamentals of Computer Science I (F1)....                                 | 4     |
| CSC 102 Fundamentals of Computer Science II .....                                   | 4     |
| CSC 103 Fundamentals of Computer Science III .                                      | 4     |
| CSC 141 Discrete Math for Computer Scientists I .....                               | 4     |
| CHEM 124 General Chemistry for the Engineering<br>Disciplines (B1a) .....           | 4     |
| ENGL 114 Writing: Exposition (A1) .....   | 4     |
| ENGL/PHIL/SPC 125 Critical Thinking (A2) .....                                      | 3     |
| SPC 201 Public Speaking or SPC 202 Principles of<br>Speech Communication (A3) ..... | 3     |
| MATH 141 Calculus I (B2) .....  | 4     |
| MATH 142 Calculus II (B2) .....   | 4     |
| MATH 143 Calculus III (B2) .....  | 4     |
| PHYS 131 General Physics (B1a) .....  | 4     |
| HIST 202 (4) (USCP, D1) or HIST 204 (3) (D1) .....                                  | 3     |
|   | 50    |
| <b>Sophomore</b>  |       |
| CPE 219, 259 Logic and Switching Circuits and Lab ..                                | 3,1   |
| CPE 215 Computer Architecture I .....   | 4     |
| CPE 315 Computer Architecture II .....  | 4     |
| EE 112 Electric Circuit Analysis I .....  | 2     |
| EE 211, 241 Electric Circuit Analysis II and Lab .....                              | 3,1   |
| EE 212, 242 Electric Circuit Analysis III and Lab ....                              | 3,1   |
| ENGL 218 Professional Writing: Argumentation and<br>Reports (A4) .....              | 4     |
| MATH 241 Calculus IV (B2) .....   | 4     |
| MATH 242 Differential Equations (B2) .....  | 4     |
| MATH 317 Topics in Engineering Math (B2) .....                                      | 4     |
| PHYS 132 General Physics (B1a) .....  | 4     |
| PHYS 133 General Physics (B1a) .....  | 4     |
| PHYS 211 Modern Physics .....   | 4     |
|   | 50    |

|  |     |
|--|-----|
| <b>Junior</b>  |     |
| CSC 205 Software Engineering I .....   | 4   |
| CSC 330 Programming Languages I .....  | 4   |
| CSC 453 Operating Systems I .....  | 4   |
| CPE 316 Computer Architecture III .....  | 4   |
| CPE 319, 359 Digital System Design and Lab .....                                   | 3,1 |
| EE 208, 248 Electronic Devices and Lab .....                                       | 3,1 |
| EE 307, 347 Digital Integrated Electronics and Lab....                             | 3,1 |
| ME 211 Engineering Statics or<br>MATE 210, 215 Materials Engineering & Lab (4) ... | 3   |
| STAT 321 Statistical Analysis I (B2) .....   | 3   |
| POLS 110 American & California Government (D1) ....                                | 3   |
| <sup>1</sup> Philosophy elective (C1) .....  | 3   |
| <sup>1</sup> Fine and performing arts elective (C2) .....                          | 3   |
| <sup>1</sup> Social, political, economics institutions electives<br>(Area D) ..... | 6   |
|  | 49  |

|  |     |
|--|-----|
| <b>Senior</b>  |     |
| CPE 436, CPE 476 Microprocessor System Design<br>Methodologies and Lab .....                       | 3,1 |
| CPE 464 Computer Networks .....  | 4   |
| CPE 461 Senior Project .....   | 3   |
| CPE 462 Senior Project .....   | 2   |
| CSC 430 Programming Languages II: .....  | 4   |
| EE 301, 341 Linear Systems Analysis and Lab .....  | 3,1 |
| EE 302, 342 Linear Control Systems and Lab .....   | 3,1 |
| <sup>1</sup> Life science elective (B1a) .....   | 2   |
| <sup>1</sup> Arts and humanities elective (Area C) .....   | 3   |
| <sup>1</sup> Literature, philosophy, arts elective (300–400<br>level) (C.3.) .....                 | 3   |
| <sup>1</sup> Social, political, economics institutions elective (300-<br>400 level) (Area D) ..... | 3   |
| <sup>1</sup> Life understanding elective (Area E1) .....   | 3   |
| <sup>1</sup> Literature elective (C.1.) .....  | 3   |
| Adviser approved technical electives .....   | 4   |
|  | 46  |
|  | 195 |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule*.

**B.S. COMPUTER ENGINEERING**

*Courses are displayed by Major, Support, General Education and Electives.*

|   | Units     |
|---|-----------|
| <b>MAJOR COURSES</b>  |           |
| * = Courses satisfy General Education requirement                           |           |
| CPE 100 Computer Engineering Orientation .....                              | 1         |
| CSC 101 Fundamentals of Computer Science I (F1)*                            | 4         |
| CSC 102 Fundamentals of Computer Science II .....                           | 4         |
| CSC 103 Fundamentals of Computer Science III.....                           | 4         |
| EE 112 Electric Circuit Analysis I .....                                    | 2         |
| CSC 141 Discrete Math for Computer Scientists I .....                       | 4         |
| CSC 205 Software Engineering I .....  | 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         |
| CPE 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 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 330 Programming Languages I.....  | 4         |
| CSC 430 Programming Languages II.....                                       | 4         |
| CPE 436, CPE 476 Microprocessor System Design<br>Methodologies and Lab..... | 3,1       |
| CSC 453 Operating Systems I .....   | 4         |
| CPE 461 Senior Project .....  | 3         |
| CPE 462 Senior Project .....  | 2         |
| CPE 464 Computer Networks .....   | 4         |
| Adviser approved technical electives .....                                  | 4         |
|   | <b>96</b> |

**SUPPORT COURSES**

|  |     |
|--|-----|
| * = Courses satisfy General Education requirement                              |     |
| CHEM 124 General Chemistry for the Engineering<br>Disciplines (B1a)* .....     | 4   |
| ENGL 218 ProfessionalWriting: Argumentation and<br>Reports (A4)* .....         | 4   |
| MATH 141 Calculus I (B2)* .....  | 4   |
| MATH 142 Calculus II (B2)* .....   | 4   |
| MATH 143 Calculus III (Area B)*.....   | 4   |
| MATH 241 Calculus IV (Area B)* .....   | 4   |
| MATH 242 Differential Equations (Area B)* .....                                | 4   |
| MATH 317 Topics in Engineering Mathematics.....                                | 4   |
| ME 211 Engineering Statics or<br>MATE 210, 215 Materials Engineering/Lab ..... | 3/4 |
| PHYS 131 General Physics (Area B)* .....                                       | 4   |
| PHYS 132 General Physics (Area B)*.....  | 4   |
| PHYS 133 General Physics (Area B)*.....  | 4   |
| PHYS 211 Modern Physics (Area B)* .....  | 4   |
| STAT 321 Statistical Analysis I (Area B)*.....                                 | 3   |

**54**

**GENERAL EDUCATION (GE) ..... 45**

*A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

*1 unit is in Support*

*Take one course from A1, A2, A3:*

A1 Expository Writing

A2 Critical Thinking

A3 Speech

A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

*24 units are in Support.*

*Take one course from B1b:*

B1a Physical Sciences \*see Support

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Support

Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

D1a HIST 202 (USCP) or HIST 204 or LS 211 .

D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

*2 units are in Support.*

F1 Computer Literacy \*see Support

**ELECTIVES ..... 0**

**195**

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# COMPUTER SCIENCE DEPARTMENT

**Computer Science Department**  
**Computer Science Bldg. (14), Room 254**  
**(805) 756-2824**

**College of Engineering Advising Center**  
**Computer Science Bldg. (14), Room 240**  
**(805) 756-1461**

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## Faculty

### Department Chair, James L. Beug

|                    |                      |
|--------------------|----------------------|
| Raymond E. Boche   | Mei-Ling Liu         |
| Lois H. Brady      | Sham S. Luthra       |
| W. Chris Buckalew  | Sigurd Meldal        |
| Laurian M. Chirica | Leonard D. Myers     |
| Bin Cong           | Cornel K. Pokorny    |
| John B. Connely    | Erika Rogers         |
| Charles H. Dana    | Chris J. Scheiman    |
| Gene Fisher        | Clinton A. Staley    |
| Joseph E. Grimes   | Daniel J. Stearns    |
| Lewis E. Hitchner  | Emilia E. Villarreal |
| John Y. Hsu        | Patrick O. Wheatley  |
| Elmo A. Keller     |                      |

## 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 Commission of the Computer Science 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, software 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 Information Technology 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 Electrical Engineering Department.

**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 16 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 one or more required courses and several restricted elective courses.

Minor courses can be counted toward the student's major, support and general education & breadth requirements. Once students have completed the core courses, they should make an appointment to see the director of the College of Engineering Advising Center to request acceptance to the minor. The Computer Science minor is not open to CSC or CPE major students. Questions concerning the minor should be directed to the College of Engineering Advising Center.

|  |       |  |
|--|-------|--|
| <b>Required Core Courses</b> .....                                       | Units |  |
| CSC 101 Fundamentals of Computer Science I (4)                           | 16    |  |
| CSC 102 Fundamentals of Computer Science II (4)                          |       |  |
| CSC 103 Fundamentals of Computer Science III (4)                         |       |  |
| CSC 141 Discrete Structures I (4)  |       |  |
| <b>Tracks (select one)</b> .....   | 16    |  |
| <i>Database and Application Development</i> (16)                         |       |  |
| CSC 365 Introduction to Database Systems (4)                             |       |  |
| CSC 366 Database, Modeling, Design and Implementation (4)                |       |  |
| Upper-division restricted electives (8)                                  |       |  |
| <i>Computer Architecture</i> (16)  |       |  |
| (Note: CPE 215, CPE 219 and CPE 259 are prerequisite to CPE 315 )        |       |  |
| CPE 315 Computer Architecture II (4)                                     |       |  |
| CPE 316 Computer Architecture III (4)                                    |       |  |
| Upper-division restricted electives (8)                                  |       |  |
| <i>Artificial Intelligence</i> (16)                                      |       |  |
| CSC 480 Artificial Intelligence I (4)                                    |       |  |
| CSC 481 Artificial Intelligence II (4)                                   |       |  |
| Upper-division restricted electives (8)                                  |       |  |
| <i>Graphics</i> (16)   |       |  |
| CSC 471 Computer Graphics I (4)  |       |  |
| CSC 473 Advanced Rendering Techniques (4) or CSC 477 Computer Vision (4) |       |  |
| Upper-division restricted electives (8)                                  | —     |  |
| <b>Total Units</b> .....   | 32    |  |

**B.S. COMPUTER 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.*

|   |       |
|---|-------|
| <b>Year 1</b>                                       | Units |
| CSC 101 Fundamentals of Computer Science I (F1).... | 4     |
| CSC 102 Fundamentals of Computer Science II .....   | 4     |
| CSC 103 Fundamentals of Computer Science III .      | 4     |
| CSC 141 Discrete Structures I .....                 | 4     |

|  |    |
|--|----|
| MATH 141 Calculus I (B2) .....                                       | 4  |
| MATH 142 Calculus II (B2) .....                                      | 4  |
| ENGL 114 Writing: Exposition (A1) .....                              | 4  |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2)..                   | 3  |
| SPC 201 Public Speaking or   |    |
| SPC 202 Principles of Speech Communication (A3)                      | 3  |
| <sup>1</sup> Life understanding elective (E1) .....                  | 3  |
| <sup>1</sup> Social, political, economics institutions (Area D)..... | 6  |
| Free electives .....   | 4  |
|  | 47 |

**Year 2**

|   |     |
|---|-----|
| CSC 205 Software Engineering I.....                                 | 4   |
| CSC 206 Software Engineering II.....                                | 4   |
| CPE 219, 259 Logic and Switching Circuits and Lab..                 | 3,1 |
| CSC 215 Computer Architecture I .....                               | 4   |
| CSC 315 Computer Architecture II .....                              | 4   |
| ENGL 218 Professional Writing: Argumentation and Reports (A4) ..... | 4   |
| POLS 110 American and California Govt. (D1) .....                   | 3   |
| Laboratory science electives (B1a) .....                            | 12  |
| <sup>1</sup> Life science elective (B1b) .....                      | 2   |
| <sup>1</sup> Fine and performing arts elective (C2).....            | 3   |
| <sup>1</sup> Philosophy elective (C1) .....                         | 3   |
|   | 47  |

**Year 3**

|   |    |
|---|----|
| CSC 300 Professional Responsibilities .....     | 4  |
| CSC 330 Programming Languages .....             | 4  |
| CSC 349 Design and Analysis of Algorithms ..... | 4  |
| STAT 321 Statistical Analysis I (B2).....       | 4  |
| Mathematics/statistics electives .....          | 8  |
| HIST 202 (4) (USCP) or HIST 204 (3) (D1).....   | 3  |
| <sup>1</sup> Literature elective (C1).....      | 3  |
| Adviser approved technical electives .....      | 12 |
| Free elective.....                              | 5  |
|   | 47 |

**Year 4**

|   |    |
|---|----|
| CSC 445 Theory of Computing .....   | 4  |
| CSC 453 Introduction to Operating Systems .....   | 4  |
| CSC 491 Senior Project.....   | 2  |
| CSC 492 Senior Project .....  | 3  |
| <sup>1</sup> Literature, philosophy, arts electives (300–400 level) (C3) .....                | 3  |
| <sup>1</sup> Arts and humanities elective (Area C).....                                       | 3  |
| <sup>1</sup> Social, political, economics institutions elective (300-400 level) (Area D)..... | 3  |
| Adviser approved technical electives .....  | 16 |
| Electives .....   | 7  |
|   | 45 |

186

<sup>1</sup> For selection of GEB electives, see page 77 or current Class Schedule.



**B.S. COMPUTER SCIENCE**

Courses are displayed by Major, Support, General Education and Electives.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   | Units |
|---|-------|
| CSC 101 Fundamentals of Computer Science I (F1)*  | 4     |
| CSC 102 Fundamentals of Computer Science II .....   | 4     |
| CSC 103 Fundamentals of Computer Science III .  | 4     |
| CSC 141 Discrete Structures I .....   | 4     |
| CSC 205 Software Engineering I .....  | 4     |
| CSC 206 Software Engineering II .....   | 4     |
| CPE 219, 259 Logic and Switching Circuits, Lab .....  | 3,1   |
| CSC 215 Computer Architecture I .....   | 4     |
| CSC 300 Professional Responsibilities .....   | 4     |
| CSC 315 Computer Architecture II .....  | 4     |
| CSC 330 Programming Languages .....   | 4     |
| CSC 349 Design and Analysis of Algorithms .....   | 4     |
| CSC 445 Theory of Computing .....   | 4     |
| CSC 453 Introduction to Operating Systems .....   | 4     |
| CSC 491 Senior Project .....  | 2     |
| CSC 492 Senior Project .....  | 3     |
| Adviser approved technical electives (300-400 level) .  | 28    |
| Must include at least three courses with CSC or CPE prefix; two of the CSC/CPE courses must be from one two-quarter sequence. |       |

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89

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |    |
|---|----|
| ENGL 218 Professional Writing: Argumentation and Reports (A4)* .....      | 4  |
| MATH 141 Calculus I (B2)* .....   | 4  |
| MATH 142 Calculus II (B2)* .....  | 4  |
| STAT 321 Statistical Analysis I (Area B)* .....                           | 4  |
| Mathematics/statistics electives .....                                    | 8  |
| Select from:  |    |
| CSC 142; MATH 143, 206, 241, 242, 248, 306, 335, 336, 437, 470; STAT 322. |    |
| Physical science electives (B1a) .....                                    | 12 |
| CHEM 124, CHEM 125, CHEM 129 or   |    |
| PHYS 131, PHYS 132, PHYS 133.   |    |

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36

**GENERAL EDUCATION (GE) ..... 45**

A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

1 unit is in Support

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

24 units are in Support.

Take one course from B1b:

- B1a Physical Sciences \*see Support
- B1b Life Sciences elective
- B2 Mathematics and/or Statistics \*see Support
- Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

2 units are in Support.

- F1 Computer Literacy \*see Support

**ELECTIVES..... 16**


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186

## 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 multiprocessor system for parallel programming, and a variety of graphics workstations and personal computers. 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:

- CSC 103 Fundamentals of Computer Science III (4)
- CSC 205 Software Engineering I (4)
- CSC 315 Computer Architecture II (4)
- CSC 445 Theory of Computing (4)
- 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> |
|--|--------------|
| <b>Select five courses from the following:</b> .....                   | 20           |
| CSC 508 Software Engineering I (4)                                     |              |
| CSC 509 Software Engineering II (4)                                    |              |
| CSC 520 Computer Architecture (4)                                      |              |
| CSC 530 Language and Translators (4)                                   |              |
| CSC 540 Theory of Computing II (4)                                     |              |
| CSC 550 Operating Systems (4)  |              |
| CSC 560 Database Systems (4)   |              |
| CSC 580 Artificial Intelligence III (4)                                |              |
| <b>Thesis/Project and Seminar</b> .....                                | 9            |
| CSC 590 Graduate Seminar (3)   |              |
| CSC 599 Thesis (6)   |              |
| <b>Electives to be selected with Graduate Adviser's approval</b> ..... | 16           |
|  | 45           |

For further information or advisement students should communicate with the Graduate Coordinator of the Computer Science Department.

# ELECTRICAL ENGINEERING DEPARTMENT

**Electrical Engineering Department Office**  
**Engineering East Bldg. (20), Room 200**  
**(805) 756-2781**

**College of Engineering Advising Center**  
**Computer Science Building (14), Room 240**  
**(805) 756-1461**

## Faculty

### Department Chair, Martin E. Kaliski

|                       |                     |
|-----------------------|---------------------|
| Samuel O. Agbo        | C. Arthur MacCarley |
| David B. Braun        | Shien-Yi Meng       |
| Jerome R. Breitenbach | Ahmad Nafisi        |
| Michael M. Cirovic    | Mahmood Nahvi       |
| Samir K. Datta        | Ali O. Shaban       |
| Fred W. DePiero       | Joy S. Shetler      |
| Saul Goldberg         | Cheng Sun           |
| Gary Granneman        | Shyama C. Tandon    |
| James G. Harris       | Donley J. Winger    |
| Michael Hawes         | Michael T. Wollman  |
| William F. Horton     | Chuan-Sung Yeh      |

## 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 focus of the electrical engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

The main objective of the department is to prepare students for pursuing engineering 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 technical electives in either Electronics or Power. The Electronics courses deal 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 courses deal 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.

Industry recognizes that students who have completed specialized technical courses are early contributors in the workforce. Students wishing to pursue graduate work may select appropriate senior courses in keeping with this goal.

Laboratories are well-equipped to provide students with both hands-on instrumentation and design experiences. 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 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 Electrical Engineering Department.

**HONORS PROGRAM FOR JOINT BACHELOR OF SCIENCE AND MASTER OF SCIENCE DEGREE IN ELECTRICAL ENGINEERING**

**Synopsis**

This program provides a means for academically excellent upper-division students to complete MS graduate studies concurrently with completion of BS degree requirements.

**Program Features**

Students may apply for admission to the Joint BS/MS Honors Program after completion of all EE 300-level courses required by their undergraduate program. The academic requirements for acceptance into this program are determined by the Graduate Committee and the Department Chair. The Graduate Committee evaluates applicants and renders decisions on their admission.

A feature of the program is to allow the use of a common project for fulfillment of the requirements for both the Master's Thesis (EE 599) and Senior Project (EE 461/462). In this case, a separate senior project deliverable is not required. A faculty adviser serves as both the thesis committee chairperson and the senior project adviser. The unit requirements for either degree are unchanged. The student must elect the MS thesis option. A student in this program, at his/her request, may be awarded the BS degree prior to the completion of the program, at a point when all requirements for the BS degree have been met, including an acceptable senior project report.

**B.S. ELECTRICAL ENGINEERING**

*Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section. In scheduling your courses each quarter, consult with your academic adviser. Courses are shown by year.*

| Freshman   | Units |
|--|-------|
| EE 110 Orientation .....   | 1     |
| EE 112 Electric Circuit Analysis I .....                               | 2     |
| IME 157 Electronic Manufacturing .....                                 | 3     |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a) ..... | 4     |
| CHEM 125 General Chemistry for the Engineering Disciplines .....       | 4     |
| CSC 234 C and UNIX (F1) .....  | 3     |
| ENGL 114 Writing: Exposition (A1) .....                                | 4     |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2) ..                    | 3     |
| SPC 201 Public Speaking or   |       |
| SPC 202 Principles of Speech Communication (A3)                        | 3     |
| MATH 141 Calculus I (B2) .....   | 4     |
| MATH 142 Calculus II (B2) .....  | 4     |
| MATH 143 Calculus III (B2) .....                                       | 4     |
| PHYS 131 General Physics (B1a) .....                                   | 4     |
| PHYS 133 General Physics (B1a) .....                                   | 4     |
|  | 47    |

**Sophomore**

|  |     |
|--|-----|
| EE 211, 241 Electric Circuit Analysis and Lab II ..... | 3,1 |
| EE 212, 242 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 |

|   |    |
|---|----|
| ENGL 218 Professional Writing: Argumentation and Reports (A4) .....   | 4  |
| MATH 241 Calculus IV (B2) .....                                       | 4  |
| MATH 242 Differential Equations (B2) .....                            | 4  |
| MATH 317 Topics in Engineering Math. (B2).....                        | 4  |
| ME 211 Engineering Statics .....                                      | 3  |
| ME 212 Engineering Dynamics .....                                     | 3  |
| PHYS 132 General Physics (B1a) .....                                  | 4  |
| PHYS 211 Modern Physics .....   | 4  |
| <sup>1</sup> Philosophy elective (C1) .....                           | 3  |
| <sup>1</sup> Social, economics, political institutions (Area D) ..... | 3  |
|   | 52 |

**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, 359 Digital System Design and Lab .....                      | 3,1 |
| EE 325, 365 Energy Conversion Electromag, Lab .....                  | 3,1 |
| EE 328 Discrete Time Systems .....                                   | 3   |
| EE 334 Electromagnetic Fields I .....                                | 3   |
| MATE 210 Materials Engineering .....                                 | 3   |
| HIST 202 (4) (USCP) or HIST 204 (3) (D1) .....                       | 3   |
| <sup>1</sup> Life sciences elective (B1b) .....                      | 2   |
| <sup>1</sup> Fine and performing arts elective (C2) .....            | 3   |
| <sup>2</sup> Electronic or Power restricted technical elective ..... | 3   |
|  | 51  |

**Senior**

|  |     |
|--|-----|
| EE 460 Senior Seminar .....  | 1   |
| EE 461 Senior Project .....  | 3   |
| EE 462 Senior Project .....  | 2   |
| ME 302 Thermodynamics .....  | 3   |
| POLS 110 American and California Govt. (D1) .....  | 3   |
| <sup>1</sup> Arts and humanities elective (Area C) .....                                       | 3   |
| <sup>1</sup> Literature elective (C1) .....  | 3   |
| <sup>1</sup> Literature, phil, arts elective (300-400 level) (C3) .....                        | 3   |
| <sup>1</sup> Social, economics, political institutions (Area D) .....                          | 3   |
| <sup>1</sup> Social, political, economics institutions elective (300-400 level) (Area D) ..... | 3   |
| <sup>1</sup> Life understanding elective (Area E) .....  | 3   |
| <sup>2</sup> Electronic or Power restricted technical electives .....                          | 7   |
| <sup>3</sup> Approved technical electives .....  | 12  |
|  | 49  |
|  | 199 |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule*.

<sup>2</sup> 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

<sup>3</sup> A minimum of two EE senior design labs and two EE design lecture courses is required. To be approved by major adviser.

**B.S. ELECTRICAL ENGINEERING**

*Courses are displayed by Major, Support and GE.*

| 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 Electromag, Lab.....  | 3,1   |
| EE 328 Discrete Time Systems.....   | 3     |
| EE 334 Electromagnetic Fields I.....  | 3     |
| EE 460 Senior Seminar .....   | 1     |
| EE 461 Senior Project.....  | 3     |
| EE 462 Senior Project.....  | 2     |
| Select either <i>Electronic or Power</i> technical electives:   | 10    |
| <i>Electronic:</i> EE 313, 353, EE 401, EE 414  |       |
| <i>Power:</i> EE 303, EE 406, ME 341  |       |
| Adviser approved technical electives .....  | 12    |
| Select a minimum of 2 EE senior design laboratories and 2 EE senior design lectures with approval by major adviser. |       |

**84**

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |   |
|---|---|
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a)* ..... | 4 |
| CHEM 125 General Chemistry for the Engineering Disciplines .....        | 4 |
| CSC 234 C and UNIX (F1)* .....  | 3 |
| ENGL 218 Professional Writing: Argumentation and Reports (A4)* .....    | 4 |
| IME 157 Electronic Manufacturing .....                                  | 3 |
| MATE 210 Materials Engineering .....                                    | 3 |
| MATH 141 Calculus I (B2)* .....   | 4 |
| MATH 142 Calculus II (B2)* .....  | 4 |
| MATH 143 Calculus III (Area B)* .....                                   | 4 |
| MATH 241 Calculus IV (Area B)* .....                                    | 4 |
| MATH 242 Differential Equations (Area B)* .....                         | 4 |
| MATH 317 Topics in Engineering Math. (Area B)*.....                     | 4 |
| ME 211 Engineering Statics .....  | 3 |
| ME 212 Engineering Dynamics .....                                       | 3 |
| ME 302 Thermodynamics .....   | 3 |
| PHYS 131 General Physics (Area B)* .....                                | 4 |
| PHYS 132 General Physics (Area B)* .....                                | 4 |
| PHYS 133 General Physics (Area B)* .....                                | 4 |
| PHYS 211 Modern Physics.....  | 4 |

**70**

**GENERAL EDUCATION (GE) ..... 45**

*A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

*1 unit is in Support*

*Take one course from A1, A2, A3:*

A1 Expository Writing

A2 Critical Thinking

A3 Speech

A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

*24 units are in Support.*

*Take one course from B1b:*

B1a Physical Sciences \*see Support

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Support

Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

*2 units are in Support.*

F1 Computer Literacy \*see Support

**ELECTIVES..... 0**

**199**

## 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, Electrical Engineering Department.

### Program of Study

Graduate students in this program must file a formal study plan with their adviser, department, college and university graduate studies office by no later than the end of the second quarter in the program. The formal program of study must include a minimum of 45 units (at least 28 of which must be at the 500 level and the remainder at the 400 level).

The broad curriculum requirements for the M.S. in Electrical Engineering are:

- core of 16 units;
- a minimum of 12 units of additional electrical engineering courses;
- at least 17 units of approved electives;
- at least 28 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 thesis option is strongly encouraged for all students.

### CURRICULUM FOR M.S. ELECTRICAL ENGINEERING

|   | Units |
|---|-------|
| <b>Core Courses</b> .....   | 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   |       |
| <b>Additional Electrical Engineering Graduate Courses</b> ..  | 12    |
| <i>To be selected from the following list: Not all courses listed are offered each academic year. Consult the EE Department for current information on course offerings</i> |       |
| EE 502 Microwave Engineering (4)  |       |
| EE 511 Electric Machines Theory (3)   |       |
| EE 513 Control Systems Theory (4)   |       |
| EE 514 Advanced Topics in Automatic Control (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 System Design (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 529 Advanced Topics in Microwave Device Electronics (3)  |       |
| EE 530 Photonics Systems (4)  |       |
| EE 533 Antennas (4)   |       |
| EE 541 Advanced Microwave Laboratory (2)  |       |
| <b>Approved Technical Electives (400-500 level)</b> .....   | 17    |
| <i>May be selected from the course list above and other adviser approved technical electives.</i>   |       |

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 45

# GENERAL ENGINEERING

## 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**  
**Computer Science Building (14), Room 240**  
**(805) 756-1461**

### Program

#### B.S. General Engineering

The Bachelor of Science degree in General Engineering is designed to allow students the latitude in course selection required to educate themselves either in the classical study of engineering or in new and evolving interdisciplinary technologies such as bioengineering and mechatronics. The degree is an excellent preparation for an applied terminal masters degree in these interdisciplinary fields such as the accelerated "4 + 1" program described in the M.S. Engineering section of this catalog. General Engineering can also accommodate 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. The B.S. degree in General Engineering 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.

The General Engineering Program encourages students to participate in the "4 + 1" B.S. and M.S. granting program. Currently, many students choose bioengineering, manufacturing engineering and mechatronics. The "4 + 1" program recognizes that the expertise required of entry level engineers in many field, particularly new and evolving technological fields, implies that a masters degree is a prerequisite for success. The program allows motivated students to reduce the time necessary to earn both degrees.

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 General Engineering curriculum provides the framework for this matrix of understanding, upon which the practitioner may begin to develop a unique area of expertise.

The General Engineering 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, developed with the support of the National Science Foundation, 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.

The application of engineering to medicine and biology underpins a strong and growing segment of the industrial sector and continues to be an area of inherent interest to students. The need for well educated professionals in this area has become more acute as the technology being applied has become more sophisticated. Evolution in computing, electronics, signal analysis and mechatronic systems have been harbingers of improvement to diagnostic efforts, therapeutic approaches and bioindustrial applications. Studies of biological materials, physiological mechanisms, biochemical kinetics and heat and mass transfer in biological systems require engineering expertise. Applied medical and biological research has taken on a distinct engineering aspect.

Mechatronics, another popular student focus, is defined as the application of decision making to physical systems. Today's engineered products are complex, composed of integrated mechanical and electronic components and operate with the aid of control software. Design and fabrication of such products requires knowledge of manufacturing, mechanical engineering, electronics and materials as well as experience with concurrent engineering tools. Embedded computers of all sizes and capabilities are used in the decision making elements of products which daily affect the lives of essentially each resident in the developed world. Microcontrollers and mechatronic systems are found in devices as mundane as lawnmowers and as esoteric as deep space probes - and every system in between.

**B.S. GENERAL 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 |   |     |
|--|-------|---|-----|
| <b>Freshman</b>  |       | <b>Junior</b>   |     |
| ENGR 110 Engineering Science I.....  | 3     | IME 314 Engineering Economics .....   | 3   |
| ENGR 111 Engineering Science II.....   | 3     | ME 302 Thermodynamics.....  | 3   |
| ENGR 112 Engineering Science III .....                                       | 3     | ME 313 Heat Transfer .....  | 3   |
| CHEM 124 General Chemistry for the Engineering<br>Disciplines (B1a) .....    | 4     | MATE 210, 215 Materials Engineering and Lab .....   | 3,1 |
| CHEM 125 General Chemistry for the Engineering<br>Disciplines .....          | 4     | POLS 110 American and California Government (D1) .  | 3   |
| ENGL 114 Writing: Exposition (A1).....                                       | 4     | <sup>1</sup> Life science elective (B1b).....   | 2   |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2) ..                          | 3     | <sup>1</sup> Literature elective (C1).....  | 3   |
| SPC 201 Public Speaking or   |       | <sup>1</sup> Philosophy elective (C1) .....   | 3   |
| SPC 202 Principles of Speech Communication (A3)                              | 3     | <sup>1</sup> Social, political, economics institutions (Area D).....                              | 3   |
| MATH 141 Calculus I (B2).....  | 4     | <sup>1</sup> Life understanding elective (Area E).....  | 3   |
| MATH 142 Calculus II (B2).....   | 4     | Adviser approved technical electives .....  | 18  |
| MATH 143 Calculus III (B2).....  | 4     |   | 48  |
| PHYS 131 General Physics (B1a).....  | 4     |   |     |
| PHYS 132 General Physics (B1a).....  | 4     | <b>Senior</b>   |     |
| 47   |       | ME 341 Fluid Mechanics.....   | 3   |
|  |       | Senior Project (in appropriate engineering discipline).   | 2,2 |
| <b>Sophomore</b>   |       | <sup>1</sup> Fine and performing arts elective (C2).....  | 3   |
| CE 204 Strength of Materials.....  | 3     | <sup>1</sup> Arts and humanities elective (Area C).....   | 3   |
| EE 201 Electric Circuit Theory.....  | 3     | <sup>1</sup> Literature, philosophy, arts elective (300–400<br>level) (C3) .....                  | 3   |
| MATH 241 Calculus IV (B2).....   | 4     | <sup>1</sup> Social, political, economics institutions elective (300-<br>400 level) (Area D)..... | 3   |
| MATH 242 Differential Equations (B2).....                                    | 4     | Adviser approved technical electives .....  | 18  |
| MATH 300–400 level elective.....   | 4     | Electives .....   | 9   |
| ME 211 Engineering Statics .....   | 3     |   | 46  |
| ME 212 Engineering Dynamics .....  | 3     |   | 190 |
| PHYS 133 General Physics (B1a).....  | 4     |   |     |
| Physical science elective .....  | 4     |   |     |
| CSC 101 Fundamentals of Computer Science or<br>CSC 234 C and Unix (F1) ..... | 3     |   |     |
| ENGL 218 Professional Writing: Argumentation and<br>Reports (A4) .....       | 4     |   |     |
| HIST 202 (4) (USCP) or HIST 204 (3) (D1) .....                               | 3     |   |     |
| <sup>1</sup> Social, political, economics institutions (Area D) .....        | 3     |   |     |
| Adviser approved technical electives .....                                   | 4     |   |     |
| 49   |       |   |     |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule*.



**B.S. GENERAL ENGINEERING**

Courses are displayed by Major, Support, General Education, and Electives. A minimum of 60 units at 300–400 level.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   |     |
|---|-----|
| CE 204 Strength of Materials.....   | 3   |
| CSC 101 Fund. of Computer Science (3) or<br>CSC 234 C and Unix (4) (F1)*..... | 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 210, 215 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)                                     |     |

Units

84

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |   |
|--|---|
| CHEM 124 General Chemistry for the Engineering<br>Disciplines (B1a)* ..... | 4 |
| CHEM 125 General Chemistry for the Engineering<br>Disciplines (B2) .....   | 4 |
| ENGL 218 Professional Writing: Argumentation and<br>Reports (A4)* .....    | 4 |
| MATH 141 Calculus I (B2)* .....  | 4 |
| MATH 142 Calculus II (Area B)* .....                                       | 4 |
| MATH 143 Calculus III (Area B)* .....                                      | 4 |
| MATH 241 Calculus IV (Area B)* .....                                       | 4 |
| MATH 242 Differential Equations (Area B)* .....                            | 4 |
| MATH 300–400 level elective .....  | 4 |
| PHYS 131 General Physics (Area B)* .....                                   | 4 |
| PHYS 132 General Physics (Area B)* .....                                   | 4 |
| PHYS 133 General Physics (Area B)* .....                                   | 4 |
| Physical science elective .....  | 4 |

52

**GENERAL EDUCATION (GE) ..... 45**

A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum 3 GE courses required at the 300–400 level.

**Area A Communication** (minimum 10 units)

1 unit is in Support

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

24 units are in Support.

Take one course from B1b:

- B1a Physical Sciences \*see Support
  - B1b Life Sciences elective
  - B2 Mathematics and/or Statistics \*see Support
- Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300–400 level)

If less than 15 units, take one course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
  - D1b POLS 110 or LS 212
- Take three courses from D2, D3, D4a, D4b
- D2 History (300–400 level)
  - D3 Economics
  - D4a Social Institutions
  - D4b Social Institutions (300–400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

2 units are in Support.

- F1 Computer Literacy \*see Support

**ELECTIVES..... 9**

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# INDUSTRIAL AND MANUFACTURING ENGINEERING DEPARTMENT

Graphic Arts Bldg. (26), Room 100  
(805) 756-2341

College of Engineering Advising Center  
Computer Science Bldg. (14), Room 240  
(805) 756-1461

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## Faculty

### Department Chair, Sema E. Alptekin

|                       |                        |
|-----------------------|------------------------|
| K. N. Balasubramanian | A. Reza Pouraghabagher |
| Kenneth L. Brown      | Luis C. Rabelo         |
| J. Kent Butler        | Paul E. Rainey         |
| Archie D. Cheda       | Ahmad K. Seifoddini    |
| Mark A. Cooper        | Richard A. Strahl      |
| H. Jo Anne Freeman    | Donald E. White        |
| Anthony K. Mason      | Tao H. Yang            |
| Unny Menon            |                        |

## Programs

### B.S. Industrial Engineering

### B.S. Manufacturing Engineering

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.

The main focus of the industrial engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

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. The emphasis is on both development and sustained operation of

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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.

The main focus of the manufacturing engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

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, mechatronics, tool design, and computer-aided manufacturing are applied directly to the problems of development and sustained operation of manufacturing systems. Students can select electives to specialize in the following areas: mechatronics manufacturing, manufacturing systems, manufacturing processes.

The Bachelor of Science program in Manufacturing Engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Graduates are prepared for job-entry at the professional level in the areas of CAD/CAM, process engineering, mechatronics, quality assurance, and production engineering. Graduates also are well prepared for successful graduate study.

#### **GRADUATE PROGRAMS**

Cal Poly offers a Master of Science degree in Engineering with specializations in Industrial Engineering, Integrated Technology Management, 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.*

|  | <i>Units</i> |
|--|--------------|
| <b>Freshman</b>  |              |
| IME 101 Introduction to Industrial and Manufacturing Engineering ..... | 1            |
| IME 141 Manufacturing Processes: Net Shape .....                       | 1            |
| IME 223 Work Design and Measurement .....                              | 4            |
| IME 144 Introduction to Design and Manufacturing ...                   | 4            |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a) ..... | 4            |
| CHEM 125 General Chemistry for the Engineering Disciplines (B1a) ..... | 4            |
| CSC 234 C and UNIX (F1) .....  | 3            |
| ENGL 114 Writing: Exposition (A1).....                                 | 4            |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2) ..                    | 3            |
| SPC 201 Public Speaking <i>or</i>                                      |              |
| SPC 202 Principles of Speech Communication (A3)                        | 3            |
| MATH 141 Calculus I (B2) .....   | 4            |
| MATH 142 Calculus II (B2) .....  | 4            |
| MATH 143 Calculus III (B2) .....                                       | 4            |
| HIST 202 (4) (USCP) <i>or</i> HIST 204 (3) (D1) .....                  | 3            |
| <sup>1</sup> Life understanding elective (Area E).....                 | 3            |
|  | <hr/> 49     |
| <b>Sophomore</b>   |              |
| IME 239 Industrial Costs and Controls .....                            | 3            |
| IME 251 Manufacturing Engineering Analysis .....                       | 3            |
| IME 314 Engineering Economics.....                                     | 3            |
| MATH 241 Calculus IV (B2) .....  | 4            |
| MATH 242 Differential Equations (B2).....                              | 4            |
| ME 211 Engineering Statics .....                                       | 3            |
| ME 212 Engineering Dynamics .....                                      | 3            |
| ENGL 218 Professional Writing: Argumentation and Reports (A4) .....    | 4            |
| PHYS 131 General Physics (B1a) .....                                   | 4            |
| PHYS 132 General Physics (B1a).....                                    | 4            |
| PHYS 133 General Physics (B1a).....                                    | 4            |
| POLS 110 American and California Govt. (D1).....                       | 3            |
| <sup>1</sup> Philosophy elective (C1).....                             | 3            |
| <sup>1</sup> Literature elective (C1) .....                            | 3            |
| <sup>1</sup> Social, political, economic institutions (Area D).....    | 3            |
|  | <hr/> 51     |

**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 <i>or</i>   |          |
| ME 341 Fluid Mechanics .....   | 3        |
| EE 201 Electric Circuits Theory .....  | 3        |
| EE 321 Electronics .....   | 3        |
| MATE 210 Materials Engineering <i>or</i>   |          |
| ME 302 Thermodynamics .....  | 3        |
| <sup>1</sup> Life sciences elective (B1b).....   | 2        |
| STAT 321 Statistical Analysis I (B2).....  | 3        |
| <sup>2</sup> Adviser approved technical electives which must meet EAC-ABET requirements..... | 10       |
|  | <hr/> 52 |

**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 (D2).....  | 3         |
| <sup>1</sup> Arts and humanities elective (Area C).....                                      | 3         |
| <sup>1</sup> Fine and performing arts elective (C2).....                                     | 3         |
| <sup>1</sup> Literature, philosophy, arts elective (300–400 level) (C3) .....                | 3         |
| <sup>1</sup> Social, political, economic institutions elective (300-400 level) (Area D)..... | 3         |
| <sup>2</sup> Adviser approved technical electives which must meet EAC-ABET requirements..... | 9         |
|  | <hr/> 50  |
|  | <hr/> 202 |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule* and consult with adviser for ABET requirements.

<sup>2</sup> Adviser approved technical electives which must meet EAC-ABET requirements: (IME 303, 356, 357, 407, 408, 409, 411, 413, 416, 418, 427, 431, 433, 435, 437, 455, 456; CSC 420; MATH 306; PSY 494; or current listing).

**B.S. INDUSTRIAL ENGINEERING**

*Courses are displayed by Major, Support and GE.*

**MAJOR COURSES**

*Units*

|  |     |
|--|-----|
| IME 101 Intro. to Industrial and Manufacturing Engr ..   | 1   |
| IME 141 Manufacturing Processes: Net Shape .....   | 1   |
| IME 144 Introduction to Design and Manufacturing ...   | 4   |
| 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:<br>IME 303, 356, 357, 407, 408, 409, 411, 413, 416, 418, 427, 431, 433, 435, 437, 455, 456;<br>CSC 420; MATH 306; PSY 494 or current listing ... | 19  |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |   |
|--|---|
| CE 204 Strength of Materials or<br>ME 341 Fluid Mechanics.....               | 3 |
| CHEM 124 General Chemistry for the Engineering<br>Disciplines (B1a)* .....   | 4 |
| CHEM 125 General Chemistry for the Engineering<br>Disciplines(Area B)* ..... | 4 |
| CSC 234 C and UNIX (F1)* .....   | 3 |
| EE 201 Electric Circuits Theory.....   | 3 |
| EE 321 Electronics.....  | 3 |
| ENGL 218 Professional Writing: Argumentation and<br>Reports (A4)* .....      | 4 |
| MATH 141 Calculus I (B2)* .....  | 4 |
| MATH 142 Calculus II (B2)* .....   | 4 |
| MATH 143 Calculus III (Area B)*.....   | 4 |
| MATH 241 Calculus IV (Area B)* .....   | 4 |
| MATH 242 Differential Equations (Area B)* .....                              | 4 |
| ME 211 Engineering Statics .....   | 3 |
| ME 212 Engineering Dynamics .....  | 3 |
| ME 302 Thermodynamics or<br>MATE 210 Materials Engineering.....              | 3 |

|   |   |
|---|---|
| PHYS 131 General Physics (Area B)* .....        | 4 |
| PHYS 132 General Physics (Area B)* .....        | 4 |
| PHYS 133 General Physics (Area B)* .....        | 4 |
| STAT 321 Statistical Analysis I (Area B)* ..... | 3 |

**68**

**GENERAL EDUCATION (GE)**

**45**

*A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

*1 unit is in Support*

*Take one course from A1, A2, A3:*

A1 Expository Writing

A2 Critical Thinking

A3 Speech

A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

*24 units are in Support.*

*Take one course from B1b:*

B1a Physical Sciences \*see Support

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Support

Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

*2 units are in Support.*

F1 Computer Literacy \*see Support

**ELECTIVES**..... **0**

**202**

**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 |
|--|-------|
| <b>Freshman</b>  |       |
| 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 144 Introduction to Design and Manufacturing ...                   | 4     |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a) ..... | 4     |
| CHEM 125 General Chemistry for the Engineering Disciplines (B1a) ..... | 4     |
| CSC 234 C and UNIX (F1) .....  | 3     |
| ENGL 114 Writing: Exposition (A1) .....                                | 4     |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2) ..                    | 3     |
| SPC 201 Public Speaking or   |       |
| SPC 202 Principles of Speech Communication (A3)                        | 3     |
| MATH 141 Calculus I (B2) .....   | 4     |
| MATH 142 Calculus II (B2) .....  | 4     |
| MATH 143 Calculus III (B2) .....                                       | 4     |
| PHYS 131 General Physics (B1a) .....                                   | 4     |
|  | 49    |
| <b>Sophomore</b>   |       |
| 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 210 Materials Engineering .....                                   | 3     |
| MATE 215 Materials Engineering Lab .....                               | 1     |
| MATH 241 Calculus IV (B2) .....  | 4     |
| MATH 242 Differential Equations (B2) .....                             | 4     |
| ME 211 Engineering Statics .....                                       | 3     |
| ME 212 Engineering Dynamics .....                                      | 3     |
| ENGL 218 Professional Writing: Argumentation and Reports (A4) .....    | 4     |
| PHYS 132 General Physics (B1a) .....                                   | 4     |
| PHYS 133 General Physics (B1a) .....                                   | 4     |
| STAT 321 Statistical Analysis I (B2) .....                             | 3     |
| <sup>1</sup> Philosophy elective (C1) .....                            | 3     |
| <sup>1</sup> Fine and performing arts elective (C2) .....              | 3     |
| HIST 202 (4) (USCP) or HIST 204 (3) (D1) .....                         | 3     |
|  | 2     |

|   |    |
|---|----|
| <b>Junior</b>   |    |
| 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<br>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  |
| POLS 110 American and California Govt. (D1) .....   | 3  |
| <sup>1</sup> Literature elective (C1) .....   | 3  |
| <sup>1</sup> Social, political, economic institutions (Area D) .....                          | 3  |
| <sup>2</sup> Adviser approved technical electives which must meet EAC-ABET requirements ..... | 6  |
|   | 49 |

|   |     |
|---|-----|
| <b>Senior</b>   |     |
| 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   |
| <sup>1</sup> Life sciences elective (B1b) .....   | 2   |
| <sup>1</sup> Arts and humanities elective (Area C) .....  | 3   |
| <sup>1</sup> Literature, philosophy, arts elective (300-400 level) (C.3.) (PHIL 337 or HUM 402 recommended) ..... | 3   |
| <sup>1</sup> Social, political, economic institutions (Area D) .....  | 3   |
| <sup>1</sup> Social, political, economic institutions-elective (300-400 level) (Area D) .....                     | 3   |
| <sup>1</sup> Life understanding elective (Area E) .....   | 3   |
| <sup>2</sup> Adviser approved technical electives which must meet EAC-ABET requirements .....                     | 8   |
|   | 50  |
|   | 200 |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule* and consult with adviser for ABET requirements.

<sup>2</sup> Adviser approved technical electives which must meet EAC-ABET requirements: IME 242, 243, 301, 319, 336, 357, 361, 362, 363, 408, 410, 411, 427, 429, 431, 437, 443, 456 or current listing.

**B.S. MANUFACTURING ENGINEERING**

*Courses are displayed by Major, Support, GE.*

| <b>MAJOR COURSES</b>  | <i>Units</i> |
|---|--------------|
| IME 101 Intro. to Industrial and Manufacturing Engr ..  | 1            |
| IME 141 Manufacturing Processes: Net Shape .....  | 1            |
| IME 142 Manufacturing Processes: Materials Joining ..   | 2            |
| IME 144 Introduction to Design and Manufacturing ...  | 4            |
| 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 Des. & Implementation I .....   | 3            |
| IME 461 Senior Project.....   | 2            |
| IME 462 Senior Project.....   | 3            |
| IME 463 Undergraduate Seminar .....   | 2            |
| Technical electives which must meet EAC-ABET requirements. With advisor's guidance students may select one of the following areas of emphasis which is most compatible with their career objectives: <i>mechatronics manufacturing, manufacturing processes, or manufacturing systems.</i> IME 157, 242, 243, 301, 303, 319, 336, 357, 361, 362, 363, 408, 410, 411, 429, 443, 456 or current listing ..... | 14           |
|   | <b>76</b>    |
| <b>SUPPORT COURSES</b>  |              |
| * = Courses satisfy General Education requirement   |              |
| CE 204 Strength of Materials .....  | 3            |
| CE 205, 206 Strength of Materials and Lab or ME 341 Fluid Mechanics.....  | 3            |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a)* .....   | 4            |
| CHEM 125 General Chemistry for the Engineering Disciplines (Area B)* .....  | 4            |
| CSC 234 C and UNIX (F1)* .....  | 3            |
| EE 201 Electric Circuits Theory.....  | 3            |
| EE 251 Electric Circuits Lab.....   | 1            |
| EE 321 Electronics.....   | 3            |
| ENGL 218 Professional Writing: Argumentation and Reports (A4)* .....  | 4            |
| MATE 210 Materials Engineering.....   | 3            |
| MATE 215 Materials Engineering Lab .....  | 1            |
| MATH 141 Calculus I (B2)* .....   | 4            |
| MATH 142 Calculus II (B2)* .....  | 4            |
| MATH 143 Calculus III (Area B)* .....   | 4            |
| MATH 241 Calculus IV (Area B)* .....  | 4            |
| MATH 242 Differential Equations (Area B)* .....   | 4            |
| ME 211 Engineering Statics .....  | 3            |
| ME 212 Engineering Dynamics .....   | 3            |
| ME 302 Thermodynamics .....   | 3            |
| ME 313 Heat Transfer .....  | 3            |

|   |   |
|---|---|
| PHYS 131 General Physics (Area B)* .....        | 4 |
| PHYS 132 General Physics (Area B)* .....        | 4 |
| PHYS 133 General Physics (Area B)* .....        | 4 |
| STAT 321 Statistical Analysis I (Area B)* ..... | 3 |

**79**

**GENERAL EDUCATION (GE) .....** **45**

*A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

*1 unit is in Support*

*Take one course from A1, A2, A3:*

A1 Expository Writing

A2 Critical Thinking

A3 Speech

A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

*24 units are in Support.*

*Take one course from B1b:*

B1a Physical Sciences \*see Support

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Support

Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

*2 units are in Support.*

F1 Computer Literacy \*see Support

**ELECTIVES.....** **0**

**200**

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## MATERIALS ENGINEERING DEPARTMENT

**Air Conditioning Engrg Bldg. (12), Rm 107-H**  
**(805) 756-2568**  
**FAX: (805) 756-2299**  
**<http://www.mate.calpoly.edu>**

**College of Engineering Advising Center**  
**Computer Science Bldg. (14), Room 240**  
**(805) 756-1461**  
**email: [mateng@calpoly.edu](mailto:mateng@calpoly.edu)**

---

### Faculty

**Department Head, Robert H. Heidersbach, Jr.**

Lanny Griffin  
 Blair London  
 Anny Morrobel-Sosa

Paul E. Rainey  
 Linda S. Vanasupa  
 Daniel W. Walsh

### 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, and with biomedical device applications.

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.

The main focus of the materials engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

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. Many of our graduates are entrepreneurs who have started their own consulting or manufacturing companies. Others are attorneys or physicians.

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 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).



**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    |
|---|----------|
| <b>Freshman</b>   |          |
| MATE 110 Introduction to Materials Engineering.....                           | 1        |
| MATE 120 Introduction to Materials Engineering Analysis.....                  | 1        |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a) .....        | 4        |
| CHEM 125 General Chemistry for the Engineering Disciplines (B1a) .....        | 4        |
| CSC 101/234/231 (F1).....   | 2        |
| ENGL 114 Writing: Exposition (A1).....  | 4        |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2) ..                           | 3        |
| SPC 201 Public Speaking or<br>SPC 202 Principles of Speech Communication (A3) | 3        |
| ENGL 218 Professional Writing: Argumentation and Reports (A4) .....           | 4        |
| MATH 141 Calculus I (B2).....   | 4        |
| MATH 142 Calculus II (B2).....  | 4        |
| MATH 143 Calculus III (B2).....   | 4        |
| PHYS 131 General Physics (B1a).....   | 4        |
| PHYS 132 General Physics (B1a).....   | 4        |
| <sup>2</sup> Engineering Drawing and Manufacturing processes electives .....  | 4        |
|   | <hr/> 50 |
| <b>Sophomore</b>  |          |
| <sup>3</sup> MATE 210, 215 Materials Engineering and Lab .....                | 3,1      |
| <sup>3</sup> MATE 220, 225 Structure of Materials and Lab.....                | 3,1      |
| <sup>3</sup> MATE 230, 235 Metals and Lab.....                                | 4,1      |
| CE 204 Strength of Materials.....   | 3        |
| <sup>3</sup> EE 201, 251 Electric Circuits Theory and Lab .....               | 3,1      |
| <sup>4</sup> 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        |
| PHYS 133 General Physics.....   | 4        |
| HIST 202 (4) (USCP) or HIST 204 (3) (D1) .....                                | 3        |
| <sup>1</sup> Philosophy elective (C1).....                                    | 3        |
| <sup>1</sup> Fine and performing arts elective (C2) .....                     | 3        |
|   | <hr/> 50 |

**Junior**

|  |          |
|--|----------|
| MATE 310 Polymers.....   | 4        |
| MATE 320 Ceramics .....  | 4        |
| MATE 330 Composites .....  | 4        |
| <sup>3</sup> MATE 340, 345 Electronic Properties of Materials and Lab..... | 3,1      |
| <sup>3</sup> MATE 350, 355 Mechanical Behavior of Materials and Lab.....   | 3,2      |
| MATE 405 Kinetics of Materials .....                                       | 5        |
| MATE 360 Thermodynamics of Materials.....                                  | 4        |
| <sup>3</sup> CE 205, 206 Strength of Materials and Lab.....                | 2,1      |
| ME 313 Heat Transfer or<br>ME 302 Thermodynamics .....                     | 3        |
| CHEM 305 Physical Chemistry .....  | 3        |
| POLS 110 American and California<br>Government (D1) .....                  | 3        |
| <sup>1</sup> Literature elective (C1).....                                 | 3        |
| <sup>1</sup> Social, political, economic institutions (Area D) .....       | 3        |
| <sup>1</sup> Life understanding elective (Area E) .....                    | 3        |
|  | <hr/> 51 |

**Senior**

|  |           |
|--|-----------|
| <sup>5</sup> MATE 400-level Analysis/Processing/Special Topics requirements.....             | 14        |
| MATE 400-level Analysis/Processing/Special Topics electives.....                             | 5         |
| MATE 461 Senior Project .....  | 1         |
| MATE 462 Senior Project .....  | 4         |
| MATE 463 Undergraduate Seminar.....  | 1         |
| Chemistry or physics elective (200–400 level).....   | 3         |
| <sup>1</sup> Life sciences elective (B1b).....   | 2         |
| <sup>1</sup> Arts and humanities elective (Area C).....                                      | 3         |
| <sup>1</sup> Literature, philosophy, arts (300–400 level) (C3) .....                         | 3         |
| <sup>1</sup> Social, political, economic institutions elective (300–400 level) (Area D)..... | 3         |
| <sup>6</sup> Mathematics, statistics elective .....  | 3         |
| <sup>1</sup> Economics 201/ECON 211/ECON 222 (D3) .....                                      | 3         |
| Free electives.....  | 4         |
|  | <hr/> 49  |
|  | <hr/> 200 |

<sup>1</sup> For selection of GEB electives, see page 77 or current *Class Schedule*.

<sup>2</sup> Choose either IME 144 or a combination of ME 151 and one of IME 141, 142, 143, or IT 141, 302.

<sup>3</sup> To be taken concurrently.

<sup>4</sup> IME 426 may be substituted.

<sup>5</sup> Must have at least one course from each of the three categories: Materials Analysis and Characterization, Materials Processing and Special Topics.

<sup>6</sup> To be selected from: MATH 206, 304, 317, 318, 408; STAT 312, 321.

**B.S. MATERIALS ENGINEERING**

*Courses displayed by Major, Support, GE, and Electives.*

|  | Units  |
|--|--|
| <b>MAJOR COURSES</b>   |  |
| MATE 110 Introduction to Materials Engineering.....                                | 1  |
| MATE 120 Intro. to Materials Engineering Analysis....                              | 1  |
| MATE 210, 215 Materials Engineering and Lab.....                                   | 3,1  |
| MATE 220, 225 Structure of Materials and Lab.....                                  | 3,1  |
| MATE 230, 235 Metals and Lab.....  | 4,1  |
| MATE 310 Polymers.....   | 4  |
| MATE 320 Ceramics.....   | 4  |
| MATE 330 Composites.....   | 4  |
| MATE 340, 345 Electronic Properties Materials, Lab..                               | 3,1  |
| MATE 350, 355 Mechanical Properties Materials, Lab..                               | 3,2  |
| MATE 360 Thermodynamics of Materials.....  | 4  |
| MATE 405 Kinetics of Materials.....  | 5  |
| MATE 461 Senior Project.....   | 1  |
| MATE 462 Senior Project.....   | 4  |
| MATE 463 Undergraduate Seminar.....  | 1  |
| <sup>1,2</sup> MATE 400-level Analysis/Processing/Special Topics requirements..... | 14   |
| <sup>1</sup> MATE 400-level Analysis/Processing/Special Topics electives.....      | 5  |
|  | <hr style="width: 100px; margin-left: 0;"/> 70 |
| <b>SUPPORT COURSES</b>   |  |
| * = Courses satisfy General Education requirement                                  |  |
| CE 204 Strength of Materials.....  | 3  |
| CE 205, 206 Strength of Materials and Lab.....                                     | 2,1  |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a)*.....             | 4  |
| CHEM 125 General Chemistry for the Engineering Disciplines.....                    | 4  |
| CHEM 305 Physical Chemistry.....   | 3  |
| CSC 231 Fortran for Engineering Students (F1)* (or CSC 101, 234).....              | 2  |
| EE 201, 251 Electric Circuits Theory and Lab.....                                  | 3,1  |
| ENGL 218 Professional Writing: Argumentation and Reports (A4)*.....                | 4  |
| IME 314 Engineering Economics (or IME 426).....                                    | 3  |
| MATH 141 Calculus I (B2) *.....  | 4  |
| MATH 142 Calculus II (B2)*.....  | 4  |
| MATH 143 Calculus III (Area B)*.....   | 4  |
| MATH 241 Calculus IV (Area B)*.....  | 4  |
| MATH 242 Differential Equations.....   | 4  |
| ME 211 Engineering Statics.....  | 3  |
| ME 212 Engineering Dynamics.....   | 3  |
| ME 313 Heat Transfer or ME 302 Thermodynamics.....                                 | 3  |
| PHYS 131 General Physics (Area B)*.....  | 4  |
| PHYS 132 General Physics (Area B)*.....  | 4  |
| PHYS 133 General Physics (Area B)*.....  | 4  |
| Chemistry or Physics elective (300-400 level).....                                 | 3  |
| <sup>3</sup> Engineering Drawing and Manufacturing elective.....                   | 4  |
| Select one of the following: MATH 206, 304, 317, 318, 408; STAT 312, 321.....      | 3  |
|  | <hr style="width: 100px; margin-left: 0;"/> 81 |

**GENERAL EDUCATION (GE) ..... 45**

*A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.  
→Minimum 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

*1 unit is in Support*  
*Take one course from A1, A2, A3:*  
A1 Expository Writing  
A2 Critical Thinking  
A3 Speech  
A4 Argumentative Writing \*see Support

**Area B Science and Mathematics** (minimum 2 units)

*24 units are in Support.*  
*Take one course from B1b:*  
B1a Physical Sciences \*see Support  
B1b Life Sciences elective  
B2 Mathematics and/or Statistics \*see Support  
Area B \* see Support

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*  
C1 Literature  
C1 Philosophy  
C2 Fine/Performing Arts  
C3 Lit/Phil/Arts (300-400 level)  
*If less than 15 units, take one course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*  
*Take one course from D1a and one from D1b*  
D1a HIST 202 (USCP) or HIST 204 or LS 211  
D1b POLS 110 or LS 212  
*Take three courses from D2, D3, D4a, D4b*  
D2 History (300-400 level)  
D3 Economics  
D4a Social Institutions  
D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*  
*Take one course from E1 or E2*  
E1 PSY 201/PSY 202  
E2 Self Development

**Area F Technology** (no additional units required)

*2 units are in Support.*  
F1 Computer Literacy \*see Support

**ELECTIVES..... 4**

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**200**

- <sup>1</sup> MATE 500-level may be substituted.
- <sup>2</sup> Must have at least one course from each of the three categories: Materials Analysis and Characterization, Materials Processing and Special Topics.
- <sup>3</sup> Choose either IME 144 or a combination of ME 151 and one of IME 141, 142, 143, IT 141 or IT 302.

# MECHANICAL ENGINEERING DEPARTMENT

Engineering Bldg. (13), Room 252  
(805) 756-1334

College of Engineering Advising Center  
Computer Science Bldg. (14), Room 240  
(805) 756-1461

## Faculty

### Department Chair, Safwat M. A. Moustafa

|                      |                      |
|----------------------|----------------------|
| Edward H. Baker      | James M. Meagher     |
| Ernest W. Blattner   | A. Masoud Mehdizadeh |
| Thomas W. Carpenter  | Ronald S. Mullisen   |
| William E. Clark     | Ronald L. Mussulman  |
| Harold E. Gascoigne  | Saeed B. Niku        |
| Raymond G. Gordon    | William B. Patterson |
| Michael A. Iannce    | Ramesh T. Shah       |
| Mark S. Johnson      | James M. Widmann     |
| Ngozi Kamalu         | Jack D. Wilson       |
| James G. LoCascio    | Yuen Cjen Yong       |
| Fredrick B. Malmborg |                      |

## Program

### B.S. Mechanical Engineering

*Students may select Mechanical Engineering Electives/  
Emphasis Area or Concentration in:  
Mechatronics*

It is our goal to graduate students who are prepared to excel as entry-level professionals, and who are willing and able to grow professionally and personally throughout 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.

The focus of the mechanical engineering program at Cal Poly is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior project capstone design experience.

In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

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 a curricular concentration in Mechatronics, as well as areas of emphasis through adviser approved electives. There is an opportunity for special emphasis in areas such as:

- Heating, Ventilation, Air Conditioning and Refrigeration (HVAC)
- Mechatronics/Robotics
- Petroleum
- Automotive
- Design
- Thermal-Fluids Engineering

### Mechatronics Concentration

This concentration prepares students to enter the high tech microprocessor-based product design and factory automation job markets as well as research in the areas of robotics, "intelligent" products and machinery, and automated manufacturing processes at research institutions.

Engineering courses are found in all years. In the junior and senior years, the professional specialties include such courses as turbomachinery, robotics, mechatronics, composite materials, 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.*

| <b>Freshman</b>   | <i>Units</i> |
|---|--------------|
| ME 134 Mechanical Systems (Transfer students must take ME 234) .....          | 3            |
| ME 151 Engineering Design Communication I .....                               | 2            |
| ME 152 Engineering Design Communication II .....                              | 2            |
| IME 142 Manufacturing Processes: Materials Joining ..                         | 2            |
| IME 143 Manufacturing Processes: Material Removal ..                          | 2            |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a) .....        | 4            |
| CHEM 125 General Chemistry for the Engineering Disciplines .....              | 4            |
| ENGL 114 Writing: Exposition (A1) .....                                       | 4            |
| ENGL 125/PHIL 125/SPC 125 Critical Thinking (A2) ..                           | 3            |
| SPC 201 Public Speaking or<br>SPC 202 Principles of Speech Communication (A3) | 3            |
| MATH 141 Calculus I (B2) .....  | 4            |
| MATH 142 Calculus II (B2) .....   | 4            |
| MATH 143 Calculus III (B2) .....  | 4            |
| PHYS 131 General Physics (B1a) .....  | 4            |
| PHYS 132 General Physics (B1a) .....  | 4            |
| <sup>1</sup> Manufacturing Processes elective .....                           | 1            |
|   | 50           |
| <b>Sophomore</b>  |              |
| 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 210, 215 Materials Engineering and Lab .....                             | 3,1          |
| PHYS 133 General Physics (B1a) .....  | 4            |
| CSC 231 Fortran for Engineering Students (F1) .....                           | 2            |
| ENGL 218 Professional Writing: Argumentation and Reports (A4) .....           | 4            |
| MATH 241 Calculus IV (B2) .....   | 4            |
| MATH 242 Differential Equations (B2) .....                                    | 4            |
| MATH 318 Advanced Engineering Mathematics (B2) .....                          | 4            |
| HIST 202 (4) (USCP) or HIST 204 (3) (D1) .....                                | 3            |
| POLS 110 American and California Government (D1) .....                        | 3            |
| <sup>2</sup> Literature elective (C1) .....                                   | 3            |
| <sup>2</sup> Life understanding elective (Area E) .....                       | 3            |
|   | 53           |
| <b>Junior</b>   |              |
| 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 344 Thermal Engineering .....  | 4   |
| ME 345 Fluid Mechanics Laboratory .....   | 1   |
| ME 346 Thermal Science Laboratory .....   | 1   |
| EE 201, 251 Electric Circuit Theory and Lab .....   | 3,1 |
| EE 321, 361 Electronics and Lab .....   | 3,1 |
| <sup>2</sup> Philosophy elective (C1) .....   | 3   |
| <sup>2</sup> Fine and performing arts elective (C2) .....                                     | 3   |
| Life Sciences Elective (B1b) .....  | 2   |
|   | 50  |
| <b>Senior</b>   |     |
| 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   |
| <sup>2</sup> Arts and humanities elective (Area C) .....                                      | 3   |
| <sup>2</sup> Literature, philosophy, arts (300-400 level) (C3) .....                          | 3   |
| <sup>2</sup> Social, political, economic institutions electives (Area D) .....                | 6   |
| <sup>2</sup> Social, political, economic institutions elective (300-400 level) (Area D) ..... | 3   |
| Adviser approved emphasis area or mechatronics concentration .....                            | 20  |
|   | 49  |
|   | 202 |

<sup>1</sup> Choose one unit from IME 141, IT 141 or IT 327.  
<sup>2</sup> For selection of GEB electives, see page 77 or current Class Schedule.

**B.S. MECHANICAL ENGINEERING**

*Courses are displayed by Major, Support, General Education, and Electives.*

| <b>MAJOR COURSES</b>   | <i>Units</i> |
|--|--------------|
| ME 151 Engineering Design Communication I .....                      | 2            |
| ME 152 Engineering Design Communication II .....                     | 2            |
| 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 344 Thermal Engineering .....                                   | 4  |
| ME 345 Fluid Mechanics Laboratory .....                            | 1  |
| ME 346 Thermal Science Laboratory .....                            | 1  |
| ME 422 Mechanical Control Systems .....                            | 4  |
| ME 440 Thermal System Design .....                                 | 4  |
| ME 461 Senior Project .....  | 2  |
| ME 462 Senior Project .....  | 3  |
| ME 463 Undergraduate Seminar .....                                 | 1  |
| Adviser approved emphasis area or mechatronics concentration ..... | 20 |

**84**

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |     |
|--|-----|
| CE 204 Strength of Materials .....   | 3   |
| CE 205, 206 Strength of Materials and Lab .....                            | 2,1 |
| CHEM 124 General Chemistry for the Engineering Disciplines (B1a)* .....    | 4   |
| CHEM 125 General Chemistry for the Engineering Disciplines (Area B)* ..... | 4   |
| CSC 231 Fortran for Engineering Students (F1)* .....                       | 2   |
| EE 201, 251 Electric Circuit Theory and Lab .....                          | 3,1 |
| EE 321, 361 Electronics and Lab .....                                      | 3,1 |
| ENGL 218 Professional Writing: Argumentation and Reports (A4)* .....       | 4   |
| IME 142 Manufacturing Processes: Materials Joining ..                      | 2   |
| IME 143 Manufacturing Processes: Material Removal ..                       | 2   |
| MATE 210, 215 Materials Engineering and Lab .....                          | 3,1 |
| MATH 141 Calculus I (B2)* .....  | 4   |
| MATH 142 Calculus II (B2)* .....   | 4   |
| MATH 143 Calculus III (Area B)* .....                                      | 4   |
| MATH 241 Calculus IV (Area B)* .....                                       | 4   |
| MATH 242 Differential Equations (Area B)* .....                            | 4   |
| MATH 318 Adv. Engineering Mathematics (Area B)* ..                         | 4   |
| PHYS 131 General Physics (Area B)* .....                                   | 4   |
| PHYS 132 General Physics (Area B)* .....                                   | 4   |
| PHYS 133 General Physics (Area B)* .....                                   | 4   |
| Manufacturing Processes elective .....                                     | 1   |
| (IME 141, IT 141 or IT 327)  |     |

**73**

**GENERAL EDUCATION (GE) .....** **45**

A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.  
→Minimum 3 GE courses required at the 300-400 level.

**Area A Communication (minimum 10 units)**

- 1 unit is in Support  
Take one course from A1, A2, A3:
- A1 Expository Writing
  - A2 Critical Thinking
  - A3 Speech
  - A4 Argumentative Writing \*see Support

**Area B Science and Mathematics (minimum 2 units)**

- 24 units are in Support.  
Take one course from B1b:
- B1a Physical Sciences \*see Support
  - B1b Life Sciences elective
  - B2 Mathematics and/or Statistics \*see Support
- Area B \* see Support

**Area C Arts and Humanities (minimum 15 units)**

- Take one course from each Area C category:
- C1 Literature
  - C1 Philosophy
  - C2 Fine/Performing Arts
  - C3 Lit/Phil/Arts (300-400 level)
- If less than 15 units, take one course from C1, C2, C3

**Area D Social, Political, Economic Inst. (minimum 15 units)**

- No more than one course in any Area D category.  
Take one course from D1a and one from D1b
- D1a HIST 202 (USCP) or HIST 204 or LS 211
  - D1b POLS 110 or LS 212
- Take three courses from D2, D3, D4a, D4b
- D2 History (300-400 level)
  - D3 Economics
  - D4a Social Institutions
  - D4b Social Institutions (300-400 level)

**Area E Life Understanding (minimum 3 units)**

- No more than one course in any Area E category.  
Take one course from E1 or E2
- E1 PSY 201/PSY 202
  - E2 Self Development

**Area F Technology (no additional units required)**

- 2 units are in Support.  
F1 Computer Literacy \*see Support

**ELECTIVES .....** **0**

**202**

**Select one:**

**Adviser Approved Emphasis Area**

|   |       |
|---|-------|
| ME 428 Design .....                                   | 4     |
| EE 325 Energy Conversion Electromagnetics .....       | 3     |
| EE 365 Energy Conversion Electromagnetics Lab .....   | 1     |
| Technical electives selected from emphasis area ..... | 12    |
|   | <hr/> |
|   | 20    |

**Mechatronics Concentration**

|   |       |
|---|-------|
| IME 157 Electronic Manufacturing .....                | 3     |
| ME 405 Mechatronics .....                             | 4     |
| ME 406 Mechatronics Design .....                      | 4     |
| ME 423 Robotics: Fundamentals and Applications .....  | 4     |
| <sup>1</sup> CPE 436/476 or IME 356 .....             | 4     |
| ME 400 Special Problems Advanced Undergraduates ..... | 1     |
|   | <hr/> |
|   | 20    |

<sup>1</sup> Elective based on interests of students.

## Cal Poly Wind Orchestra

A group of 75 to 85 woodwind, brass, and percussion players (also string, bass harp, and piano) perform the finest traditional and contemporary repertoire written for the large wind band.

*At right:*  
Students in the trombone section.

*Below:* Professor William V. Johnson, Director of Bands, conducting a rehearsal of the Wind Orchestra for a Pops Concert in the Performing Arts Center.

*Photos by Laura Dickinson and Laura Hennessy.*



## Clay Studio

Xiao Hui Guan, a Mechanical Engineering senior, enjoys throwing clay on the potter's wheel in the Art and Design Department's Clay Studio.

*Photo: class assignment for ART 329 Corporate Editorial Photography, taught by Robert Howell, Professor, Art & Design.*



College of  
*Liberal Arts*

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# College of Liberal Arts

Faculty Office Bldg. (47), Room 31  
(805) 756-2359

Harold Hellenbrand, Dean  
Susan Currier, Associate Dean

| Department:                      | Program:   |  |
|----------------------------------|--|--|
|                                  | Agricultural Communication: Minor<br>Values, Technology and Society: Minor<br>Women's Studies: Minor | 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.  |
| Art and Design                   | Art and Design: BS<br>Art: 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.   |
| English                          | English: BA, MA, Minor<br>Linguistics: Minor   |  |
| Ethnic Studies                   | Ethnic Studies: Minor  |  |
| Graphic Communication            | Graphic Communication: BS, Minor   |  |
| History                          | History: BA, Minor   | The College of Liberal Arts offers a London Study Program, which is administered by the Global Affairs Office. For further information, see the section on Study and Travel – U.S. and Abroad.   |
| Journalism                       | Journalism: BS   |  |
| Liberal Studies                  | Liberal Studies: BA  | The College of Liberal Arts also offers interdisciplinary and international courses through its Humanities Program. Many humanities classes fulfill Cal Poly general education and breadth requirements. For more information, contact the Humanities Program Office (Bldg 47, Room 128, (805) 756-1205).  |
| Modern Languages and Literatures | Modern Languages and Literatures: BA<br>French: Minor<br>German: Minor<br>Spanish: Minor             |  |
| Music                            | Music: BA, Minor   | 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, <i>Mustang Daily</i> , Model United Nations, foreign language clubs, 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. |
| Philosophy                       | Philosophy: BA, Minor  |  |
| Political Science                | Political Science: BA<br>International Relations: Minor<br>Public Administration: Minor              |  |
| Psychology and Human Development | Child Development: BS<br>Psychology: BS, MS, Minor<br>Gerontology: Minor                             |  |
| Social Sciences                  | Social Sciences: BS<br>Anthropology & Geography: Minor<br>Sociology: Minor                           |  |
| Speech Communication             | Speech Communication: BA, Minor  |  |
| Theatre and Dance                | Theatre: Minor<br>Dance: Minor   |  |

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## AGRICULTURAL COMMUNICATION MINOR

The purpose of the Agricultural Communication minor is to prepare students to become effective communicators about agriculture in the media. This interdisciplinary minor will enhance the students' ability to seek careers in dynamic professions associated with the agricultural industry.

Our primary target majors are students in the College of Agriculture and the College of Liberal Arts. Other students may also choose to minor in agricultural communication to add support to their technical expertise in their major.

A key feature of this minor is an interdisciplinary approach to preparing students to assume leadership roles in communicating about agriculture. The minor is designed to capitalize on the unique strengths of the students who we anticipate will minor in agricultural communication. Students with strong journalism backgrounds will benefit from the technical agriculture elective area. Students with strong backgrounds in agriculture will benefit from the professional communications elective area.

The Agricultural Communication minor will consist of 30 units. The program will be part of the College of Agriculture and the College of Liberal Arts and advised by the faculty members assigned to the Brock Center for Agricultural Communication.

|  | <i>Units</i> |
|--|--------------|
| <b>Required Courses (15)</b>                       |              |
| JOUR 203 News Writing and Reporting .....          | 4            |
| JOUR 205 Agricultural Communications .....         | 4            |
| SPC 301 Business and Professional Communication .. | 4            |
| AGED 404 Agricultural Leadership .....             | 3            |
| <b>Elective Area .....</b>                         | <b>15</b>    |

### *College of Agriculture Majors:*

15 units must be selected from adviser approved list.  
At least 10 units must be at 300-400 level, and  
2 classes must be in Journalism, Speech  
Communication, or English

### *Journalism, Speech Communications, and other non-Agriculture Majors:*

15 units must be selected from adviser approved list.  
At least 10 units must be at 300-400 level

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30



# ART AND DESIGN DEPARTMENT

Dexter Bldg. (34), Room 170  
(805) 756-1148

<http://artdesgn.calpoly.edu>

## Faculty

### Department Chair, Eric B. Johnson

|                     |                         |
|---------------------|-------------------------|
| Sky Bergman         | George D. Jercich       |
| Robert S. Densham   | Mary LaPorte            |
| Keith W. Dills      | John P. Mendenhall      |
| Clarissa Hewitt     | Michael B. Miller       |
| Robert Howell       | Joanne Beaulieu Ruggles |
| Charles W. Jennings | Jean Wetzel             |

## Programs

### B.S. Art and Design

*with Concentrations in:*  
Graphic Design  
Photography and Digital Imagery  
Studio Art

### Art Minor

The Art and Design Department offers a curriculum leading to the Bachelor of Science degree in Art and Design which prepares students for professional participation in the fields of graphic design or photography. The department also offers a studio art concentration and an art minor.

All three 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.

The Art and Design program is accredited by the National Association of Schools of Art and Design.

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 <sup>1</sup>

The curriculum in graphic design offers a foundation study of basic design, typography and design history, with specialized courses in corporate identity, packaging graphics, web page design, 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 photography program as well, gaining practical experience in the art director and photographer relationship. Coursework in computer imaging and interactive 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 and Digital Imagery

The photography and digital imagery concentration is a diversified commercially oriented program stressing careers in advertising and illustration, portraiture, corporate and editorial photography and digital image making. The creative artist is understood to be an integral part of the commercial marketplace of photography and digital image making. Development of the individual's creative, expressive abilities is a key ingredient throughout the program. Creative problem solving is emphasized within a context of a variety of communicative and expressive projects. Studio and location lighting are emphasized as well as the development of both professional printing and computer skills. Courses progress from 35 mm black and white to color photography, digital image making, large format photography, video and multimedia production, and advertising illustration. The program culminates in the creation of a professional portfolio that positions the graduate for the marketplace of the profession. The program includes a study of the history of photography as well as current professional practices and also provides the student important opportunities to work on joint projects with graphic design students.

<sup>1</sup> 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.

**Studio Art**

The studio art concentration will provide students with a third career path. Current and prospective students who are not presently being served by our two applied concentrations in graphic design or photography may receive a studio arts education which will provide them with alternative opportunities as studio artists. This concentration will enable students to employ a range of two and three dimensional media to create artworks which will provide an expressive vehicle for their own thoughts, ideas or views. Students will be required to make a commitment to looking at art, talking about art, thinking about art, and absorbing the intensity of artistic images. Unlike the career orientation of the graphic design and the photography and digital imagery concentrations which are commissioned by an external client, the studio artist concentration responds more to an internal personal motivation.

**B.S. 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. Minimum 60 units upper division required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|  | Units |
|--|-------|
| ART 101 Fundamentals of Drawing (C2)* .....                        | 4     |
| ART 108 Fundamentals of Sculpture (Area C)* .....                  | 4     |
| ART 131 2-Dimensional Design Fundamentals .....                    | 3     |
| ART 132 Beginning Color Theory .....                               | 3     |
| ART 134 3-Dimensional Design I .....                               | 3     |
| ART 181 Computer Imaging and Design .....                          | 3     |
| ART 211/212 Art History .....                                      | 4,4   |
| ART 221 Basic B/W Photography .....                                | 3     |
| ART 222 35mm Intermediate B/W Photography .....                    | 3     |
| ART 224 Intro. Artificial Lighting for Photography ....            | 3     |
| ART 312 Contemporary Art .....                                     | 4     |
| Select two: ART 310/311/316/317/318 Art History ..                 | 4,4   |
| ART 460 Professional Practices .....                               | 2     |
| ART 461 Senior Project .....                                       | 2     |
| ART 462 Senior Portfolio Project .....                             | 2     |
| ART 463 Undergraduate Seminar .....                                | 2     |
| <i>3-D Studio approved electives</i>                               |       |
| ART 135, 240, 245, 255, 308, 340, 341, 345, 346,<br>355, 356 ..... | 6     |
| Concentration courses (see below) .....                            | 55    |

**118**

**GENERAL EDUCATION (GE)** .....

**64**

A minimum of 72 units is required for GE; 8 of these units are in Major/Support; a minimum of 64 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 15 units)

Take one course from B1a and one from B1b; one with lab:

- B1a Physical Sciences
- B1b Life Sciences

Take two courses from B2:

- B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 9 units)

8 units in Major.

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts \* see Major
- C3 Lit/Phil/Arts (300-400 level)
- Area C \*see Major

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

- F1 Computer Literacy
- F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, D, E. No more than one additional course per area.

**ELECTIVES** .....

**16**

**198**

**CONCENTRATIONS (select one)**

**Graphic Design Concentration**

|  |           |
|--|-----------|
| ART 133 Color and Design .....   | 3         |
| ART 201 Intermediate Drawing or elective .....   | 3         |
| ART 232 Beginning Graphic Design .....   | 3         |
| ART 313 Design History .....   | 4         |
| ART 331 Typographic Design .....   | 3         |
| ART 332 Symbology .....  | 3         |
| ART 333 Corporate Identity .....   | 3         |
| ART 408/432/486/487.....   | 3         |
| ART 430 Advanced Typographic Design .....  | 3         |
| ART 431 Package Design .....   | 3         |
| ART 433 Editorial Design .....   | 3         |
| Adviser approved electives. <i>Select from:</i> ART<br>204, 301, 302, 303, 304, 305, 306, 483, 484 ... | 15        |
| <i>Select from:</i> ART 314, 336, 486, 487, TH 430,<br>IT 330, GRC 101, 437 .....                      | 6         |
|  | <u>55</u> |

**Photography and Digital Imagery Concentration**

|   |           |
|---|-----------|
| ART 314 History of Photography .....  | 4         |
| ART 324 Photographic Expression: B/W .....  | 4         |
| ART 322 Color Photography .....   | 3         |
| ART 323 Introduction to Digital Image Making.....   | 3         |
| ART 325 4x5 Camera Techniques .....   | 3         |
| ART 326 4x5 Camera/Commercial .....   | 3         |
| ART 327 Portraiture B/W .....   | 3         |
| ART 329 Editorial and Corporate Photography.....  | 3         |
| ART 483 Video and Multimedia Production.....  | 4         |
| ART 427 Illustration Photography .....  | 3         |
| ART 428 Portfolio Production Photography .....  | 1         |
| ART 486 Advanced Digital Image Making .....   | 3         |
| Adviser approved electives<br><i>Select from:</i> ART 133, 201, 204, 301, 302,<br>303, 304, 305, 306, 336, 484, 465 ..... | 9         |
| <i>Select from:</i> ART 487, GRC 101, 327, TH 330....   | 9         |
|   | <u>55</u> |

**Studio Art Concentration**

|   |           |
|---|-----------|
| ART 133 Color and Design .....  | 3         |
| ART 201 Intermediate Drawing .....  | 3         |
| ART 204 Beginning Watercolor.....   | 3         |
| <sup>1</sup> ART 240 Glassblowing.....  | 4         |
| <sup>1</sup> ART 245 Ceramics .....   | 3         |
| <sup>1</sup> ART 255 Jewelry Design.....  | 3         |
| ART 301 Advanced Drawing .....  | 3         |
| ART 302 Life Drawing .....  | 3         |
| ART 305 Painting Techniques.....  | 3         |
| <sup>1</sup> ART 308 Sculpture .....  | 3         |
| 300-400 level Art History (in addition to core).....  | 4         |
| Adviser approved electives. <i>Select from:</i> ART<br>303, 304, 306, 321, 322, 336, 340, 341, 345,<br>346, 355, 356, 400, 408, 484, 486, 487 ..... | 20        |
|   | <u>55</u> |

**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: Keith Dills, Clarissa Hewitt, George Jercich, Michael B. Miller, Joanne Ruggles or Jean Wetzel.

|  |              |
|--|--------------|
|  | <i>Units</i> |
| <b>Core courses</b> .....  | 16           |
| ART 101 Fundamentals of Drawing (4) (C.2.)   |              |
| ART 108 Fundamentals of Sculpture I (4) (C.2.)   |              |
| ART 112 Survey of Western Art (3) (C.2.)   |              |
| ART 312 Art History—Contemporary Art (4) (C.3.)  |              |
| <b>Art &amp; Design Department adviser approved electives:</b><br><i>Complete a minimum of 3 units from:</i> ..... | 3            |
| ART 201 Intermediate Drawing (3)   |              |
| ART 204 Beginning Watercolor (3)   |              |
| ART 240 Glassblowing (3)   |              |
| ART 245 Ceramics I (3)   |              |
| ART 255 Jewelry Design (3)   |              |
| <i>Complete 12 units from:</i> .....   | 12           |
| ART 301 Advanced Drawing (3)   |              |
| ART 302 Life Drawing I (3)   |              |
| ART 303 Life Drawing II (3)  |              |
| ART 304 Intermediate Watercolor (3)  |              |
| ART 305 Painting Techniques (3)  |              |
| ART 308 Intermediate Sculpture (3)   |              |
| ART 310 Art History—American Art (4)   |              |
| ART 311 Art History—Nineteenth Century (4)   |              |
| ART 313 Design History (3)   |              |
| ART 316 Women as Subject and Object in Art<br>History (4)  |              |
| ART 317 Asian Art Survey (4) (C3)  |              |
| ART 318 Asian Art Topics (4) (C3)  |              |
| ART 340 Glass Fusing and Forming (4)   |              |
| ART 341 Advanced Selected Topics in Glass (4)  |              |
| ART 345 Ceramics II (3)  |              |
| ART 346 Ceramics III (3)   |              |
| ART 355 Metalsmithing (3)  |              |
| ART 356 Jewelry Casting (3)  |              |
|  | <u>31</u>    |

<sup>1</sup> These classes cannot be double-counted for concentration and 3D approved electives.

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## ENGLISH DEPARTMENT

**Faculty Office Bldg. (47), Room 32-E**  
**(805) 756-2596**

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### Faculty

#### Department Chair, Linda H. Halisky

|                     |                  |
|---------------------|------------------|
| Kathleen A. Balgley | Donald Lazere    |
| John Battenburg     | Nancy Lucas      |
| Kristina Bross      | Martin Luschei   |
| Carl R. V. Brown    | Carol MacCurdy   |
| Kenneth J. Brown    | Steven R. Marx   |
| Kevin Clark         | Matthew S. Novak |
| Susan Currier       | Michael P. Orth  |
| Angela M. Estes     | Johanna E. Rubba |
| William Fitzhenry   | Kathryn Rummell  |
| John C. Hampsey     | Debora Schwartz  |
| John F. Harrington  | Habib Sheik      |
| Robert L. Inchausti | Richard K. Simon |
| David J. Kann       | Douglas B. Smith |
| Douglas Keeseey     | Evelyn M. Torres |
| Brent Keetch        | Patricia Troxel  |
| Alfred Landwehr     | Michael J. Wenzl |
| Kathleen M. Lant    |                  |

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. Minimum 60 units upper division required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|  |    |
|--|----|
| ENGL 203 Core I: Old English/Medieval .....  | 4  |
| ENGL 204 Core II: Renaissance .....  | 4  |
| ENGL 205 Core III: 1660-1798 .....   | 4  |
| ENGL 251 Great Books of World Literature: Classical and Ancient World (C1)* .....  | 3  |
| ENGL 290 Introduction to Linguistics .....   | 4  |
| ENGL 303 Core IV: 1798-1865 .....  | 4  |
| ENGL 304 Core V: 1865-1914 .....   | 4  |
| ENGL 305 Core VI: 1914-Present .....   | 4  |
| ENGL 461 Senior Project (must be taken in conjunction with a designated 400-level English course) .....  | 1  |
| English electives (300 level) .....  | 8  |
| English electives (400 level; at least 12 units must be in literature courses) .....   | 20 |
| <i>Emphasis Areas (16)</i> :Students may, if they choose, shape sixteen units of their upper division English electives into one of the following emphasis areas, by consulting with an Emphasis Area adviser and completing one of the following sets of courses. |    |
| <i>Creative Writing:</i>   |    |
| ENGL 327, 328 or 329;  |    |
| Two of: ENGL 427, 428 or 429;  |    |
| ENGL 439, 449, 459 modern/contemporary;  |    |
| Senior Project Adjunct in Creative Writing.  |    |
| <i>Literature:</i>   |    |
| ENGL 326 Literary Theory;  |    |
| One 300-level literature course;   |    |
| Two 400-level literature courses;  |    |
| Senior Project Adjunct in Literature.  |    |

Units

60

**SUPPORT COURSES**

|   |   |
|---|---|
| Foreign language (121 or 122) .....                   | 4 |
| Or demonstration of a comparable level of proficiency |   |
|   | 4 |

**GENERAL EDUCATION (GE)** ..... 69

A minimum of 72 units is required for GE; 3 of these units are in Major/Support; a minimum of 69 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 15 units)

Take one course from B1a and one from B1b; one with lab:

B1a Physical Sciences

B1b Life Sciences

Take two courses from B2:

B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 12 units)

3 units in Major.

Take one course from each Area C category:

C1 Literature \* see Major

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES** ..... 53

**CURRICULUM FOR ENGLISH MINOR**

|  | <i>Units</i> |
|--|--------------|
| Required Courses.....  | 15           |
| ENGL 253 Great Books (3)   |              |
| ENGL 302 Writing: Advanced Composition or<br>ENGL 326 Literary Theory (4)                              |              |
| ENGL 339 Introduction to Shakespeare (4)   |              |
| ENGL 390 The Linguistic Structure of Modern English<br>or ENGL 395 History of the English Language (4) |              |
| Select <i>one</i> of the following British literature courses .....                                    | 4            |
| ENGL 330 British Literature: Medieval Period (C3)  |              |
| ENGL 331 British Literature: The Renaissance (C3)  |              |
| ENGL 332 British Literature: The Enlightenment (C3)  |              |
| ENGL 333 British Literature: The Romantic<br>Movement (C3)   |              |
| ENGL 334 British Literature: The Victorians (C3)   |              |
| ENGL 335 British Literature: Twentieth Century (C3)  |              |
| Select <i>one</i> of the following American literature courses .                                       | 4            |
| ENGL 340 American Literature to 1860 (C3)  |              |
| ENGL 341 American Literature 1860-1914 (C3)  |              |
| ENGL 342 American Literature 1914 to the<br>Present (C3)   |              |
| Select <i>one</i> of the following courses .....   | 3            |
| ENGL 350 Modern Novel (C3)   |              |
| ENGL 351 Modern Poetry (C3)  |              |
| ENGL 352 Modern Drama (C3)   |              |
|  | <hr/> 26     |

**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 The Linguistic Structure of Modern<br>English (4) |              |
| ENGL 395 History of the English Language (4)               |              |
| ENGL 497 Theories of Language Learning and<br>Teaching (4) |              |
| SPC 316 Intercultural Communication (3) (USCP)             |              |
|  | <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 undergraduate 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<br>Historical and Contemporary (4) (4)   |              |
| ENGL 503 Graduate Introduction to Linguistics (4)  |              |
| ENGL 505 Seminar in Composition Theory (4)   |              |
| ENGL 511 Seminar in American Literary<br>Periods (4) (4)   |              |
| ENGL 512 Seminar in British Literary Periods (4) (4)   |              |
| English electives.....   | 12           |
| Additional units in the English 400 and 500 series,<br>selected from one of these three emphasis areas:<br>literature, writing or linguistics. |              |
|  | 48           |

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in English and other subjects.

# ETHNIC STUDIES DEPARTMENT

Mathematics and Home Economics Bldg. (38), Room 136  
(805) 756-1707

## Faculty

Director, Robert F. Gish

Beverly Singer  
Victor Valle  
Philip Q. Yang

## 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> |
|---|--------------|
| <b>Core courses (12)</b>  |              |
| ES 110 Introduction to Ethnic Studies (D4a) (USCP)...   | 3            |
| ES 114 Racism in American Culture (USCP) .....  | 4            |
| ES 210 U.S. Cultural Heritage (D4a) (USCP) .....  | 3            |
| ES 320 American Cultural Images (D4a) (USCP) or<br>ES 321 American Cultural Images: American<br>Indians (C3) (USCP) .....                         | 3            |
| <b>Adviser approved electives</b> .....   | 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. |              |



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# GRAPHIC COMMUNICATION DEPARTMENT

Graphic Arts Bldg. (26), Room 207  
 (805) 756-1108  
 (805) 756-7118 fax

---

## Faculty

### Department Head, Harvey Robert Levenson

|                       |                   |
|-----------------------|-------------------|
| Herschel L. Apfelberg | Kristl J. Honda   |
| 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:*

Design Reproduction Technology  
 Electronic Publishing and Imaging  
 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 graphic imaging equipment provide the student with diverse experience in the practical aspects of the industry.

## CURRICULAR CONCENTRATIONS

### Design Reproduction Technology<sup>1</sup>

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.

### Electronic Publishing and Imaging

The Electronic Publishing and Imaging concentration emphasizes the growing trend towards computerization of the printing and publishing process. This concentration covers traditional print media and emerging digital media such as Internet publishing, direct on-demand digital printing, CD ROM publishing, and multimedia. The concentration leads to careers in management of electronic imaging and publishing systems, often beginning with positions in prepress, scanning, customer service, scheduling, estimating, sales, and preflight. Students in this concentration also pursue careers with the hardware and software manufacturers which service the graphic communication industry.

### 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, newspapers, magazines, books, financial and legal catalogs, business forms and documents, service bureaus, and specialized printing operations.

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<sup>1</sup> 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. Minimum 60 units upper division required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   |    |
|---|----|
| GRC 101 Introduction to Graphic Communication ....  | 3  |
| GRC 201 Electronic Publishing Systems .....   | 3  |
| GRC 202 Image Capture and Manipulation.....   | 3  |
| GRC 203 Electronic Prepress .....   | 4  |
| GRC 210 Implementing Quality Management in the<br>Graphic Arts .....  | 4  |
| GRC 211 Substrates and Ink .....  | 4  |
| GRC 300 Typography .....  | 4  |
| GRC 324 Binding and Finishing Processes .....   | 3  |
| GRC 331 Color Quality Control .....   | 4  |
| GRC 401 Printing Marketing and Sales .....  | 4  |
| GRC 403 Printing Estimating .....   | 4  |
| GRC 411 Pricing, Costing and Web Estimating .....   | 4  |
| GRC 415 Sheeted Lithographic Technology .....   | 5  |
| GRC 416 Web Printing Technology .....   | 5  |
| GRC 421 Printing Production Management.....   | 4  |
| GRC 422 Printing Supervision and Personnel Issues...  | 4  |
| GRC 438 Electronic Art Preparation .....  | 4  |
| GRC 460 Research Methods in Graphic<br>Communication .....  | 1  |
| GRC 461 Senior Project .....  | 3  |
| ENGL 215 Writing: Argumentation or<br>ENGL 218 Professional Writing: Argumentation<br>and Reports (A4)* ..... | 4  |
| Concentrations courses (see below) .....  | 26 |

Units

100

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |   |
|--|---|
| PSC 101 Physical Environment: Matter/Energy (B1a)*.  | 4 |
| CHEM 111 Survey of Chemistry (Area B)* .....   | 5 |
| <sup>1</sup> MATH 118 Pre-Calculus Algebra or<br>MATH 120 Pre-Calculus Algebra and Trigonometry<br>(B2)* ..... | 4 |
| STAT 217 Statistical Methods (B2)* .....   | 4 |

17

**GENERAL EDUCATION (GE) ..... 51**

A minimum of 72 units is required for GE; 21 of these units are in Major/Support; a minimum of 51 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 10 units)

A minimum of 14 units is required; 4 units in Major.

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech
- A4 Argumentative Writing \*see Major

**Area B Science and Mathematics** (minimum 2 units)

17 units are in Major.

Take one course from B1b:

- B1a Physical Sciences \*see Support
- B1b Life Sciences elective
- B2 Mathematics and/or Statistics \*see Support
- Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

- F1 Computer Literacy
- F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 18**

186

<sup>1</sup> 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)**

**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 Symbology .....                                       | 3  |
| GRC 439 Electronic Origination: Books and Publications.....   | 4  |
| GRC 440 Electronic Origination: Newspapers and Magazines..... | 4  |
| Restricted electives: select 3 units from the following:      | 3  |
| ART 333 Corporate Identity (3)                                |    |
| GRC 322 Advanced Typography (3)                               |    |
| GRC 437 Consumer Packaging (3)                                |    |
| <hr/>   | 26 |

**Electronic Publishing and Imaging Concentration**

|  |    |
|--|----|
| CSC 234 C and UNIX .....                     | 3  |
| CSC electives (in addition to GEB F1) .....  | 8  |
| ENGL 411 Writing Interactive Documents ..... | 4  |
| GRC 429 Digital Media.....                   | 3  |
| GRC 432 Imaging Systems Management .....     | 4  |
| Adviser approved electives.....              | 4  |
| <hr/>  | 26 |

**Printing Management Concentration**

|  |    |
|--|----|
| BUS 207 Business Law .....                               | 4  |
| BUS 212 Financial Accounting for Nonbusiness Majors..... | 4  |
| BUS 245 Elements of Marketing .....                      | 4  |
| GRC 333 Printing Plant Layout Analysis .....             | 3  |
| GRC 432 Imaging Systems Management .....                 | 4  |
| GRC 437 Consumer Packaging .....                         | 3  |
| Adviser approved electives.....                          | 4  |
| <hr/>  | 26 |

**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 this minor are available in the Graphic Communication Department office.

|  |              |
|--|--------------|
|  | <i>Units</i> |
| Core Courses.....  | 21           |
| GRC 101 Introduction to Graphic Communication (3)            |              |
| GRC 212 Substrates and Ink: Applications (3)                 |              |
| GRC 277 Computer Applications in Desktop Publishing (3) (F1) |              |
| GRC 300 Typography (4)                                       |              |
| GRC 325 Finishing Processes: Applications (2)                |              |
| GRC 329 Prepress Methods and Procedures (3)                  |              |
| GRC 330 Print Reproduction Processes (3)                     |              |
| Electives (Select 3 units from the following).....           | 3            |
| GRC 357 Screen Printing Technology (2)                       |              |
| GRC 401 Printing Marketing and Sales (4)                     |              |
| GRC 470 Selected Advanced Topics (3)                         |              |
| GRC 474 Applied Graphic Communication Practices (2)          |              |
| <hr/>  | 24           |

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# HISTORY DEPARTMENT

Faculty Office Bldg. (47), Room 27C  
(805) 756-2543

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## Faculty

### Department Chair, Carolyn J. Stefanco

|                   |                     |
|-------------------|---------------------|
| Timothy M. Barnes | Paul Hiltbold       |
| Lloyd N. Beecher  | Lynn M. Hudson      |
| Robert E. Burton  | Daniel E. Krieger   |
| Nancy L. Clark    | Edward L. Mayo      |
| George Cotkin     | Max E. Riedlsperger |
| Manzar Foroohar   | John Snetsinger     |

## 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 weigh evidence and think critically. Details and application forms are available from the History Department.

|   | <i>Units</i> |
|---|--------------|
| Required courses.....                           | 14           |
| HIST 110, HIST 111 Western Civilization (4) (5) |              |
| HIST 303 Research and Writing Seminar (5)       |              |
| Select 16 units from 300 and 400 upper-division |              |
| History courses (excluding HIST 315) .....      | 16           |
|   | <hr/> 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. Minimum 60 units upper division required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   |    |
|---|----|
| HIST 110 Western Civilization: Ancient to Renaissance.....            | 4  |
| HIST 111 Western Civilization: Reformation to Twentieth Century ..... | 5  |
| HIST 201 United States History (D1)* .....                            | 3  |
| HIST 303 Research and Writing Seminar in History ...                  | 5  |
| HIST 304 Historiography .....   | 4  |
| HIST 460 Senior Project .....   | 2  |
| HIST 461 Senior Project .....   | 2  |
| History electives (300–400 level).....                                | 21 |
| Foreign language requirement, select one:                             |    |
| FR 201, GER 201, SPAN 201 .....                                       | 4  |

Units

50

**SUPPORT COURSES**

|   |    |
|---|----|
| Electives (300–400, including History)..... | 24 |
|---|----|

24

**GENERAL EDUCATION (GE) ..... 69**

A minimum of 72 units is required for GE; 3 of these units are in Major/Support; a minimum of 69 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 15 units)

Take one course from B1a and one from B1b; one with lab:

- B1a Physical Sciences elective
- B1b Life Sciences elective

Take two courses from B2:

- B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 12 units)

No more than one course in any Area D category.

Take one course from D1b

D1a HIST 201\*see Major

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES..... 43**

186

# HUMANITIES PROGRAM

Faculty Office Building (Bldg. 47), Room 28  
(805) 756-1205

## Faculty

Director, Richard K. Simon

## Program

### Values, Technology and Society Minor

The Humanities Program offers interdisciplinary and international classes in a wide variety of subject areas, from the ethical issues involved in technology, to the cultures of China, Japan, and Spain. Many humanities classes satisfy University general education and breadth requirements.

### 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.

Units

#### Required Courses: (13)

|  |   |
|--|---|
| CSC 302 Computers and Society (F2).....              | 3 |
| ENGR 301 Technology in the 20th Century (F2).....    | 3 |
| HUM 402 Values and Technology (C3).....              | 3 |
| POLS 451 Science, Technology and Public Policy ..... | 4 |

#### Elective Courses: ..... 11

Students are required to take 11 units of elective courses, at least one from each category

#### Technology:

|   |  |
|---|--|
| ENVE 330 Environmental Quality Control (3)                              |  |
| IME 319 Human Factors Engineering (3)                                   |  |
| IT 301 Current Technological Issues (3)                                 |  |
| PSC 110 Energy for the Present and Future (3) (B1a)                     |  |
| PSC 171 Nuclear Weapon Proliferation in the Post Soviet World (3 (B1a)) |  |

#### Society:

|  |  |
|--|--|
| ANT 311 Archaeological Laboratory Methods (4)        |  |
| ANT 360 Human Cultural Adaptations (3)               |  |
| CRP 211 Introduction to Urbanization (3)             |  |
| FNR 101 Natural Resources Management and Society (3) |  |
| POLS 320 Politics of Global Survival (4)             |  |
| PSY 494 Psychology of Technological Change (4)       |  |

#### Philosophy and Values:

|  |  |
|--|--|
| HIST 306 History of American Technology (3)  |  |
| HUM 302 Human Values in Agriculture (3) (C3) |  |
| PHIL 339 Biomedical Ethics (3) (C3)          |  |
| PHIL 340 Environmental Ethics (3) (C3)       |  |

# JOURNALISM DEPARTMENT

Graphic Arts Bldg. (26), Room 227  
(805) 756-2508

## Faculty

Department Head, Nishan R. Havandjian

Mark Arnold  
Dwight DeWerth-Pallmeyer  
Randall L. Murray

## 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 is accredited by the Accrediting Council on Education in Journalism and Mass Communications (ACEJMC) which stipulate that of the 189 units required for a bachelor's degree, 131 quarter units must be taken in courses outside the major area of journalism/mass communication/communication, 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 TV station. 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. The department is headquarters for the California Intercollegiate Press Association (CIPA), an organization whose members consist of the student media in California universities.

## BS 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. Minimum 60 units upper division required.

### MAJOR COURSES

|   | Units     |
|---|-----------|
| JOUR 203 News Writing and Reporting.....                              | 4         |
| JOUR 218 Mass Media in Society .....                                  | 4         |
| JOUR 233 Copy Editing .....   | 4         |
| JOUR 290 Multicultural Journalism (USCP) .....                        | 4         |
| JOUR 302 Mass Media Law .....   | 4         |
| JOUR 304 Reporting Contemporary Issues .....                          | 4         |
| JOUR 390 Visual Communication for Mass Media ....                     | 4         |
| JOUR 401 International Communication.....                             | 4         |
| JOUR 444 Media Internship.....  | 3         |
| JOUR 460 Senior Project.....  | 3         |
| Choose four units from the following: .....                           | 2,2       |
| JOUR 351 Adv. Radio Reporting: KCPR (2)                               |           |
| JOUR 352 Adv. Newspaper Reporting: <i>Mustang Daily</i> (2)           |           |
| JOUR 353 Adv. Television Reporting: CPTV (2)                          |           |
| Restricted Journalism electives to be selected from:...               | 16        |
| JOUR 201, 205, 312, 331, 333, 335, 342, 346, 385, 402, 407, 413, 470. |           |
|   | <b>58</b> |

### SUPPORT COURSES

|  |           |
|--|-----------|
| Foreign language 101, 102, 103 (Spanish, French, German or other) .....  | 4,4,4     |
| Department approved upper division electives .....   | 24        |
| At least 12 units must be in the College of Liberal Arts and/or College of Science and Mathematics. All courses must have a lecture component. Courses must be approved by your academic adviser and department head. <i>Courses in journalism, mass communication and/or communication may not be used to satisfy upper division electives.</i> |           |
| Elective courses .....   | 23        |
| <i>Courses in journalism, mass communication and/or communication may not be used.</i>   |           |
|  | <b>59</b> |

**GENERAL EDUCATION (GE)** ..... 72

*A minimum of 72 units is required to satisfy GE requirements.*

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

*Take one course from A1, A2, A3:*

A1 Expository Writing

A2 Critical Thinking

A3 Speech

*If less than 11 units, take one additional course in:*

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 15 units)

*Take one course from B1a and one from B1b; one with lab:*

B1a Physical Sciences elective

B1b Life Sciences elective

*Take two courses from B2:*

B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one additional course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 15 units)

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

*Take three courses from D2, D3, D4a, D4b*

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

*Take one course from F1 or F2*

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

*To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.*



# LIBERAL STUDIES

## An Interdisciplinary Program

Faculty Offices East (Bldg. 25), Room 113  
(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 level.

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, human development, life science, mathematics, performing arts, 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, 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. Minimum 60 units upper division required.

#### MAJOR COURSES

\* = Courses satisfy General Education requirement.

|  | Units |
|--|-------|
| LS 101 Orientation to Liberal Studies .....  | 1     |
| LS 211 The American Enterprise: The Birth of a Nation to 1876 Centennial (C1, D1a)* .....  | 5     |
| LS 212 The American Enterprise: The 1876 Centennial to the 21 <sup>st</sup> Century (C1, D1b)* .....                                     | 5     |
| LS 461 Senior Project .....  | 3     |
| BIO 127 Natural History: Animal Adaptations (B1b)* ..  | 3     |
| BIO 128 Natural History: Animal Communities (Area B)* .....  | 3     |
| BIO 129 Natural History: Plant Communities .....   | 3     |
| ENGL 330–353 (C3)* .....   | 4     |
| (ENGL 345/346 (USCP) recommended for credential track)   |       |
| <i>Linguistics</i> . Select one course from the following:   |       |
| ENGL 290, 390, 391, 395 .....  | 4     |
| MATH 118 Pre-Calculus Algebra (B2)* .....  | 4     |
| MATH 327 Introduction to Modern Mathematics (B2)*  | 4     |
| MATH 328 Introduction to Modern Mathematics (Area B)* .....  | 4     |
| <i>Ethics</i> . Select one course from the following:  |       |
| PHIL 331/335/337 (Area C)* .....   | 3     |
| PSC 101 The Physical Environment: Matter and Energy (B1a)* .....   | 4     |
| PSC 102 The Physical Environment: Atoms and Molecules (Area B)* .....  | 4     |
| PSC 103 The Physical Environment: Earth and the Universe (Area B)* .....   | 4     |
| Foreign language electives .....   | 4,4   |
| <i>International Cultural History</i> . One course; may be selected from: ANT 202; HIST 314, 340, 341, 343, 381, 382, 415; HUM 310 ..... | 3     |

**69**

#### SUPPORT COURSES

|   |           |
|---|-----------|
| Courses to complete track (see following; select one track) ..... | <b>66</b> |
|---|-----------|

**GENERAL EDUCATION (GE)** ..... 35

A minimum of 72 units is required for GE; 37 of these units are in Major/Support; a minimum of 35 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Major.

B1a Physical Sciences \*see Major

B1b Life Sciences \*see Major

B2 Mathematics and/or Statistics \*see Major

Area B \* see Major

**Area C Arts and Humanities** (minimum 6)

11 units are in Major.

Take one course from each Area C category:

C1 Literature \*see Major

C1 Philosophy elective

C2 Fine/Performing Arts elective

C3 Lit/Phil/Arts (300-400 level) \*see Major

Area C \*see Major

**Area D Social, Political, Economic Inst.** (minimum 9 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a LS 211 \*see Major

D1b LS 212 \*see Major

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, D, E. No more than one additional course per area.

**ELECTIVES** ..... 16

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 186
**COURSES IN CREDENTIAL TRACK**

|  |         |
|--|---------|
| LS 230 Community-Based Field Experience or<br>EDUC 300 Intro. to the Teaching Profession.....                                    | 3       |
| EDUC 306 Introduction to Effective Teaching in a<br>Pluralistic Society .....  | 4       |
| EDUC 307 Introduction to the Learner's Culture,<br>Language and Identity .....   | 4       |
| EDUC 440 Educating the Exceptional Individual.....   | 4       |
| EDUC 480 Computer Based Curriculum .....   | 3       |
| BIO 306 Applications of Biological Concepts or<br>PSC 304 Applications of Physical Science or<br>PSC 305 Patterns of Change..... | 4       |
| ENGL 260 Children's Literature .....   | 3       |
| Foreign language.....  | 4       |
| CD 209 Early Development or<br>PSY 256 Developmental Psychology.....   | 4       |
| MATH 329 Mathematical Applications to Elementary<br>Teaching .....   | 3       |
| MU 100 Music Fundamentals .....  | 4       |
| MU 360/SPC 310/TH 380 .....  | 3       |
| KINE 305 Drug Education .....  | 2       |
| KINE 310 Concepts in Elementary Physical Education<br>Area of emphasis.....  | 3<br>18 |
| <i>At least 7 units must be 300-400 level.</i>   |         |
|  | 66      |

**COURSES IN GENERAL TRACK**

*At least 7 units must be 300-400 level.*

|  |       |
|--|-------|
| Courses to complete a minor.....                                 | 24-30 |
| Psychology adviser approved elective .....                       | 4     |
| Music adviser approved elective .....                            | 3     |
| Fine/performing arts adviser approved elective .....             | 3     |
| Additional electives (20-17 units must be 300-400<br>level)..... | 32-26 |
|  | 66    |

# MODERN LANGUAGES AND LITERATURES DEPARTMENT

Faculty Office Bldg. (47), Room 28  
(805) 756-1205

## Faculty

### Department Chair, Bianca Rosenthal

|                         |                       |
|-------------------------|-----------------------|
| Odile Ayrat-Clause      | William Martínez, Jr. |
| Hernán Castellano-Girón | Irel Urreiztieta      |
| William T. Little       | Gloria Velásquez      |

## Programs

### B.A. Modern Languages and Literatures

#### Minors: French, German, Spanish

The department offers coursework in French, German, and Spanish, as well as elementary Italian and Japanese. Instruction at all levels emphasizes communicative competence to prepare students for cultural, educational, literary and professional needs in California, throughout the United States and abroad. Audiovisual components are used in the classroom as well as in the language laboratory.

The Department strongly encourages students to follow its placement formula: One year of high school French, German, Italian, Japanese, or Spanish is equivalent to one quarter at Cal Poly.

The department is active in training students who wish to obtain a bilingual teaching credential. It administers the Bilingual Proficiency Examination in Spanish.

The department also supports such student clubs as the French Club, the German Club, the Circolo Italiano, the Latin American Studies Association, MEXA (Movimiento Estudiantil Xicano de Aztlán), and Tomo Dachi Kai.

The curriculum for the Bachelor of Arts degree provides strong preparation for a career in single-subject teaching, multiple-subject teaching, business, government, and international affairs; it also provides preparation for graduate study in business administration, Chicano/Latino studies, comparative literature, ethnic studies, foreign languages, Latin American studies, and other fields in the humanities social sciences, and various service areas.

## CURRICULUM FOR FRENCH MINOR

| Required courses  | Units |
|---|-------|
| FR 121, FR 122 Intermediate French .....  | 4,4   |
| FR 233 Critical Reading in French Literature (C1)....   | 4     |
| FR 301 Adv. French Composition and Grammar ....   | 4     |
| FR 305 Significant Writers in French (C3) .....   | 4     |
| <b>Electives to be chosen from the following:</b> .....                                       | 8     |
| FR 302 Adv. French Conversation and Grammar (4)   |       |
| FR 305 Significant Writers in French (4) (C3)<br>(repeatable to 8 units)                      |       |
| FR 405 French Literature in English Translation (4)<br>(C3) and FORL 400 (1)                  |       |
| FR 470 Selected Advanced Topics (1–4)<br>(repeatable to 8 units)                              |       |
| FORL 303 Culture (French) (3) or<br>HUM 310 Humanities in World Cultures<br>(French) (3) (C3) |       |
|   | 28    |

## CURRICULUM FOR GERMAN MINOR

| Required courses   | Units |
|--|-------|
| GER 121, GER 122 Intermediate German .....   | 4,4   |
| GER 233 Critical Reading in German Literature (C1) .   | 4     |
| GER 301 Adv. German Composition and Grammar ..   | 4     |
| GER 305 Significant Writers in German (C3) .....   | 4     |
| <b>Electives to be chosen from the following:</b> .....  | 8     |
| GER 302 Adv German Conversation and Grammar (4)  |       |
| GER 305 Significant Writers in German (4) (C3)<br>(repeatable to 8 units)                      |       |
| GER 405 German Literature in English Translation (4)<br>(C3) and FORL 400 (1)                  |       |
| GER 470 Selected Advanced Topics (1–4) (repeatable<br>to 8 units)                              |       |
| FORL 303 Culture (German) (3) or<br>HUM 310 Humanities in World Cultures<br>(German) (3) (C3.) |       |
|  | 28    |

**CURRICULUM FOR SPANISH MINOR**

| Required courses   | Units |
|--|-------|
| SPAN 121, SPAN 122 Fundamentals of Spanish .....                                 | 4,4   |
| SPAN 124 Adv. Spanish Composition and Grammar .                                  | 4     |
| SPAN 233 Introduction to Hispanic Readings (C1) ....                             | 4     |
| SPAN 305 Significant Writers in Spanish (C3)                                     | 4     |
| <b>Electives to be chosen from the following:</b> .....                          | 8     |
| SPAN 205 Introduction to Spanish Linguistics (4)                                 |       |
| SPAN 210 Intro. to Research Methods in Spanish (4)                               |       |
| SPAN 301 Advanced Composition in Spanish (4)                                     |       |
| SPAN 305 Significant Writers in Spanish (4) (C3)                                 |       |
| SPAN 340 Chicano/a Authors (4) (C3)(USCP)  |       |
| SPAN 402 Advanced Linguistics in Spanish (4)                                     |       |
| SPAN 405 Hispanic Literature in English Translation<br>(4) (C3) and FORL 400 (1) |       |
| SPAN 410 Advanced Literature in Spanish (4)                                      |       |
| SPAN 470 Selected Advanced Topics (1-4)  |       |
| HUM 310 Humanities in World Cultures (Hispanic or<br>Latin American) (C3) (3)    |       |
|  | 28    |

**B.A. MODERN LANGUAGES AND LITERATURES**

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Minimum 60 units upper division required.

**MAJOR COURSES****Primary Language**

|   | Units |
|---|-------|
| * = Courses satisfy General Education requirement                                       |       |
| SPAN 121 Fundamentals of Spanish .....  | 4     |
| SPAN 122 Fundamentals of Spanish or<br>SPAN 123 Spanish for Bilingual Speakers .....    | 4     |
| SPAN 124 Composition in Spanish .....   | 4     |
| SPAN 205 Introduction to Spanish Linguistics .....                                      | 4     |
| SPAN 210 Intro. to Research Methods in Spanish .....                                    | 4     |
| SPAN 233 Introduction to Hispanic Readings (C1)* ...                                    | 4     |
| SPAN 301 Advanced Composition in Spanish .....  | 4     |
| SPAN 305 Significant Writers in Spanish .....   | 4     |
| SPAN 340 Chicano Authors (USCP) .....   | 4     |
| SPAN 402 Advanced Linguistics in Spanish .....  | 4     |
| SPAN 405 Hispanic Literature in Translation .....                                       | 4     |
| SPAN 410 Advanced Literature in Spanish .....   | 4     |
| SPAN 460 Senior Project .....   | 4     |
| SPAN 470 Special Topics .....   | 4,4   |
| HUM 310 World Cultures (Spain, Latin America,<br>Mexico or Chicano Culture) (C3)* ..... | 3     |
| 300-400 level electives .....   | 12    |

**Secondary Language Concentration**

Select secondary language in either French, German or other language as approved by Department Chair.

|  |    |
|--|----|
| Introductory courses (101, 102, 103).....          | 12 |
| Intermediate courses (121, 122, 233 Area C*) ..... | 12 |
| Advanced course (300-400 level) .....              | 4  |

91

**GENERAL EDUCATION (GE) ..... 61**

A minimum of 72 units is required for GE; 11 of these units are in Major/Support; a minimum of 61 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 15 units)

Take one course from B1a and one from B1b; one with lab:

B1a Physical Sciences elective

B1b Life Sciences elective

Take two courses from B2:

B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 6 units)

11 units in Major\*.

Take one course from each Area C category:

C1 Literature \*see Major

C1 Philosophy elective

C2 Fine/Performing Arts elective

C3 Lit/Phil/Arts (300-400 level) \*see Major

Area C \*see Major

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, D, E. No more than one additional course per area.

**ELECTIVES ..... 18**

186

# MUSIC DEPARTMENT

Davidson Music Center (45), Room 129  
(805) 756-2406

fax (805) 756-7464  
<http://www.calpoly.edu/~mu>

## Faculty

### Department Chair, John G. Russell

|                    |                    |
|--------------------|--------------------|
| Antonio G. Barata  | Paul Rinzler       |
| Thomas H. Davies   | Craig H. Russell   |
| William V. Johnson | William T. Spiller |
| Frederick C. Lau   | Clifton Swanson    |
| Alyson McLamore    |                    |

## 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 new Performing Arts Center, completed in 1996, is one of the outstanding concert halls in California and hosts a wide range of concerts and activities that enrich the university and community.

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.) Each student enrolled in private instruction must take an applied music jury at the end of Spring Quarter.
3. Each student is required to attend a minimum of 6 concerts per quarter.
4. At the end of the sixth quarter of enrollment (third quarter of enrollment for transfer students) a student must take a mid-point evaluation to verify progress and potential in music. This test will include the following:
  - private performance skills (should be at the MU 250 level; tested through a jury)
  - musicianship skills at the level of Musicianship III
  - knowledge of music theory at the level of Theory II
  - piano proficiency (see No. 5 below)
5. 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.
6. Use of Music Department instruments, scheduled practice rooms, electronic studio, or lockers requires a Music Use Fee. See the Music Department Office for details.
7. 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.
8. The Music Department is not able to offer the full complement of performing ensembles and private instruction during the Summer Quarter; 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. Minimum 60 units upper division required.

|  | Units     |
|--|-----------|
| <b>MAJOR COURSES</b>                                 |           |
| MU 103 Music Theory I.....                           | 4         |
| MU 104 Musicianship I.....                           | 2         |
| MU 106 Musicianship II.....                          | 2         |
| MU 121 Introduction to Non-Western Music.....        | 4         |
| MU 207 Music Theory II.....                          | 4         |
| MU 208 Musicianship III.....                         | 2         |
| MU 308 Sound Design: Technologies.....               | 4         |
| MU 309 Music Theory III.....                         | 4         |
| MU 320 Music Research and Writing.....               | 4         |
| MU 321 Music History I.....                          | 4         |
| MU 322 Music History II.....                         | 4         |
| MU 323 Music History III.....                        | 4         |
| MU 325 (USCP) or MU 326 or MU 336.....               | 4         |
| MU 401 Contemporary Music Theory.....                | 4         |
| MU 420 Music History: Selected Topics.....           | 4         |
| MU 461 Senior Project.....                           | 3         |
| Approved music courses (300–400 level).....          | 12        |
| Major Ensemble at 100 level with adviser approval... | 6         |
| Major Ensemble at 300 level with adviser approval... | 3         |
| Applied Study.....                                   | 9         |
|  | <b>87</b> |

**GENERAL EDUCATION (GE) ..... 72**

A minimum of 72 units is required to satisfy GE requirements.  
 →See page 77 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 15 units)

Take one course from B1a and one from B1b; one with lab:

- B1a Physical Sciences elective
- B1b Life Sciences elective

Take two courses from B2:

- B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES ..... 27**

**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     |
|---|-----------|
| <b>Required Courses</b>   |           |
| MU 103 Music Theory I.....  | 4         |
| MU 104 Musicianship I (2) and one quarter of<br>Vocal or Instrumental Study (1)                             |           |
| OR  |           |
| 3 quarters of Vocal or Instrumental Study (1)(1)(1).....  | 3         |
| MU 114 Introduction to Composing or<br>MU 207 Music Theory II.....  | 4         |
| MU 120 Music Appreciation (4).....  | 4         |
| <b>Upper division electives.....</b>  | <b>15</b> |
| Chosen from 300–400 level Music courses (or, in some cases, specific courses offered by other departments). |           |
|   | <b>30</b> |

# PHILOSOPHY DEPARTMENT

Faculty Office Bldg. (47), Room 37-B  
(805) 756-2041

## Faculty

### Department Chair, Paul S. Miklowitz

|                      |                       |
|----------------------|-----------------------|
| Stephen W. Ball      | Russell A. Lascola    |
| A. C. W. Bethel      | Diane P. Michelfelder |
| Linda Bomstad        | Frederick J. O'Toole  |
| Simon J. Evnine      | Judy D. Saltzman      |
| Charles T. Hagen     | Talmage E. Scriven    |
| Laurence D. Houlgate | 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

|  | <i>Units</i> |
|--|--------------|
| ENGL/PHIL/SPC 125 Critical Thinking (A2) | 3            |
| PHIL 230 Philosophical Classics (C1)     | 3            |
| PHIL 231 Philosophical Classics (C1)     | 3            |
| PHIL 311 Greek Philosophy (3) (C3)       | 3            |

### Electives to be chosen from the following groups: ..... 12

#### *One of the following:*

|  |
|--|
| PHIL 312 Medieval Philosophy (3) (C3)                              |
| PHIL 313 Continental Philosophy: Montaigne to<br>Leibnitz (3) (C3) |
| PHIL 314 British Philosophy: Bacon to Mill (3) (C3)                |
| PHIL 315 German Philosophy: Kant to<br>Nietzsche (3) (C3)          |

#### *One of the following:*

|   |
|---|
| PHIL 316 Contemporary European<br>Philosophy (3) (C3)             |
| PHIL 317 Contemporary British and American<br>Philosophy (3) (C3) |

*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. Minimum 60 units upper division required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   |    |
|---|----|
| PHIL 225 Symbolic Logic .....                                   | 4  |
| PHIL 230 Philosophical Classics (C1)* .....                     | 3  |
| PHIL 231 Philosophical Classics (Area C)* .....                 | 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 .....                                      | 4  |
| PHIL 412 Epistemology .....                                     | 4  |
| PHIL 460 Senior Project .....                                   | 2  |
| PHIL 461 Senior Project .....                                   | 2  |
| Concentration (see below) or 300–400 level PHIL electives ..... | 18 |

Units

**58**

**GENERAL EDUCATION (GE) ..... 66**

A minimum of 72 units is required for GE; 6 of these units are in Major; a minimum of 66 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 15 units)

Take one course from B1a and one from B1b; one with lab:

- B1a Physical Sciences elective
- B1b Life Sciences elective

Take two courses from B2:

- B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 9)

6 units are in Major.

Take one course from each Area C category:

- C1 Literature elective
- C1 Philosophy \*see Major
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level) elective
- Area C \*see Major

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, D, E. No more than one additional course per area.

**ELECTIVES..... 62**

**186**

**CONCENTRATION OR ELECTIVES**

Select either the following concentration or 18 units of 300–400 level PHIL electives.

**Ethics and Society Concentration..... 18**

Select six of the following courses:

- PHIL 332 History of Ethics (3)
- PHIL 333 Political Philosophy (3)
- PHIL 334 Jurisprudence (3)
- PHIL 335 Social Ethics (3) (C3) (USCP)
- PHIL 336 Ethics, Gender and Society (3) (C3) (USCP)
- PHIL 337 Business Ethics (3)
- PHIL 339 Biomedical Ethics (3)
- PHIL 340 Environmental Ethics (3)

**Philosophy Electives**

300–400 level PHIL electives..... 18



# POLITICAL SCIENCE DEPARTMENT

Faculty Office Bldg. (47), Room 14-A  
(805) 756-2984

## Faculty

**Department Chair, Dianne N. Long**

|                       |                         |
|-----------------------|-------------------------|
| John H. Culver        | Reginald H. Gooden, Jr. |
| Randal L. Cruikshanks | Richard B. Kranzdorf    |
| Philip L. Fetzer      | Carl E. Lutrin          |
| David L. George       | Carroll R. McKibbin     |
| Jefferson M. Gill     | Allen K. Settle         |

## Programs

### B.A. Political Science

*Students may select Individualized Course of Study or a Concentration in:*

International Affairs  
Pre-Law  
Public Administration

### International Relations Minor

### Public Administration Minor

The Political Science Department offers instruction leading to the Bachelor of Arts degree in Political Science. 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.

In addition to the major, the department offers minors in International Relations and Public Administration. Beyond that, the 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.

## 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.

### Individualized Course of Study

Permits students with varying backgrounds and interests to pursue a course of study which meets their individual needs and interests. 28 units of coursework at the 300–400 level are selected by the student and approved by the student's academic adviser.

## 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 which 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.

### Required courses

|  |   |
|--|---|
| POLS 225 Introduction to International Relations .....   | 4 |
| POLS 420 Contemporary U.S. Foreign Policy or<br>HIST 387 History of U.S. Foreign Relations ..... | 4 |
| ECON 325 Underdevelopment and Economic<br>Growth (D4b) .....                                     | 3 |
| GEOG 308 Global Geography (D4b) .....  | 3 |

Area of emphasis ..... 12–16

Adviser approved electives ..... 2–0

28–30

## 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.

### Required courses

|   |   |
|---|---|
| POLS 351 Public Administration .....      | 4 |
| POLS 386 Government Internship .....      | 4 |
| POLS 455 Public Policy Analysis .....     | 4 |
| POLS 472 State and Local Government ..... | 4 |

Adviser approved electives ..... 12

28

**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. Minimum 60 units upper division required.

| MAJOR COURSES   | Units   |
|---|---|
| POLS 180 Political Inquiry .....                              | 4   |
| POLS 225 Introduction to International Relations .....        | 4   |
| POLS 230 Basic Concepts of Political Thought .....            | 4   |
| POLS 360 Political Analysis .....                             | 4   |
| POLS 461, 462 Senior Project.....                             | 2,2   |
| Political science electives (300–400 level).....              | 16  |
| Concentration courses or individualized course of study ..... | 28  |
|   | <hr style="width: 100%; border: 0.5px solid black;"/> |
|   | <b>64</b>   |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |   |
|---|---|
| HIST 110 Western Civilization .....                             | 4   |
| HIST 111 Western Civilization .....                             | 5   |
| Geography elective (300–400 level).....                         | 4   |
| Anthropology/Sociology elective (300–400 level).....            | 4   |
| ENGL 310/315/318 .....  | 4   |
| STAT 221 Introduction to Probability and Statistics (B2)* ..... | 5   |
|   | <hr style="width: 100%; border: 0.5px solid black;"/> |
|   | <b>26</b>   |

**GENERAL EDUCATION (GE) ..... 67**

A minimum of 72 units is required for GE; 5 of these units are in Major/Support; a minimum of 67 units is required to satisfy remaining GE requirements.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 10)

5 units are inSupport.

Take one course from B1a and one from B1b; one with lab:

- B1a Physical Sciences elective
- B1b Life Sciences elective

Take one additional course from B2

- B2 Mathematics and/or Statistics \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300–400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211

- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300–400 level)

- D3 Economics

- D4a Social Institutions

- D4b Social Institutions (300–400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202

- E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

- F1 Computer Literacy

- F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES** ..... **29**

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**186**

**CONCENTRATIONS** (select one)

**International Affairs Concentration**

|   |   |
|---|---|
| POLS 324 International Politics .....                           | 4   |
| POLS 329 Comparative Politics .....                             | 4   |
| POLS 328 Politics of Developing Areas .....                     | 4   |
| POLS 420 Contemporary U.S. Foreign Policy .....                 | 4   |
| Adviser approved electives (4 units must be 300–400 level)..... | 12  |
|   | <hr style="width: 100%; border: 0.5px solid black;"/> |
|   | <b>28</b>   |

**Pre-Law Concentration**

|  |   |
|--|---|
| ENGL 302 Writing: Advanced Composition ..... | 4   |
| POLS 341 American Constitutional Law .....   | 4   |
| POLS 344 Civil Liberties .....               | 4   |
| POLS 334 Jurisprudence .....                 | 3   |
| POLS 345 Judicial Process.....               | 4   |
| Pre-Law electives (300–400 level).....       | 9   |
|  | <hr style="width: 100%; border: 0.5px solid black;"/> |
|  | <b>28</b>   |

**Public Administration Concentration**

|   |   |
|---|---|
| POLS 351 Public Administration .....      | 4   |
| POLS 386 Government Internship .....      | 4   |
| POLS 472 State and Local Government ..... | 4   |
| POLS 455 Public Policy Analysis .....     | 4   |
| Adviser approved electives .....          | 12  |
|   | <hr style="width: 100%; border: 0.5px solid black;"/> |
|   | <b>28</b>   |

# PSYCHOLOGY AND HUMAN DEVELOPMENT DEPARTMENT

Faculty Office Bldg. (47), Room 24  
(805) 756-2033

## Faculty

### Department Chair, Shawn Meghan Burn

|                       |                      |
|-----------------------|----------------------|
| Margaret M. Berrio    | Ann Morgan           |
| Robert L. Blodget     | Linden L. Nelson     |
| Harry J. Busselen     | Marilynn F. Rice     |
| Robert A. Christenson | Kathleen A. Ryan     |
| Patrice L. Engle      | 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 J. Tryon       |
| J. Kelly Moreno       | Debra Valencia-Laver |

## Programs

### B.S. Child Development

#### B.S. Psychology

*Students may select Individualized Course of Study or a Concentration in:*

Applied Social Psychology  
Counseling and Family Psychology  
Developmental Psychology

#### 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. Child Development, B.S. Psychology, 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. CHILD DEVELOPMENT

The Child Development major is designed for students who are interested in working with children in educational settings. The major provides a background in how children learn and develop, and serves as preparation for working in infant/toddler and preschool programs, for employment as developers of educational resources and software, and for

graduate study in teaching credential programs and child development. The program provides a foundation for students pursuing careers in elementary education.

The Child Development major is designed to enable students to develop a program of study suited to meet their individual needs. After a student takes a required core of courses in child development, the student, with the assistance of an adviser, develops a personal program of study by selecting adviser approved electives, free electives, two internships, and a senior project.

In the Child Development core of required courses, students:

1. Learn about children, how they learn and develop physically, emotionally, socially, and intellectually, and how adults can facilitate or hinder the process.
2. Gain experience working with children of different ages in different settings.
3. Develop expertise in the use of educational technology through developing competencies in accessing, processing, and disseminating information through the use of computers and video technology.
4. Become part of a learning community of faculty and students engaged in a collaborative learning process.
5. Develop an understanding of multicultural and anti-bias issues and how to lead children into a celebration of cultural pluralism transmitting ideals of fairness and respect.
6. Develop skills in leadership and team and community building.

### B.S. PSYCHOLOGY

The Psychology major offers a broad preparation in the science of psychology, with concentrations in Applied Social Psychology, Counseling and Family Psychology, and Developmental Psychology. Theoretical approaches, research techniques, laboratory experiences and internships are hallmarks of the psychology program.

Graduates often pursue careers in mental health programs, social services agencies, public health settings, education institutions, and personnel-related settings. Many majors go on to graduate work in such fields of psychology as: counseling, developmental, family, social, clinical or experimental.

#### CONCENTRATIONS

##### 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.

**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 related fields.

**Counseling and Family Psychology**

Interdisciplinary study that provides knowledge and experience necessary for a variety of careers in family, social, educational, clinical, and other health-related service agencies in the public and private sectors. Appropriate for students who wish to work in such settings, and who desire an applied approach to understanding and modifying individual, interpersonal, and family systems. Students are prepared for graduate study in clinical psychology, counseling psychology, social work, and marriage and family counseling.

**Individualized Course of Study**

Permits students to pursue a course of study which meets their individual needs and interests. Courses are selected by the student with the advice and approval of the student's academic adviser.

**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.

|   |              |
|---|--------------|
|   | <i>Units</i> |
| <b>Required courses</b> .....                             | 13-15        |
| PSY 201/202 General Psychology (E.1.) (3)                 |              |
| STAT 211/217/321 (B.2.) (3-4)                             |              |
| <i>Select two of the following:</i>                       |              |
| PSY 252 Social Psychology (4)                             |              |
| PSY 256 Developmental Psychology (4)                      |              |
| PSY 304 Physiological Psychology (E.2.) (3)               |              |
| PSY 305 Personality (4)                                   |              |
| PSY 405 Abnormal Psychology (4)                           |              |
| <b>Adviser approved PSY courses (300–400 level)</b> ..... | 12           |
|   | 25-27        |

Note: At least ½ of total units must be 300-400 level

**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 psychological, biological, 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.*

|  |              |
|--|--------------|
|  | <i>Units</i> |
| <b>Required core</b> .....   | 16           |
| KINE 408 Exercise and Health Promotion for Senior Adults (4)   |              |
| PSY 318 Psychology of Aging (4)  |              |
| SOC 326 Sociology of Aging (4)   |              |
| FSN 315 Nutrition in Aging (4)   |              |
| <b>Adviser approved elective</b> .....   | 4            |
| May be selected from: POLS 425, PSY 310, PSY 317, PSY 459  |              |
| <b>Gerontology-related Fieldwork</b> .....   | 4            |
| May be fulfilled as an elective in the student's major or it may be challenged due to previous work. |              |
|  | 24           |

**B.S. CHILD DEVELOPMENT**

Courses are displayed by Major, Support, General Education, and Electives.

|   | Units |
|---|-------|
| <b>MAJOR COURSES</b>                                      |       |
| CD 102 Orientation to Child Development.....              | 4     |
| CD 128 Program Planning for Nurturing Relationships ..... | 3     |
| CD 130 Supervised Study of Children.....                  | 4     |
| CD 203 Family Development .....                           | 4     |
| CD 209 Early Development.....                             | 4     |
| CD 230 Supervised Study of Children: Early Childhood..... | 4     |
| PSY 303 Family Interaction or PSY 351 Group Dynamics..... | 4     |
| CD 306 Adolescence.....                                   | 4     |
| CD 309 Learning, Development and Technology I.....        | 4     |
| CD 310 Learning, Development and Technology II.....       | 4     |
| CD 311 Learning, Development and Technology III.....      | 4     |
| PSY 323 The Helping Relationship.....                     | 4     |
| CD 324 Guiding Children and Adolescents.....              | 4     |
| CD 329 Research Methods in Human Development.....         | 3     |
| CD 330 Supervised Internship.....                         | 4     |
| CD 401 Perspectives on Childhood Education.....           | 4     |
| CD 430 Advanced Internship.....                           | 4     |
| CD 461 Senior Project Seminar.....                        | 2     |
| CD 462 Senior Project .....                               | 2     |

70

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |    |
|--|----|
| BIO 302 Human Genetics (B1b)* .....            | 3  |
| FSN 210 Nutrition (Area E)* .....              | 3  |
| PSY 201/PSY 202 General Psychology (E1)* ..... | 3  |
| Adviser approved electives .....               | 20 |

29

**GENERAL EDUCATION (GE) ..... 63**

A minimum of 72 units is required for GE; 9 of these units are in Support and a minimum of 63 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 12 units)

3 units in Support.

Take one course from B1a with lab:

B1a Physical Sciences elective

B1b Life Sciences \*see Support

Take two courses from B2:

B2 Mathematics and/or Statistics electives

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

6 units are in Support.

E1 PSY 201/PSY 202 \*see Support

Area E course \*see Support

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D. No more than one additional course per area.

**ELECTIVES..... 24**

186

**B.S. PSYCHOLOGY**

Courses are displayed by Major, Support, General Education, and Electives.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   | Units |
|---|-------|
| PSY 201/PSY 202 General Psychology (E1)* .....                          | 3     |
| PSY 252 Social Psychology .....   | 4     |
| PSY 254 Family Psychology .....   | 4     |
| PSY 256 Developmental Psychology .....                                  | 4     |
| PSY 304 Physiological Psychology (Area E)* .....                        | 3     |
| PSY 305 Personality .....   | 4     |
| PSY 307 Memory and Cognition .....                                      | 4     |
| PSY 323 The Helping Relationship .....                                  | 4     |
| PSY 329 Research Methods in Psychology .....                            | 3     |
| PSY 333 Quantitative Research Methods for the Behavioral Sciences ..... | 3     |
| PSY 351 Group Dynamics or PSY 429 Experimental Psychology .....         | 4     |
| PSY 405 Abnormal Psychology .....                                       | 4     |
| PSY 453 Supervised Fieldwork .....                                      | 5     |
| PSY 454 Supervised Fieldwork .....                                      | 5     |
| PSY 458 Learning .....  | 4     |
| PSY 461 Senior Project Seminar .....                                    | 1     |
| PSY 462 Senior Project .....  | 3     |
| PSY electives (300-400 level) .....                                     | 8     |
| Concentration or individualized course of study .....                   | 28    |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |          |
|---|----------|
| BIO 302 Human Genetics (B1b)* .....   | 3        |
| STAT 217 Applied Statistics for Liberal Arts or STAT 251 Statistical Inference for Management I (B2)* ..... | 4        |
| <hr style="width: 100%; border: 0.5px solid black;"/>   |          |
|   | <b>7</b> |

**GENERAL EDUCATION (GE) ..... 59**

A minimum of 72 units is required for GE; 13 of these units are in Major/Support; a minimum of 59 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 8 units)

7 units in Support.

Take one course from B1a with lab:

B1a Physical Sciences elective

B1b Life Sciences \*see Support

Take one additional course from B2

B2 Mathematics and/or Statistics \*see Support

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

6 units in Major.

E1 PSY 201/PSY 202 \*see Major

Area E \*see Major

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D. No more than one additional course per area.

**ELECTIVES ..... 22**

**CONCENTRATIONS OR ELECTIVES (select one)**

**Applied Social Psychology Concentration**

|   |    |
|---|----|
| PSY 302 Behavior in Organizations.....          | 4  |
| PSY 360 Applied Social Psychology .....         | 4  |
| Select 2 of the following:.....                 | 8  |
| PSY 311 Environmental Psychology (4)            |    |
| PSY 317 Psychology of Stress (4)                |    |
| PSY 351 Group Dynamics (4)                      |    |
| PSY 359 Applied Psychology Research Methods (4) |    |
| PSY 432 Psychological Testing (4)               |    |
| PSY 465 Cross-Cultural Issues in Psychology (4) |    |
| PSY 494 Psychology of Technological Change (4)  |    |
| Adviser approved concentration electives .....  | 12 |
|   | 28 |

**Counseling and Family Psychology Concentration**

|   |    |
|---|----|
| PSY 370 Introduction to Clinical and Counseling<br>Psychology ..... | 4  |
| Select 3 of the following:.....                                     | 12 |
| PSY 330 Behavioral Effects of Psychoactive Drugs (4)                |    |
| PSY 413 Parent-Child Relationships (4)                              |    |
| PSY 432 Psychological Testing (4)                                   |    |
| PSY 450 Family Intervention (4)                                     |    |
| PSY 456 Behavioral Disorders in Children (4)                        |    |
| Adviser approved concentration electives .....                      | 12 |
|   | 28 |

**Developmental Psychology Concentration**

|  |    |
|--|----|
| PSY 419 Self and Identity.....                 | 4  |
| PSY 420 Social and Emotional Development.....  | 4  |
| PSY 421 Cognitive Development.....             | 4  |
| PSY 459 Lifespan Theories .....                | 4  |
| Adviser approved concentration electives ..... | 12 |
|  | 28 |

**Individualized Course of Study .....** 28

Students have the option of choosing one of the above concentrations or they may take 28 adviser approved electives

## 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. an on-campus screening interview.

Related work or volunteer experience is highly desirable as is having received professional counseling. Candidates should request from the department a supplemental application packet for admission to the program.

### Prerequisites

Prerequisites are coursework in abnormal psychology, family therapy/intervention, behavior disorders in children, neuropsychology, personality, 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, fulfillment of the Graduation Writing Requirement, 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 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 professional and personal growth of each graduate student is of major importance; consequently, candidates are 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 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 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 program. A second grade of C or lower will disqualify the student from the program and University recommendation for the license. Further candidates may be disqualified from this program for academic-related actions judged by the M.S. Program Committee to reflect unethical, unprofessional or incompetent clinical skills.

**CURRICULUM FOR M.S. PSYCHOLOGY**

|   | <i>Units</i> |
|---|--------------|
| PSY 419/PSY 420/PSY 459 .....   | 4            |
| PSY 450 Family Intervention.....  | 4            |
| PSY 504 Neuropsychology and Psychopharmacology  | 4            |
| EDUC/PSY 555 Counseling and Communication .....   | 4            |
| EDUC 556 Ethnic Counseling .....  | 4            |
| PSY 558 Career Counseling.....  | 4            |
| PSY 560 Individual Therapy: Theory and Application  | 4            |
| PSY 564 Ethics and the Law: MFC Counseling .....  | 4            |
| PSY 565 Diagnosis/Treatment Psychopathology .....   | 4            |
| PSY 566 Group Therapy: Theory and Application ....  | 4            |
| PSY 569 Counseling Clinic Practicum .....   | 3,3          |
| PSY 571 Family Therapy: Theory and Application.....   | 4            |
| PSY 572 Child and Adolescent Therapy: Theory and<br>Application .....   | 4            |
| PSY 574 Applied Psychological Testing.....  | 4            |
| PSY 575 Gender, Couple and Sexual Dysfunction<br>Therapy .....  | 4            |
| PSY 576 Field Experience: Marital and Family<br>Counseling .....  | 16           |
| PSY 585 Research Methods for Counseling<br>Psychology.....  | 4            |
| PSY 590 Research Applications in Psychology and<br>Human Services .....   | 4            |
| <sup>1</sup> PSY 599 Thesis (4)<br>4 units of approved electives and written<br>comprehensive examination ..... | 4            |
|   | <hr/> 90     |

<sup>1</sup> Must register for thesis credit each quarter of advisement.

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## SOCIAL SCIENCES DEPARTMENT

Faculty Office Bldg. (47), Room 13-D  
(805) 756-2260

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### Faculty

Department Chair, **Richard A. Shaffer**

#### Anthropology

Barbara E. Cook  
Patrick C. McKim

#### Geography

William L. Preston  
George J. Suchand  
Calvin H. Wilvert

#### Sociology

James W. Coleman  
Harold R. Kerbo  
John A. McKinstry  
Barbara L. Mori  
Leo W. Pinard II

### Programs

#### B.S. Social Sciences

*Students may select Individualized Course of Study or a Concentration in:*

Criminal Justice  
Cross-Cultural Studies  
Environmental Geography  
Organizations  
Pacific Rim  
Social Sciences (Teaching)  
Social Services

#### Anthropology-Geography Minor

#### Sociology 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.

#### Environmental Geography

Provides students with a conceptual understanding of environmental topics and to place current problems in a global and historic context. Students will also gain applied skills which will help them to obtain employment. Students will also be better prepared to gain admittance to graduate schools in geography.

#### Individualized Course of Study

Provides students the opportunity to pursue a course of study which meets their individual needs and interests. It consists of 28 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.

**Pacific Rim**

Provides students the opportunity to learn more about the peoples, culture and political-economic systems of countries in the Pacific Rim. The goal of the program is to prepare students to work with people from the various Pacific Rim countries, to prepare to live in Pacific Rim countries and to enable them to understand the way of life, values and goals of the various societies of this region.

**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 14 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. Students enrolled in the minor will learn about 1) the cultural and ecological diversity of the earth's surface; 2) the interrelationships between peoples of varying cultures; 3) the interactions of different cultures with their resource habitats and environmental alteration; and 4) the methodologies and technologies used to evaluate cultures and environments. The goal of the minor is to instill a respect for cultural diversity and environmental sustainability. Students from a number of majors (e.g., History, Political Science, Liberal Studies) who are planning teaching careers in elementary and secondary education will find this minor of special interest. Also, students interested in attending graduate school in either Anthropology or Geography are encouraged to enhance their preparation with this minor.

Units

**Foundation Courses**

|   |   |
|---|---|
| ANT 201 Cultural Anthropology (D4a) .....               | 3 |
| ANT 203 Biological Anthropology .....                   | 4 |
| GEOG 150 Introduction to Cultural Geography (D4a) ..... | 3 |
| GEOG 250 Physical Geography .....                       | 4 |

**Ecological Courses (select 1) .....**

|  |   |
|--|---|
| ANT 360 Human Cultural Adaptations (D4b) (3) | 3 |
| GEOG 325 Climate and Humanity (4)            |   |
| GEOG 333 Human Impact on the Earth (4)       |   |

**Global and Regional Courses (select 1).....**

|   |   |
|---|---|
| ANT 202 World Prehistory (4)                  | 3 |
| ANT 311 Archaeological Laboratory Methods (4) |   |
| ANT 450 Area Studies (4)                      |   |
| GEOG 308 Global Geography (D4b) (3)           |   |
| GEOG 315 Resource Utilization (4)             |   |
| GEOG 340 Geography of California (4)          |   |
| GEOG 350 Geography of the United States (4)   |   |
| GEOG 360 Geography of Europe (4)              |   |
| GEOG 401 Area Geography (4)                   |   |
| GEOG 370 Geography of Mexico (4)              |   |

**Topical and Systematic Skills (select 1).....**

|   |   |
|---|---|
| ANT 310 California Archaeology (4)              | 3 |
| ANT 433 Language and Culture (4)                |   |
| ANT 401 Culture and Health (4)                  |   |
| ANT 420 Development Anthropology (4)            |   |
| ANT 444 Sex, Death and Human Nature (4)         |   |
| ENVE 324 Introduction to Air Pollution (F2) (3) |   |
| GEOG 305 Political Geography (4)                |   |
| GEOG 310 Urban Geography (4)                    |   |

**Technical Skills (select 1).....**

|  |   |
|--|---|
| BRAE 237 Engineering Surveying 1 (2)                     | 2 |
| BRAE 345 Aerial Photogrammetry and Remote Sensing (3)    |   |
| BRAE 446 CAD Software for Land Modeling (2)              |   |
| FNR 300 Computer Applications in Resource Management (2) |   |
| FNR/LA 318 Applications of GIS in Natural Resources (3)  |   |
| MSC 111 Orienteering (2)                                 |   |

—  
25

**SOCIOLOGY MINOR**

The Minor in Sociology provides students with a broad understanding of contemporary society. The primary focus of the minor is the analysis of social change. These currents of change will impact on our students in the years to come in whatever direction their careers take. For example, students would learn about: 1) the nature of international social, economic and political structures and their consequences in our daily lives; 2) the social results of emerging technology; 3) changes in family life, especially in regards to the role of women; 4) the changing ethnic mix in California and the United States and its implications; and 5) the development of new marketing and specific communities. The shifting demographic patterns in society, the emerging life styles, the increase in the percentage of elderly in the population, and the nature of specific subculture influences, and are influenced by, the above social process.

| Required courses  | Units |
|---|-------|
| SOC 105 Introduction to Sociology (D4a).....  | 3     |
| SOC 106 Social Problems .....   | 4     |
| SOC 309 World Systems and Its Problems (D4b).....   | 3     |
| SOC 315 Race and Ethnic Relations (D4b) (3) or<br>SOC 316 American Ethnic Minorities (USCP) (4) ..... | 3     |
| SOC 323 Social Stratification.....  | 4     |
| <b>Electives</b> .....  | 12    |
| At least 4 units must be at 300–400 level   |       |
|   | 29    |

**B.S. SOCIAL SCIENCES**

*Courses are displayed by Major, Support, Concentration, General Education, and Electives.*

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|  | Units |
|--|-------|
| ANT 201 Cultural Anthropology (D4a)* .....                                   | 3     |
| ANT 203 Biological Anthropology .....  | 4     |
| Anthropology electives (300–400 level) .....                                 | 8     |
| CSC 110 Computers and Computer Applications (F1)*                            | 3     |
| GEOG 150 Introduction to Cultural Geography .....                            | 3     |
| GEOG 250 Physical Geography .....  | 4     |
| Geography electives (300–400 level).....                                     | 8     |
| SOC 105 Introduction to Sociology .....                                      | 3     |
| SOC 106 Social Problems .....  | 4     |
| SOC 323 Social Stratification .....  | 4     |
| SOC 355 Social Data Collection and Analysis .....                            | 4     |
| SOC 421 Social Theory .....  | 4     |
| SOCS 461 Senior Project .....  | 2     |
| SOCS 462 Senior Project .....  | 2     |
| Sociology electives (300–400 level) .....                                    | 8     |
| Concentration courses or individualized course of<br>study (see below) ..... | 28    |
| STAT 221 Introduction to Probability and Statistics<br>(B2)* .....           | 5     |

97

**GENERAL EDUCATION (GE) ..... 61**

*A minimum of 72 units is required for GE; 11 of these units are in Major/Support; a minimum of 61 units is required to satisfy remaining GE requirements.*

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

*Take one course from A1, A2, A3:*

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

*If less than 11 units, take one additional course in:*

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 10 units)

*5 units are in Major.*

*Take one course from B1a and one from B1b; one with lab:*

- B1a Physical Sciences elective
- B1b Life Sciences elective

*Take one additional course from B2*

- B2 Mathematics and/or Statistics \*see Major

**Area C Arts and Humanities** (minimum 15 units)

*Take one course from each Area C category:*

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

*If less than 15 units, take one additional course from C1, C2, C3*

**Area D Social, Political, Economic Inst.** (minimum 12 units)

*3 units are in Major.*

*No more than one course in any Area D category.*

*Take one course from D1a and one from D1b*

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

*Take two courses from D2, D3, D4b*

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions \*see Major
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

*No more than one course in any Area E category.*

*Take one course from E1 or E2*

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

*3 units in Major.*

- F1 Computer Literacy \*see Major

**Additional GE Courses**

*To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.*

**ELECTIVES ..... 28**

**186**

**CONCENTRATION OR INDIVIDUALIZED COURSE OF STUDY** (*select one*)

**Criminal Justice Concentration**

|   |    |
|---|----|
| SOC 316 American Ethnic Minorities (USCP) ..... | 4  |
| SOC 402 Crime and Delinquency .....             | 4  |
| SOC 412 Criminal Justice .....                  | 4  |
| SOC 413 Methods of Social Work .....            | 4  |
| SOCS 440 Internship .....                       | 8  |
| Adviser approved electives.....                 | 4  |
|   | 28 |

**Cross-Cultural Studies Concentration**

|  |    |
|--|----|
| ANT 360 Human Cultural Adaptation.....                                       | 3  |
| GEOG 308 Global Geography.....   | 3  |
| SOC 309 The World System and Its Problems .....                              | 3  |
| <i>Problems and Issues courses to be selected from:</i> .....                | 8  |
| ANT 401, 420, 444; GEOG 305, 325; SOC 315<br><i>Regions and Applications</i> |    |
| To be selected from approved list. See adviser.....                          | 11 |
|  | 28 |

**Environmental Geography Concentration**

|  |    |
|--|----|
| GEOG 315 Geography of Resource Utilization.....  | 4  |
| GEOG 325 Climate and Humanity .....  | 4  |
| GEOG 333 Human Impact on the Earth .....   | 4  |
| <i>Applications and Issues courses to be selected from:</i> ....   | 16 |
| ANT 310, 420; BIO 301; BRAE 237, 345, 446;<br>CRP 111, 112; FNR 202, 300; FNR/LA 318;<br>GEOL 211; LA 212, 321; OH 121; SS 121, 202,<br>433. |    |
|  | 28 |

**Organizations Concentration**

|   |    |
|---|----|
| <i>Select 20 units from the following courses:</i> .....                        | 20 |
| SOC 310 Self, Organizations and Society (4)                                     |    |
| SOC 350 Social Organization in Modern Japan (4)                                 |    |
| SOC 395 Sociology of Complex Organizations (4)                                  |    |
| SOCS 440 Internship (4)   |    |
| BUS 382 Organization and Mgmt. Theory (4)                                       |    |
| BUS 384 Human Resource Management (4)   |    |
| BUS 387 Organizational Behavior (4) or<br>PSY 302 Behavior in Organizations (4) |    |
| Adviser approved electives .....  | 8  |
|   | 28 |

**Pacific Rim Concentration**

|   |    |
|---|----|
| ANT 360 Human Cultural Adaptation .....                               | 3  |
| SOC 309 The World System and its Problems .....                       | 3  |
| GEOG 308 Global Geography .....                                       | 3  |
| Select East Asia or Latin America Track .....                         | 19 |
| <i>East Asia Track to be selected from:</i>                           |    |
| HIST 415, 416, 417; HUM 310; JPNS 101, 102,<br>103; RELS 307; SOC 350 |    |
| <i>Latin America Track to be selected from:</i>                       |    |
| GEOG 370; HIST 340, 341; HUM 310; POLS 327;<br>SPAN 201, 202, 301;    |    |
|   | 28 |

**Social Services Concentration**

|  |    |
|--|----|
| SOC 301 Social Work and Social Welfare Institutions... | 4  |
| SOC 316 American Ethnic Minorities.....                | 4  |
| SOC 413 Methods of Social Work.....                    | 4  |
| SOCS 440 Internship.....                               | 8  |
| Adviser approved electives .....                       | 8  |
|  | 28 |

**Teaching Concentration**

|  |    |
|--|----|
| GEOG 308 Global Geography .....                | 4  |
| GEOG 340 Geography of California .....         | 4  |
| GEOG 350 Geography of the United States.....   | 4  |
| SOC 316 American Ethnic Minorities (USCP)..... | 4  |
| SOCS 440 Internship or                         |    |
| EDUC 300 Intr. Teaching Profession.....        | 4  |
| Adviser approved electives .....               | 8  |
|  | 28 |

**Individualized Course of Study**..... 28

28 units at the 300–400 level selected in consultation with advising faculty. A written justification for the courses selected and the way they constitute a cohesive, integrated study is required.

# SPEECH COMMUNICATION DEPARTMENT

Faculty Office Bldg. (47), Room 33  
(805) 756-2553

## Faculty

### Department Head (Interim), James R. Conway

|                     |                         |
|---------------------|-------------------------|
| Bernard K. Duffy    | Steven McDermott        |
| Susan Duffy         | Harry Sharp, Jr.        |
| Michael L. Fahs     | Terrence C. Winebrenner |
| David Henry         | Raymond F. Zeuschner    |
| Lorraine D. Jackson |                         |

## 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. 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 28-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.

|  | <i>Units</i> |
|--|--------------|
| <b>Required courses</b>  |              |
| SPC 212 Interpersonal Communication .....  | 4            |
| SPC 312 Communication Theory .....   | 4            |
| SPC 322 Persuasion .....   | 4            |
| SPC 330 Classical Rhetorical Theory (C3) or<br>SPC 331 Political Advocacy and Contemporary<br>Rhetoric ..... | 4            |
| <b>Electives</b> .....   | 12           |
| 12 units of Speech Communication of which at least<br>8 units must be 300–400 level.                         |              |
|  | 28           |

**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. Minimum 60 units upper division required.

|  | Units     |
|--|-----------|
| <b>MAJOR COURSES</b>   |           |
| 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        |
|  | <u>59</u> |

**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         |
| PSY 333/SPC 333 Quantitative Research Methods for the Behavioral Sciences.....                | 3         |
| Upper division history elective.....  | 3         |
|   | <u>16</u> |

**GENERAL EDUCATION (GE) .....** 72

A minimum of 72 units is required to satisfy GE requirements.  
 →See page 77 for complete GE course listing.  
 →Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 15 units)

Take one course from B1a and one from B1b; one with lab:

- B1a Physical Sciences elective
- B1b Life Sciences elective

Take two courses from B2:

- B2 Mathematics and/or Statistics

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

- F1 Computer Literacy
- F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per area.

**ELECTIVES.....** 39

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 well-balanced programs of study, integrating practical production work with classes that examine the principles, theoretical aspects, and historical development of dance and theatre.

A full range of studio dance courses are offered. They include ballet, modern, jazz, ballroom, and folk. Dance notation, composition and dance production are available, as well as courses designed for future elementary and secondary teachers of dance. The department also provides general education and breadth courses in the areas of dance history and dance appreciation.

In theatre, the main aspects of the discipline are covered—technical theatre, design, acting, directing and playwriting. In addition, the department offers general education and breadth courses in introductory theatre, theatre history and literature, and specialized study of theatre such as Women’s Theatre and Black Theatre. A new BA degree program in Theatre has been proposed and approval is pending.

The department also acts as a cultural focus for the campus and community. An annual dance concert is presented under the auspices of Orchesis. Each quarter the department presents a dramatic production. Recent productions include *The Glass Menagerie*, *Endgame*, *The Physicists*, and *Hecuba*. The department also produces original works, sponsors guest lecturers, and manages a program of student-directed works.

### 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.

| Core courses                                     | Units |
|--|-------|
| DANC 134 Beginning Social Dance .....            | 2     |
| DANC 221 Dance Appreciation (C2) .....           | 3     |
| DANC 231 Intermediate Ballet .....               | 2     |
| DANC 232 Intermediate Modern Dance .....         | 2     |
| DANC 321 Dance History (C3) .....                | 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 332 Modern Dance Repertory (2)                |   |
| 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 is 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.

| Core courses                                       | Units |
|--|-------|
| TH 210 Introduction to Theatre (C2) .....          | 3     |
| TH 327 Theatre History and Literature (C3) .....   | 3     |
| TH 328 Theatre History and Literature (C3) .....   | 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 310 Women’s Theatre (3) (C3)                          |      |
| TH 320 Black Theatre (3) (C3) (USCP)                     |      |
| 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 Intro. Stage Design: Lighting and Sound (3)       |      |
| TH 440 Advanced Acting (3)                               |      |
| TH 470 Selected Advanced Topics (1–3)                    | —    |

28



# WOMEN'S STUDIES PROGRAM

Faculty Office Building (Bldg. 47), Room 25H  
(805) 756-1525

## Faculty

### Director, Carolyn J. Stefanco

The following faculty participate in the Women's Studies program and hold academic rank in a department outside the program:

|                                  |   |
|----------------------------------|---|
| Art and Design                   | Jean Wetzel                                   |
| English                          | Susan Currier<br>Linda Halisky<br>Nancy Lucas |
| Modern Languages                 | Gloria Velasquez                              |
| History                          | Lynn Hudson                                   |
| Music                            | Alyson McLamore                               |
| Philosophy                       | Diane Michelfelder                            |
| Political Science                | John Culver<br>Dianne Long                    |
| Psychology and Human Development | Shawn Burn<br>Patrice Engle<br>Laura King     |
| Social Sciences                  | Barbara Mori                                  |
| Speech Communication             | Lorraine Jackson                              |

## WOMEN'S STUDIES MINOR PROGRAM

The Women's Studies Minor enables students to explore women's experiences and to analyze how gender, along with race, class, ethnicity, age, and sexual identity, shapes women's lives. In addition to providing a body of information, the Minor also teaches students to question knowledge from multiple theoretical perspectives and encourages active student learning through the application of feminist pedagogy. Core (required) and elective courses challenge the academy by putting women at the center of scholarly investigation; by explaining how gender shapes experience; and by revealing the effects of values, beliefs, and the social construction of gender in intellectual inquiry.

The Minor is housed within the College of Liberal Arts, and its courses are offered by Art and Design, English, Ethnic Studies, History, Music, Philosophy, Political Science, Psychology and Human Development, Social Sciences, Speech Communication, Theatre and Dance, and Women's Studies.

## Required Courses (19)

|   | Units |
|---|-------|
| WS 301 Introduction to Women's Studies (USCP).....  | 4     |
| WS 401 Seminar in Women's Studies .....   | 4     |
| WS 411 Women in Cross-Cultural Perspective (D4b)  | 3     |
| WS/HIST 434 American Women's History to 1870 or<br>WS/HIST 435 American Women's History from<br>1870 (USCP) ..... | 4     |
| PSY 314 Psychology of Women or<br>SOC 311 Sociology of Gender .....   | 4     |

## Elective Courses .....

|   |   |
|---|---|
| Students select 9 units from the approved list of elective courses in consultation with their Women's Studies faculty adviser.  | 9 |
| ENGL 345 Women Writers (4) (C3) (USCP)  |   |
| ENGL The English Department offers topics courses, such as ENGL 439 Significant British Writers: Woman as Hero or the Novel of Female Development (4) and ENGL 459 Significant World Writers: Literature and the Goddess (4) which are approved as electives for the Women's Studies minor. See a Women's Studies adviser for topics courses. |   |
| ES 300 Chicano/a Literature (4) (C3) (USCP)   |   |
| ES 325 African American Women's Experiences (3) (USCP)  |   |
| MU 328 Women in Music (4) (C3)  |   |
| PHIL 336 Ethics, Gender and Society (3) (USCP)  |   |
| POLS 343 Civil Rights in America (4) (USCP)   |   |
| PSY 314 Psychology of Women (4)   |   |
| SOC 311 Sociology of Gender (4)   |   |
| SOC 351 Women in East Asia (4)  |   |
| SPC 370 Gender and Communication (4)  |   |
| TH 310 Women's Theatre (3) (C3)   |   |
| WS/ART 316 Women as Subject and Object in Art History (4)   |   |
| WS/HIST 434 American Women's History to 1870 (4)  |   |
| WS/HIST 435 American Women's History from 1870 (4) (USCP)   |   |



### **Nuclear Magnetic Resonance Spectrometer**

Mike Duarte, Chemistry senior, and Dr. Dane Jones, Professor of Chemistry, loading a sample into the high-field, pulsed nuclear magnetic resonance spectrometer. Darick Ding, Chemistry senior, works at the console.

Cal Poly is one of the first undergraduate schools in the country to have a high-field, pulsed nuclear magnetic resonance spectrometer. This instrument uses the same principle as that used in magnetic resonance imaging (MRI) and is the most powerful tool available for structure determination of all types of molecules, from biochemicals and simple organic compounds, to complex polymers.

The high-field, pulsed nuclear magnetic resonance spectrometer is used in industry and research, and by Cal Poly students in courses such as magnetic resonance spectroscopy, organic analysis, polymer chemistry, physical chemistry, and student research.

It was obtained with funds provided by the California State Lottery and the National Science Foundation, along with a gift from a local chemical company.

*Photo by Keith Selle.*

College of  
*Science*  
& *Mathematics*

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# College of Science and Mathematics

Faculty Offices East (25), Room 229  
(805) 756-2226

Philip S. Bailey, Dean  
Roxy L. Peck, Associate Dean

| Department:                        | Program:  |
|------------------------------------|---|
|                                    | Biotechnology: Minor  |
| Biological Sciences                | Biological Sciences: BS, MS<br>Ecology and Systematic Biology: BS<br>Microbiology: BS |
| Chemistry and Biochemistry         | Biochemistry: BS<br>Chemistry: BS   |
| Mathematics                        | Mathematics: BS, MS, Minor  |
| Physical Education and Kinesiology | Kinesiology: BS, MS   |
| Physics                            | Physical Science: BS<br>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 SCHOOL

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 Resource Committee has been established to assist students, regardless of their major, in all phases of their preparation. Please see Health Professions, page 37, 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 216, 217, 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.

| Core courses (14-16)                              | Units |
|---|-------|
| BIO 375/CHEM 375 Molecular Biology Laboratory ... | 2     |
| CHEM 474 Protein Laboratory Techniques .....      | 2     |
| BIO 351 Molecular Genetics <i>or</i>              |       |
| CHEM 373 Molecular Biology .....                  | 5-3   |
| ZOO 426 Serology and Immunology <i>or</i>         |       |
| CHEM 473 Immunochemistry.....                     | 4-3   |
| Choose remainder from following:.....             | 4-5   |
| BIO 352 Cell Biology (4)                          |       |
| BACT 402 General Virology (5)                     |       |
| BACT 424 Bacterial Cytology (5)                   |       |
| BOT 425 Plant Virology (5)                        |       |
| BOT 450 Plant Biotechnology (5)                   |       |
| <b>Restricted electives</b> .....                 | 6-11  |

### *Biochemistry Majors*

To be selected from the list of courses given below. The number of units taken from the Restricted Electives list, when added with the units earned in the Core Courses, must total at least 24 units.

ASCI 401; BACT 402, 421, 423, 424; BIO 311, 322, 324, 352; BOT 450; BRAE 448; CHEM 439, 477; DSCI 450; SCM 451; ZOO 433

### *Biological Science Majors*

Select one or more courses from Group A and one or more courses from Group B. The number of units taken from the Restricted Electives list, when added with the units earned in the Core Courses, must total at least 24 units.

#### Group A:

BIO 322, 324; BOT 450; BRAE 448; DSCI 450; SCM 451; BIO 432, 433

#### Group B:

BACT 402, 423; BIO 311; CHEM 231, 372, 477; BIO 433

### *Microbiology Majors*

To be selected from the list of courses given below. The number of units taken from the Restricted Electives list, when added with the units earned in the Core Courses, must total at least 24 units.

BACT 342; BIO 311, 322, 324; BOT 450; BRAE 448; CHEM 372, 439, 477; DSCI 450; SCM 451

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# BIOLOGICAL SCIENCES DEPARTMENT

Fisher Science Hall (33), Room 273  
 (805) 756-2788  
 Email address: [bio@calpoly.edu](mailto:bio@calpoly.edu)  
[www.calpoly.edu/~bio/BS\\_intro.html](http://www.calpoly.edu/~bio/BS_intro.html)

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## Faculty

### Department Chair, V. L. Holland

|                      |                       |
|----------------------|-----------------------|
| Frederick P. Andoli  | David J. Keil         |
| Leslie S. Bowker     | Christopher L. Kitts  |
| Robert J. Brown      | Anthony E. Knable     |
| Raul J. Cano         | George N. Knecht      |
| Jaime S. Colomé      | Mark Kubinski         |
| Alan F. Cooper       | Kingston L. Leong     |
| Alvin A. De Jong     | Elena Levine          |
| Douglas D. Donaldson | Mark A. Moline        |
| Susan L. Elrod       | Royden Nakamura       |
| Dennis F. Frey       | Maria E. Ortiz        |
| Roger D. Gambs       | Lee R. Parker         |
| David V. Grady       | Elizabeth K. Perryman |
| Michael T. Hanson    | Thomas L. Richards    |
| Dennis N. Homan      | Dirk R. Walters       |
| Peter Jankay         | Archie M. Waterbury   |
| Eric V. Johnson      | Michael A. Yoshimura  |

## Programs

### B.S. Biological Sciences

*Students may select an Individualized Course of Study or a Concentration in:*  
 Anatomy-Physiology  
 Biology

### B.S. Ecology and Systematic Biology

*Students may select an Individualized Course of Study or a Concentration in:*  
 Marine Biology and Fisheries  
 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 with an academic major in biological sciences leading to a credential 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 interested in 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 track 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 diversity 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****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 judicious selection of electives, the student will be academically prepared to apply for professional certification as a Fisheries Biologist by the American Fisheries Society.

**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 judicious selection of electives, the student will be academically prepared to apply for professional certification as an Associate Wildlife Biologist by the Wildlife Society.

**Individualized Course of Study**

This program allows students, in consultation with their advisers, the flexibility to design courses of study that prepare them for a diversity of career opportunities in ecology and systematic biology. Ecology stresses a broad understanding of the interactions of organisms with their environment; systematics stresses the identification and classification of living organisms. With this foundation, graduates may pursue careers in education, ecology, environmental impact analysis, environmental monitoring or management, museums, herbaria, zoos and botanical gardens. A graduate will be academically prepared for professional certification as an Associate Ecologist by the Ecological Society of America.

**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 Electives. Minimum of 60 units upper division required.*

|  | Units        |
|--|--------------|
| <b>MAJOR COURSES</b>   |              |
| * = Courses satisfy General Education requirement                    |              |
| BACT 221 General Bacteriology (E2)* .....                            | 4            |
| BIO 151 Introduction to Biology (B1b)* .....                         | 5            |
| BIO 152 Biology of Plants and Fungi (Area B)* .....                  | 5            |
| BIO 153 Biology of Animals (Area B)* .....                           | 5            |
| BIO 351 Principles of Genetics .....                                 | 5            |
| BIO 352 Cell Biology .....   | 4            |
| BIO 414 Evolution .....  | 4            |
| BIO 461 Senior Project .....   | 3            |
| <i>Technology. Select one course from:</i> .....                     | 2            |
| BIO 322, 324, 342, 353, 375, 475; BOT 450                            |              |
| <i>Ecology. Select one course from:</i> .....                        | 4            |
| BIO 325 or BOT 326 (Area B)*   |              |
| <i>Botany. Select one course from:</i> .....                         | 4            |
| BOT 223, 323, 335 (Area B)*  |              |
| <i>Zoology. Select one course from:</i> .....                        | 4            |
| ZOO 321, 322, 323, 329, 335, 336, 341, 425                           |              |
| <i>Physiology. Select one course from:</i> .....                     | 4            |
| BIO 431, 434, 435  |              |
| Concentration or individualized course of study<br>(see below) ..... | 27-30        |
|  | <b>80-83</b> |

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|  |           |
|--|-----------|
| CHEM 127 General Chemistry (B1a)* .....                          | 4         |
| CHEM 128 General Chemistry (Area B)* .....                       | 4         |
| CHEM 129 General Chemistry (Area B)* .....                       | 4         |
| MATH 120 Pre-Calculus Algebra and<br>Trigonometry (B2)* .....    | 5         |
| (MATH 118 & 119, or MATH 141 substitute)                         |           |
| PHYS 121 College Physics (Area B)* .....                         | 4         |
| PHYS 122 College Physics (Area B)* .....                         | 4         |
| PHYS 123 College Physics (Area B)* .....                         | 4         |
| STAT 218 Applied Statistics for the Life Sciences<br>(B2)* ..... | 4         |
| Computer literacy elective (F1)* .....                           | 3         |
| (CSC 110 or 113 recommended)                                     |           |
|  | <b>36</b> |

**GENERAL EDUCATION (GE)** ..... 45

A minimum of 72 units is required for GE; 27 of these units are in Major/Support; a minimum of 45 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.  
→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from each Area A category:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Major/Support.

- B1a Physical Sciences \*see Major
- B1b Life Sciences \*see Major
- B2 Mathematics and/or Statistics \*see Major
- Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

4 units are in Major.

- E2 Self Development \*see Major

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES** ..... 22-25

186

**CONCENTRATION OR INDIVIDUALIZED COURSE OF STUDY (select one)**

**Anatomy and Physiology Concentration**

|   |       |
|---|-------|
| CHEM 216 Organic Chemistry .....                  | 4     |
| CHEM 217 Organic Chemistry .....                  | 5     |
| CHEM 371 Biochemical Principles .....             | 5     |
| CHEM 372 Metabolism .....                         | 3     |
| Select three of the following courses: .....      | 12-13 |
| BIO 432 Vertebrate Systems Physiology             |       |
| BIO 433 Endocrinology and Reproductive Physiology |       |
| BIO 434 Environmental Physiology                  |       |
| ZOO 405 Vertebrate Development                    |       |
| ZOO 422 Functional Histology                      |       |

29-30

**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, 323, 333, 334, 335                |     |
| Zoology .....                              | 4   |
| ZOO 321, 322, 323, 329, 335, 336, 341, 425 |     |
| Anatomy/Physiology .....                   | 4-5 |
| BACT 424                                   |     |
| BIO 431, 432, 433, 434, 435                |     |
| BOT 335                                    |     |
| ZOO 240, 241                               |     |
| Organic Chemistry .....                    | 5   |
| CHEM 212 Survey of Organic Chemistry.      |     |
| CHEM 216 & 217 may be substituted.         |     |
| Biochemistry .....                         | 5   |
| CHEM 313 Survey of Biochemistry.           |     |
| CHEM 371 & 372 may be substituted.         |     |

Adviser approved electives ..... 6

28-29

**Individualized Course of Study**

|   |    |
|---|----|
| CHEM 212 Survey of Organic Chemistry .....  | 5  |
| CHEM 216 & 217 may be substituted.  |    |
| CHEM 313 Survey of Biochemistry .....   | 5  |
| CHEM 371 & 372 may be substituted.  |    |
| Adviser approved electives .....  | 17 |
| (13 units must be 300/400 level)  |    |
| To be selected with adviser approval from 200, 300, 400-level BACT, BIO, BOT, ZOO courses excluding BIO 220, 300, 302, 306. |    |

27

**B.S. ECOLOGY AND SYSTEMATIC BIOLOGY**

Courses are displayed by Major, Support, General Education, and Electives. Minimum of 60 units upper division required.

|   | Units        |
|---|--------------|
| <b>MAJOR COURSES</b>  |              |
| * = Courses satisfy General Education requirements  |              |
| BACT 221 General Bacteriology (E2)*.....  | 4            |
| BIO 151 Introduction to Biology (B1b)* .....  | 5            |
| BIO 152 Biology of Plants and Fungi (Area B)* .....   | 5            |
| BIO 153 Biology of Animals (Area B)* .....  | 5            |
| BIO 303 Survey of Genetics<br>or BIO 351 Principles of Genetics (Area B)*.....                                      | 3-5          |
| BIO 325 General Ecology or<br>BOT 326 Plant Ecology (Area B)* .....   | 4            |
| BIO 414 Evolution or<br>BIO 415 Biogeography.....   | 4            |
| BIO 431 General and Cellular Physiology or<br>BIO 434 Environmental Physiology or<br>BIO 435 Plant Physiology ..... | 4            |
| BIO 461 Senior Project .....  | 3            |
| BIO 462 Senior Project .....  | 2            |
| BOT 223 Introductory Plant Taxonomy (Area B)* .....   | 4            |
| BOT 333 Field Botany .....  | 4            |
| ZOO 335 General Entomology or<br>ZOO 336 Invertebrate Zoology.....  | 4            |
| ZOO 437 Animal Behavior .....   | 4            |
| Concentration courses or adviser approved electives<br>(see below) .....  | 20-26        |
|   | <b>75-83</b> |
| <b>SUPPORT COURSES</b>  |              |
| * = Courses satisfy General Education requirement   |              |
| <sup>1</sup> CHEM 127 General Chemistry (B1a)* .....  | 4            |
| CHEM 128 General Chemistry (Area B)* .....  | 4            |
| CHEM 212 Survey of Organic Chemistry (Area B)* ...  | 5            |
| FNR 403 Environmental Impact Analysis and Mgt or<br>FNR/LA 318 Applic of GIS in Natural Resources....               | 3            |
| <sup>2</sup> MATH 120 Pre-Calculus Algebra and Trig. (B2)* .....  | 5            |
| <sup>3</sup> PHYS 121 College Physics (Area B)* .....   | 4            |
| SS 121 Introductory Soil Science (F2)* .....  | 4            |
| STAT 218 Stat Methods in the Life Sciences (B2)* .....  | 4            |
| STAT 313 Applied Experimental Design and<br>Regression Models (Area B)* .....                                       | 4            |
| <sup>4</sup> Computer literacy elective (F1)* .....   | 3            |
| (CSC 110 or CSC 113 recommended)  |              |
|   | <b>40</b>    |

**GENERAL EDUCATION (GE) ..... 44**

A minimum of 72 units is required for GE; 28 of these units are in Major/Support; a minimum of 44 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from each Area A category:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Major/Support.

- B1a Physical Sciences \*see Major
- B1b Life Sciences \*see Major
- B2 Mathematics and/or Statistics \*see Major
- Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

4 units are in Major.

- E2 Self Development \*see Major

**Area F Technology** (no additional units required)

4 units are in Support.

- F2 Technology elective \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 19-27****186**

<sup>1</sup> CHEM 129 and 313 are recommended for students planning postgraduate training.

<sup>2</sup> MATH 118 and 119, or 141 will substitute.

<sup>3</sup> PHYS 122, 123 are recommended for students planning postgraduate training.

<sup>4</sup> Students are expected to have completed their computer literacy requirement by the end of their sophomore year.



**CONCENTRATION OR INDIVIDUALIZED COURSE OF STUDY (select one)**

**Marine Biology and Fisheries Concentration**

|   |   |
|---|---|
| BIO 328 Marine Biology or                     |   |
| BIO 334 Limnology.....                        | 4 |
| BOT 437 Phycology .....                       | 4 |
| ZOO 320 Fishery Resource Management or        |   |
| ZOO 423 Freshwater Fisheries Biology.....     | 4 |
| ZOO 322 Ichthyology.....                      | 4 |
| ZOO 436 Functional Invertebrate Zoology ..... | 4 |
| Select with adviser approval from: .....      | 4 |
| BIO 227, 328, 334, 435, 437, 444;             |   |
| FNR 203, 406;                                 |   |
| ZOO 320, 321, 341, 421, 423                   |   |

24

**Wildlife Biology Concentration**

|   |   |
|---|---|
| BIO 227 Wildlife Conservation Biology ..... | 4 |
| BIO 228 Wildlife Biology Laboratory.....    | 1 |
| BIO 327 Wildlife Biology Methods .....      | 5 |
| BIO 427 Wildlife Management .....           | 4 |
| ZOO 321 Mammalogy.....                      | 4 |
| ZOO 323 Ornithology .....                   | 4 |
| Select with adviser approval from: .....    | 4 |
| BIO 207, 334, 444;                          |   |
| FNR 203, 302, 406;                          |   |
| ZOO 341, 421                                |   |

*For students seeking certification, select FNR 203, 302, 406 in lieu of free electives.*

26

**Individualized Course of Study**

|  |     |
|--|-----|
| Choose one of the following.....         | 4-5 |
| BACT 342 Sanitary Microbiology (4)       |     |
| BACT 436 Microbial Ecology (5)           |     |
| BIO 328 Marine Biology (4)               |     |
| BIO 334 Limnology (4)                    |     |
| BOT 437 Phycology (4)                    |     |
| ZOO 320 Fishery Resource Management (4)  |     |
| ZOO 423 Freshwater Fisheries Biology (4) |     |
| Adviser approved electives.....          | 16  |

20-21

**B.S. MICROBIOLOGY**

Courses are displayed by Major, Support, General Education, and Electives. Minimum of 60 units upper division required.

|   | Units |
|---|-------|
| <b>MAJOR COURSES</b>  |       |
| * = Courses satisfy General Education requirement   |       |
| BACT 221 General Bacteriology (E2)* .....   | 4     |
| BACT 222 General Microbiology (AreaB)* .....  | 5     |
| BACT 402 General Virology .....   | 5     |
| BACT 421 Food Microbiology .....  | 4     |
| BACT 423 Medical Microbiology .....   | 5     |
| BACT 424 Microbial Physiology .....   | 5     |
| BIO 151 Introduction to Biology (B1b)* .....  | 5     |
| BIO 351 Principles of Genetics .....  | 5     |
| BIO/CHEM 375 Molecular Biology Laboratory .....   | 2     |
| BIO 461 Senior Project .....  | 3     |
| CHEM 127 General Chemistry (B1a)* .....   | 4     |
| CHEM 128 General Chemistry (Area B)* .....  | 4     |
| CHEM 129 General Chemistry (Area B)* .....  | 4     |
| <sup>1</sup> MATH 118 Pre-Calculus Algebra (B2)* .....  | 4     |
| PHYS 121 College Physics (Area B)* .....  | 4     |
| PHYS 122 College Physics (Area B)* .....  | 4     |
| PHYS 123 College Physics (Area B)* .....  | 4     |
| <sup>2</sup> STAT 218 Applied Statistics for the Life Sciences (B2)* .....  | 4     |
| ZOO 426 Serology and Immunology .....   | 4     |
| <sup>3</sup> Restricted electives .....   | 16    |
| To be selected in consultation with adviser.<br>Students are encouraged to select one of the following career tracks: Biotechnology, Medical Technology, Public Health, Applied Microbiology, Pre-Health Professions, and Postgraduate Studies. |       |
| <b>95</b>   |       |

**SUPPORT COURSES**

Courses to complete Career Track (select one track) (20-24 units)  
**Medical Technology and Public Health Microbiology Career Tracks (20):**  
 BIO 153, CHEM 212, 231, 313  
**Applied Microbiology, Biotechnology, Post-Graduate Studies, and Pre-Health Professions Career Tracks (24):**  
 CHEM 216, 217, 318, 371, 372, 374

**20-24**<sup>1</sup> MATH 119 or 120 will substitute.<sup>2</sup> MATH 141 will substitute.<sup>3</sup> To be selected with written consent of instructor based on choice of career track.**GENERAL EDUCATION (GE) ..... 48**

A minimum of 72 units is required for GE; 24 of these units are in Major/Support; a minimum of 48 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE course required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from each Area A category:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Major/Support.

B1a Physical Sciences \*see Major

B1b Life Sciences \*see Major

B2 Mathematics and/or Statistics \*see Major

Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

4 units are in Major.

E2 Self Development \*see Major

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

F1 Computer Literacy

F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 19-23****186**

## 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 Director of the Graduate and Research 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 .....                           | 4           | 4               |
| BIO 502 Biology of Organisms .....                       | 4           | 4               |
| BIO 503 Population Biology .....                         | 4           | 4               |
| 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 .....                   | 6           | 11              |
| Electives from 400- and 500-level courses .....          | 15          | 15              |
|  | 45          | 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 chair of the Biological Sciences Department or with the Director of the Graduate and Research Committee.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Bacteriology, Biology, Botany, Zoology and other subjects.

# CHEMISTRY AND BIOCHEMISTRY DEPARTMENT

Faculty Offices East Bldg. (25), Room 125B  
(805) 756-2693

## Faculty

### Department Chair, Albert C. Censullo

|                     |                          |
|---------------------|--------------------------|
| Linda Atwood        | John F. Marlier          |
| Christina A. Bailey | John C. Maxwell          |
| Philip S. Bailey    | Neil J. Moir             |
| Robert S. Cichowski | Margaret (Peggy) S. Rice |
| Lee C. Coombs       | William C. Rife          |
| Norman L. Eatough   | Mary (Sam) N. Rigler     |
| Leland S. Endres    | Rod W. Schoonover        |
| Thomas G. Frey      | Michael G. Silvestri     |
| John W. F. Goers    | Jan W. Simek             |
| Ralph A. Jacobson   | Russell L. Tice          |
| Dane R. Jones       | Nanine A. Van Draanen    |
| David L. Keeling    | James D. Westover        |
| Martin A. Kellerman | Max T. Wills             |
| Kevin B. Kingsbury  |                          |

## Programs

### B.S. Biochemistry

*Students may select Advanced Electives or Concentration in:*  
Polymers and Coatings

### B.S. Chemistry

*Students may select Advanced Electives or Concentration in:*  
Polymers and Coatings

The Chemistry and Biochemistry 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 and Biochemistry Department provides curricula leading to the Bachelor of Science in Chemistry, the Bachelor of Science in Chemistry with a concentration in Polymers and Coatings, the Bachelor of Science in Biochemistry, and the Bachelor of Science in Biochemistry with a concentration in Polymers and Coatings. 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 clinical chemistry, environmental

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 or biochemistry 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.

**B.S. CHEMISTRY**

Courses are displayed by Major, Support, General Education, and Electives. Minimum of 60 units upper division required.

**MAJOR COURSES**

Units

\* = Courses satisfy General Education requirement

|   |    |
|---|----|
| CHEM 127 General Chemistry (B1a)* .....   | 4  |
| CHEM 128 General Chemistry .....  | 4  |
| CHEM 129 General Chemistry .....  | 4  |
| CHEM 156 General Chemistry Laboratory .....   | 1  |
| CHEM 216 Organic Chemistry I (Area B)* .....  | 4  |
| CHEM 217 Organic Chemistry II .....   | 5  |
| CHEM 231 Quantitative Analysis I .....  | 5  |
| CHEM 318 Organic Chemistry III .....  | 5  |
| CHEM 332 Quantitative Analysis II .....   | 3  |
| CHEM 351 Physical Chemistry I .....   | 3  |
| CHEM 352 Physical Chemistry II .....  | 3  |
| CHEM 353 Physical Chemistry III .....   | 3  |
| CHEM 354 Physical Chemistry Laboratory .....  | 2  |
| CHEM 357 Physical Chemistry III Laboratory .....  | 1  |
| CHEM 359 Chemical Literature .....  | 2  |
| CHEM 439 Instrumental Analysis .....  | 5  |
| CHEM 459 Undergraduate Seminar .....  | 2  |
| CHEM 461 Senior Project .....   | 2  |
| CHEM 481 Inorganic Chemistry .....  | 3  |
| CHEM 483 Inorganic Synthesis .....  | 1  |
| Advanced adviser approved chemistry electives to complete major, or concentration ..... | 18 |

**80****SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |       |
|---|-------|
| BIO 101/BIO 151/BOT 121/ZOO 131 (B1b)* .....  | 3/4   |
| CSC 110 Computers and Computer Applications or<br>CSC 113 Computers and Computer Applications:<br>Macintosh (F1)* ..... | 3     |
| MATH 141, 142, 143 Calculus I, II, III (B2)(Area B)* ...  | 4,4,4 |
| MATH 241 Calculus IV (B2)(Area B)* .....  | 4     |
| MATH 242 or 200-400 level STAT or CSC course .....  | 4     |
| PHYS 131 General Physics (Area B)* .....  | 4     |
| PHYS 132 General Physics (Area B)* .....  | 4     |
| PHYS 133 General Physics (Area B)* .....  | 4     |
| Physics elective (200-level and above except<br>PHYS 215) .....   | 3     |

**41-42****GENERAL EDUCATION (GE)****49**

A minimum of 72 units is required for GE; 23 of these units are in Major/Support; a minimum of 49 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE course required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from each Area A category:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Major/Support.

- B1a Physical Sciences \*see Major
- B1b Life Sciences \*see Major
- B2 Mathematics and/or Statistics \*see Major
- Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES**..... **15-16****186****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 210 Materials Engineering .....               | 3 |

**18**

**B.S. BIOCHEMISTRY**

Courses are displayed by Major, Support, General Education, and Electives. Minimum of 60 units upper division required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|   |      |
|---|------|
| CHEM 127 General Chemistry (B1a)* .....   | 4    |
| CHEM 128 General Chemistry (Area B)* .....  | 4    |
| CHEM 129 General Chemistry (Area B)* .....  | 4    |
| CHEM 216 Organic Chemistry I (Area B)* .....  | 4    |
| CHEM 217 Organic Chemistry II (Area B)* .....   | 5    |
| CHEM 231 Quantitative Analysis I (Area B)* .....  | 5    |
| CHEM 318 Organic Chemistry III .....  | 5    |
| CHEM 359 Chemical Literature.....   | 2    |
| CHEM 351 Physical Chemistry I (Area B)* .....   | 3    |
| CHEM 352 Physical Chemistry II .....  | 3    |
| CHEM 353 Physical Chemistry III .....   | 3    |
| CHEM 354 Physical Chemistry Laboratory.....   | 2    |
| CHEM 371 Biochemical Principles (Area B)*.....  | 5    |
| CHEM 372 Metabolism (Area B)* .....   | 3    |
| CHEM 373 Molecular Biology .....  | 3    |
| Select at least one from:   |      |
| CHEM 374, 375, 474 .....  | 2    |
| Select at least one from:   |      |
| CHEM 374, 375, 439 <sup>1</sup> , 474, BIO 432 <sup>1</sup> .....                           | 2    |
| CHEM 459 Undergraduate Seminar .....  | 2    |
| CHEM 461 Senior Project .....   | 2    |
| Advanced adviser approved electives to complete<br>Biochemistry major or concentration..... | 8-18 |

**71-81**

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |       |
|---|-------|
| BIO 151 Introduction to Biology (B1b)* .....  | 5     |
| CSC 110 Computers and Computer Applications or<br>CSC 113 Computers and Computer Applications:<br>Macintosh (F.1.)* ..... | 3     |
| MATH 141, 142, 143 Calculus I, II, III (B2)* .....  | 4,4,4 |
| PHYS 121, 122, 123 College Physics or<br>PHYS 131, 132, 133 General Physics (Area B)* ...                                 | 4,4,4 |
| Life science elective<br>(BACT 221 or 300-level) (B1a)*.....  | 3     |

**35**

**GENERAL EDUCATION (GE)**

**49**

A minimum of 72 units is required for GE; 23 of these units are in Major; a minimum of 49 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE course required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (no additional units required)

20 units are in Major/Support.

- B1a Physical Sciences \*see Major
- B1b Life Sciences \*see Major
- B2 Mathematics and/or Statistics \*see Major
- Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

3 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES**..... **21-31**

**186**

**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 210 Materials Engineering .....              | 3 |

**18**

<sup>1</sup> Excess units will count as approved Chemistry electives.

# MATHEMATICS DEPARTMENT

Faculty Offices East Bldg. (25), Room 208  
(805) 756-2206  
www.calpoly.edu/~math/

## Faculty

### Department Chair, Thomas E. Hale

|                     |                        |
|---------------------|------------------------|
| Steven J. Agronsky  | Euel W. Kennedy        |
| Estelle L. Basor    | Martin T. Lang         |
| Michael R. Colvin   | George M. Lewis        |
| H. Arthur DeKleine  | George W. Luna         |
| James E. Delany     | Jean M. McDill         |
| Gary M. Epstein     | Kent E. Morrison       |
| Gerald P. Farrell   | James R. Mueller       |
| Jack E. Girolo      | Paul F. Murphy         |
| D. Edward Glassco   | Thomas D. O'Neil       |
| Stuart Goldenberg   | Linda J. Patton        |
| Harvey C. Greenwald | Don P. Rawlings        |
| Donald G. Hartig    | H. Bernard Strickmeier |
| Alan W. Holz        | Raymond D. Terry       |
| J. Myron Hood       | John Van Eps           |
| Kempton L. Huehn    | Robin Ward             |
| Rex L. Hutton       | Stephen T. Weinstein   |
| Goro C. Kato        | Robert S. Wolf         |

## 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. 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 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.

## 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>Units</i> |
|--|--------------|
| <b>I. Required courses</b> .....   | 8            |
| MATH 206 Linear Algebra I (4)  |              |
| MATH 248 Methods of Proof in Mathematics (4)                                   |              |
| <b>II. Complete at least two of the following tracks</b> .....                 | 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 (4)  |              |
| MATH 336 Combinatorial Mathematics (4)   |              |
| MATH 437 Game Theory (4)   |              |
| 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 (4)                                       |              |
| MATH 432 Mathematical Optimization II (4)                                      |              |
| 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)   |              |
| <b>III. Mathematics electives</b> .....  | 6            |

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 30

**B.S. MATHEMATICS**

Courses are displayed by Major, Support, General Education, and Electives. Minimum of 60 units upper division required.

|   | Units        |
|---|--------------|
| <b>MAJOR COURSES</b>                                |              |
| * = Courses satisfy General Education requirement   |              |
| MATH 141 Calculus I (B2)* .....                     | 4            |
| MATH 142 Calculus II (Area B)* .....                | 4            |
| MATH 143 Calculus III (Area B)* .....               | 4            |
| MATH 202 Orientation to the Mathematics Major ..... | 1            |
| MATH 206 Linear Algebra I (Area B)* .....           | 4            |
| MATH 241 Calculus IV (Area B)* .....                | 4            |
| MATH 242 Differential Equations (Area B)* .....     | 4            |
| MATH 248 Methods of Proof in Mathematics .....      | 4            |
| MATH 336 Combinatorial Mathematics .....            | 4            |
| MATH 412 Advanced Calculus I .....                  | 4            |
| MATH 459 Undergraduate Seminar .....                | 4            |
| MATH 461 Senior Project .....                       | 2            |
| MATH 462 Senior Project .....                       | 2            |
| MATH 481 Modern Algebra I .....                     | 4            |
| <sup>1</sup> Advanced Work in Major .....           | 20-28        |
|   | <b>69-77</b> |

**SUPPORT COURSES**

|  |              |
|--|--------------|
| * = Courses satisfy General Education requirement                            |              |
| CSC 101 Fundamentals of Computer Science I (F1)* ..                          | 4            |
| CSC 102 Fundamentals of Computer Science II .....                            | 4            |
| <sup>2</sup> CSC 103/MATH 300/MATH 350 .....                                 | 3            |
| PHYS 131 General Physics (B1a)* .....  | 4            |
| PHYS 132 General Physics (Area B)* .....                                     | 4            |
| PHYS 133 General Physics (Area B)* .....                                     | 4            |
| STAT 321 Probability and Statistics for Engineers and Scientists (B2)* ..... | 4            |
| STAT 322 Statistical Analysis for Engineers and Scientists .....             | 4            |
| <sup>1</sup> Advanced Work in Support .....                                  | 8-0          |
|  | <b>39-31</b> |

<sup>1</sup> Advanced Work in Major and Support are to total 28 units.

<sup>2</sup> Students planning to seek the Single Subject Credential in Mathematics should take MATH 300, 341, 419, 442, and 443.

**GENERAL EDUCATION (GE) ..... 50**

A minimum of 72 units is required for GE; 22 of these units are in Major; a minimum of 48 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE course required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 2 units)

18 units are in Major.

Take one course from B1b:

- B1a Physical Sciences \*see Major
- B1b Life Sciences elective
- B2 Mathematics and/or Statistics \*see Major
- Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3)

No more than one course in any Area E category.

Take one course from E1 or E2

- E1 PSY 201/PSY 202
- E2 Self Development

**Area F Technology** (no additional units required)

4 units are in Support.

- F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional course from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES ..... 30**



**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 (4) (4)

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 (4),  
MATH 437 Game Theory (4)
- 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 333, 417, 419, 433, 470

**Additional electives in Support. Select from:**

- CSC 361
- IME 301, 305
- PHYS 301, 405, 408
- STAT 425, 426, 427

**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> |
|--|--------------|
| <b>Required courses</b> .....  | 24           |
| MATH 540 Introduction to Topology (4)  |              |
| MATH 550 Real Analysis (4)   |              |
| MATH 560 Field Theory (4)  |              |
| <i>Complete one of the following two tracks:</i>                                       |              |
| MATH 520, 521, 522 Applied Analysis I, II, III (12)                                    |              |
| MATH 530, 531, 532 Graduate Discrete Mathematics with Applications I, II, III (12)     |              |
| <b>MATH, CSC, STAT electives</b> .....   | 12           |
| Select 400–500 level MATH, CSC, or STAT courses as approved by the advising committee. |              |
| <b>Electives</b> .....   | 9            |
| Select additional units at the 400 or 500 level as approved by the advising committee. |              |
| <b>Satisfactorily complete the comprehensive examinations.</b>                         | —            |
|  | 45           |

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# PHYSICAL EDUCATION AND KINESIOLOGY DEPARTMENT

Physical Education Bldg. (43), Room 453  
 (805) 756-2545  
[www.calpoly.edu/~pek/](http://www.calpoly.edu/~pek/)

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## Faculty

### Department Head, Dwayne G. Head

|                     |                    |
|---------------------|--------------------|
| Doris Acord         | Kellie G. Hall     |
| C. Andrea Brown     | Raymond Nakamura   |
| Steven C. Davis     | Andrew J. Proctor  |
| Gerald E. DeMers    | Michael A. Sutliff |
| Rafael F. Escamilla | James L. Webb      |
| Sonja S. Glassmeyer |                    |

## Programs

### B.S. Kinesiology

*Students may select Individualized Course of Study or a Concentration in:*  
 Commercial/Corporate Health Promotion  
 Health Education  
 Pre-Physical Therapy  
 Teaching

### M.S. Kinesiology

The Physical Education and Kinesiology Department offers undergraduate and graduate degree programs in kinesiology. 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 Kinesiology is a broad based program offering students curricular choices for a wide range of career opportunities. Concentrations include teaching, health education, commercial/corporate health promotion, and pre-physical therapy. Students also have the option of choosing an individualized course of study.

## CURRICULAR CONCENTRATIONS

### Commercial/Corporate Health Promotion

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: worksite health promotion in public, private and

governmental fitness facilities; and various clinical 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 dysfunction's 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. KINESIOLOGY**

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 |
|---|-------|
| <b>MAJOR COURSES</b>  |       |
| KINE 206–KINE 229 Professional Activity.....                            | 8     |
| KINE 218 Aquatics .....   | 2     |
| KINE 250 Health Education.....  | 2     |
| KINE 252 Introduction to Athletic Training .....                        | 2     |
| KINE 280 Responding to Emergencies: First Aid/CPR .                     | 3     |
| KINE 302 Mechanical Kinesiology .....                                   | 4     |
| KINE 303 Physiology of Exercise .....                                   | 4     |
| KINE 307 Adapted Physical Activity for Special Populations .....        | 4     |
| KINE 317 Computer Applications in Kinesiology.....                      | 3     |
| KINE 319 Measurement and Evaluation in Kinesiology .....                | 4     |
| KINE 401 Managing Physical Education and Health Promotion Programs..... | 3     |
| KINE 402 Motor Learning and Control.....                                | 4     |
| KINE 404 Motor Development.....   | 3     |
| KINE 411 Psycho/Social Aspects of Physical Activity..                   | 3     |
| KINE 461 Senior Project.....  | 2     |
| KINE 462 Senior Project.....  | 1     |
| Concentration courses (see below) .....                                 | 37-41 |

89-93

**SUPPORT COURSES**

\* = Courses satisfy General Education requirement

|   |     |
|---|-----|
| CHEM 111 General Chemistry or CHEM 127 General Chemistry (B1a)*.....  | 5   |
| ENGL 310/ENGL 315/ENGL 318 (Students in Teaching Concentration must take ENGL 315).....                             | 4   |
| FSN 210 Nutrition (Area E)* .....   | 3   |
| MATH 118 or MATH 116 and MATH 117 (B2)*.....  | 4   |
| PSY 201/PSY 202 General Psychology (E1)*.....   | 3   |
| STAT 217 Applied Statistics for Liberal Arts (B2)* or STAT 218 Applied Statistics for the Life Sciences (B2)* ..... | 4   |
| ZOO 131 or BIO 101 or BIO 151 (B1b)* .....  | 4   |
| ZOO 240, ZOO 241 Human Anatomy and Physiology (Area B)* .....   | 5,5 |
| ZOO 340 Human Muscle Anatomy .....  | 1   |

38

**GENERAL EDUCATION (GE) ..... 46**

A minimum of 72 units is required for GE; 26 of these units are in Support; a minimum of 46 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE course required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

- A1 Expository Writing
- A2 Critical Thinking
- A3 Speech

If less than 11 units, take one additional course in:

- A4 Argumentative Writing

**Area B Science & Mathematics** (no additional units required)

20 units are in Support.

- B1a Physical Sciences \*see Major
- B1b Life Sciences \* see Support
- B2 Mathematics and/or Statistics \*see Major
- Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

- C1 Literature
- C1 Philosophy
- C2 Fine/Performing Arts
- C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

- D1a HIST 202 (USCP) or HIST 204 or LS 211
- D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

- D2 History (300-400 level)
- D3 Economics
- D4a Social Institutions
- D4b Social Institutions (300-400 level)

**Area E Life Understanding** (no additional units required)

6 units are in Support.

- E1 PSY 201/PSY 202 \*see Support
- Area E \*see Support

**Area F Technology** (minimum 2 units)

Take one course from F1 or F2

- F1 Computer Literacy
- F2 Technology elective

**Additional GE Courses**

To complete 72-unit requirement, select additional course from Areas A, C, D. No more than one additional course per area.

**ELECTIVES..... 9-13**

**CONCENTRATIONS (select one)**

**Commercial/Corporate Health Promotion**

|   |    |
|---|----|
| KINE 408 Exercise & Health Promo for Senior Adults  | 3  |
| KINE 434 Exercise Prescription .....  | 3  |
| KINE 445 Electrocardiography .....  | 3  |
| KINE 450 Worksite Health Promotion Programs.....  | 3  |
| KINE 451 Nutrition for Fitness and Sport .....  | 3  |
| KINE 452 Testing & Exercise Prescription for Fitness Specialists .....                          | 3  |
| KINE 463 Commercial/Corporate Health Promotion or KINE 485/KINE 495 Cooperative Ed Experience . | 3  |
| CHEM 212 Survey of Organic Chemistry.....   | 5  |
| CHEM 313 Survey of Biochemistry & Biotechnology..   | 5  |
| BUS 178 Intro. to Human Relations in Business.....  | 3  |
| BUS 271 Principles of Management .....  | 3  |
| SPC 301 Business and Professional Communication ..  | 4  |
| <hr/>   |    |
|   | 41 |

**Health Education Concentration**

|   |    |
|---|----|
| KINE 305 Drug Education .....                       | 2  |
| KINE 354 School Health Programs.....                | 2  |
| KINE 405 Administration of Health Education .....   | 2  |
| KINE 408 Exercise & Health Promotion Senior Adults  | 3  |
| KINE 450 Worksite Health Promotion Programs.....    | 3  |
| KINE 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 302 Human Genetics.....                         | 3  |
| FSN 310 Maternal and Child Nutrition.....           | 3  |
| PSY 459 Lifespan Theories .....                     | 4  |
| PSY 205 Human Sexuality .....                       | 3  |
| Adviser approved electives.....                     | 2  |
| <hr/>   |    |
|   | 38 |

**Teaching Concentration**

|  |    |
|--|----|
| KINE 209 Creative and Non-Traditional Games .....                                  | 1  |
| KINE 215 Field Sports .....  | 2  |
| KINE 275 Sports Officiating.....   | 2  |
| KINE 276 Athletic Coaching Theory .....  | 3  |
| KINE 296 Planning Techniques in Physical Education                                 | 3  |
| KINE 354 School Health Programs.....   | 2  |
| KINE 356 Teaching Gymnastics .....   | 2  |
| KINE 384 Water Safety Instructor.....  | 3  |
| KINE 419 Curriculum &Prog Content in Elementary PE                                 | 3  |
| KINE 421 Strategies for Teaching Physical Education .                              | 3  |
| KINE 422 Teaching Elementary Physical Education....                                | 2  |
| KINE 423 Teaching Secondary Physical Education....                                 | 3  |
| KINE 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 |
| KINE 400, 408, 432,434, 437, 445                        |    |
| BACT 221  |    |
| CHEM 326  |    |
| PSY 317, 405  |    |
| <hr/>   |    |
|   | 37 |

**MASTER OF SCIENCE DEGREE IN KINESIOLOGY**

**General Characteristics**

The degree program is designed to offer advanced study in kinesiology 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 Kinesiology. This emphasis prepares students to work in the health promotion field in diversified settings, including corporate, club, private, and governmental agencies. 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 Kinesiology should have an undergraduate degree in Kinesiology 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 and Kinesiology Program.

### Classified Standing

For admission to classified standing, an applicant must have an undergraduate major in kinesiology 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 Kinesiology.

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. KINESIOLOGY

|  | Units  |
|--|--|
| <b>Required courses</b> .....  | 19   |
| KINE 515 Behavior and Communication in a Health and Physical Education Setting (3) |  |
| KINE 517 Research Methods in Kinesiology (3)                                       |  |
| KINE 519 Evaluation of Current Studies (3)   |  |
| KINE 522 Biomechanics (3)  |  |
| KINE 525 Human Performance and Learning (3)  |  |
| KINE 530 Advanced Physiology of Exercise (4)                                       |  |
| <b>Area of Emphasis</b> .....  | 12/16  |
| <i>Exercise and Health Promotion Emphasis (16)</i>                                 |  |
| KINE 503 Seminar in Adult Wellness (3)   |  |
| KINE 504 Cardiopulmonary Physiology, Pathology and Exercise (3)                    |  |
| KINE 514 Health Education Planning (3)   |  |
| KINE 516 Management of Health Promotion in the Workplace (3)                       |  |
| KINE 536 Advanced Electrocardiography (4)  |  |
| <i>Human Movement and Sport Emphasis (12)</i>                                      |  |
| KINE 502 Current Trends and Issues in Physical Education (3)                       |  |
| KINE 511 Administration of Physical Education and Athletics (3)                    |  |
| KINE 526 Sport in American Society (3)   |  |
| KINE 539 Observation, Development and Analysis of Teaching (3)                     |  |
| <b>Electives to be selected with adviser's approval</b> ....                       | 14/10  |
|  | <hr style="width: 100px; margin-left: auto; margin-right: 0;"/> 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  
[www.calpoly.edu/~phys](http://www.calpoly.edu/~phys)

## Faculty

### Chair, Richard A. Saenz

|                       |                          |
|-----------------------|--------------------------|
| Lawrence H. Balthaser | Randall D. Knight        |
| Joseph C. Boone       | John Mottmann            |
| Ronald F. Brown       | Kenneth S. Ozawa         |
| Anthony J. Buffa      | Ralph A. Peters          |
| David H. Chipping     | John E. Poling           |
| Gayle Cook            | David M. Roach           |
| Robert H. Dickerson   | 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         |

## Programs

### B.S. Physics

*Students may select Advanced Physics Electives or a Concentration in:*  
 Electronics  
 Electro-optics

### B.S. Physical Science

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 serve students who plan to enter another field in which a physical science background would be useful. The program provides students an interdisciplinary mix of courses in physics, chemistry, astronomy, and geology. Students intending to do graduate study in either chemistry or physics should elect a chemistry or physics major. The Physical Science degree program is administered jointly by the Chemistry and Biochemistry Department and the Physics Department.

**B.S. PHYSICS**

Courses are displayed by Major, Concentration, General Education, and Electives. Minimum of 60 units upper division required.

**MAJOR COURSES**

\* = Courses satisfy General Education requirement

|  | Units |
|--|-------|
| PHYS 131 General Physics (Area B)* .....                                 | 4     |
| PHYS 132 General Physics (Area B)* .....                                 | 4     |
| PHYS 133 General Physics (Area B)* .....                                 | 4     |
| PHYS 202 Physics on the Computer .....                                   | 4     |
| PHYS 206 Instrumentation in Experimental Physics ...                     | 3     |
| PHYS 211 Modern Physics I .....  | 4     |
| PHYS 212 Modern Physics II .....   | 3     |
| PHYS 256 Electrical Measurements Laboratory .....                        | 1     |
| PHYS 301 Thermal Physics I .....   | 3     |
| PHYS 302 Analytical Mechanics I .....                                    | 3     |
| PHYS 303 Analytical Mechanics II .....                                   | 3     |
| PHYS 323 Optics .....  | 5     |
| PHYS 340 Quantum Physics Laboratory I .....                              | 1     |
| PHYS 341 Quantum Physics Laboratory II .....                             | 1     |
| PHYS 342 Quantum Physics Laboratory III .....                            | 2     |
| PHYS 363 Undergraduate Seminar .....                                     | 2     |
| PHYS 405 Quantum Mechanics I .....                                       | 4     |
| PHYS 408 Electromagnetic Fields and Waves I .....                        | 4     |
| PHYS 461 Senior Project .....  | 2     |
| PHYS 462 Senior Project .....  | 2     |
| CHEM 127 General Chemistry (B1a) * .....                                 | 4     |
| CHEM 128 General Chemistry (Area B) * .....                              | 4     |
| CSC 101/243 (F1) * (CSC 101 recommended) .....                           | 4     |
| MATH 141 Calculus I (B2) * .....   | 4     |
| MATH 142 Calculus II (Area B)* .....                                     | 4     |
| MATH 143 Calculus III (Area B)* .....                                    | 4     |
| MATH 241 Calculus IV (Area B)* .....                                     | 4     |
| MATH 242 Differential Equations (Area B)* .....                          | 4     |
| MATH 304 Vector Analysis (B2) * .....                                    | 4     |
| MATH 318 Advanced Engineering Mathematics .....                          | 4     |
| Advanced Physics electives or Concentration<br>courses (see below) ..... | 20-21 |

**119-120**

**GENERAL EDUCATION (GE) ..... 50**

A minimum of 72 units is required for GE; 22 of these units are in Major; a minimum of 50 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3.

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 2 units)

18 units are in Major.

Take one course from B1b:

B1a Physical Sciences \*see Major

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Major

Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

4 units in Major.

F1 Computer Literacy \*see Major

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 16-17**

**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 424 or MATH 418.

In addition, select courses at the 300 or 400 level with the prefixes PHYS, MATH, STAT or CSC. At least 9 of these elective units must have the PHYS prefix. All courses must be taken for a letter grade.

For students anticipating an industrial career  
PHYS 357, 412, 413, 423, and 452 are suggested electives.

For students anticipating graduate work in physics  
PHYS 401, 406, 424, and MATH 408 are suggested electives. In addition, PHYS 357 is suggested for students who anticipate becoming experimental physicists.

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 20
**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 |

**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 |



**B.S. PHYSICAL SCIENCE**

Courses are displayed by Major, Support, General Education, and Electives. Minimum of 60 units upper division required.

|   | Units      |
|---|------------|
| <b>MAJOR COURSES</b>  |            |
| * = Courses satisfy General Education requirement   |            |
| ASTR 301 The Solar System or<br>Astronomy and/or earth science adviser approved<br>elective .....       | 3<br>4     |
| CHEM 127, 128, 129 General Chemistry (B1a)* .....   | 4,4,4      |
| CHEM 351 Biophysical Chemistry or<br>CHEM 305 Physical Chemistry (Area B)* .....                        | 3<br>3     |
| <sup>1</sup> CHEM 216 Organic Chemistry or<br>CHEM 212 Organic Chemistry (Area B)* .....                | 5<br>5     |
| <sup>1</sup> CHEM 313 Survey of Biochemistry or<br>CHEM 371 Biochemical Principles (Area B)* .....      | 5<br>5     |
| Chemistry adviser approved elective .....   | 4          |
| GEOL 201 Physical Geology (Area B)* .....   | 3          |
| Physical sciences adviser approved elective (300–<br>400 level) .....                                   | 9          |
| <sup>1</sup> PHYS 131, 132, 133 General Physics or<br>PHYS 121, 122, 123 College Physics (Area B)* .... | 4,4,4<br>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          |
|   | <b>72</b>  |

**SUPPORT COURSES**

|  |           |
|--|-----------|
| * = Courses satisfy General Education requirement  |           |
| CSC 110 or CSC 113 (F1) * .....                    | 3         |
| MATH 141, 142, 143 Calculus I, II, III (B2)* ..... | 4,4,4     |
| MATH/CSC/STAT 200-level electives.....             | 8         |
|  | <b>23</b> |

<sup>1</sup> A choice of the PHYS 121, 122, 123 sequence or CHEM 212 or CHEM 313 restricts the Physics and Chemistry electives available to the student later in this program.

**GENERAL EDUCATION (GE) ..... 51**

A minimum of 72 units is required for GE; 21 of these units are in Major; a minimum of 49 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 2 units)

18 units are in Major.

Take one course from B1b:

B1a Physical Sciences \*see Major

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Major

Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

3 units are in Support.

F1 Computer Literacy \*see Support

**Additional GE Courses** (minimum 5 units)

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES..... 40**

# STATISTICS DEPARTMENT

**Faculty Offices East (25), Room 107D  
(805) 756-2709**

## Faculty

**Department Chair, Robert K. Smidt**

James C. Daly  
Jay L. Devore  
John E. Groves  
Y. Leon Maksoudian  
Roxy L. Peck

John M. Rogers  
Andrew A. Schaffner  
Kent D. Smith  
Sing-Chou Wu

## 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

|  | <i>Units</i> |
|--|--------------|
| <b>Select one of the following introductory sequences ....</b>   | <b>8–9</b>   |
| <ul style="list-style-type: none"> <li>• STAT 217 Applied Statistics for the Liberal Arts (4) and STAT 313 Applied Experimental Design and Regression Models (4)</li> <li>• STAT 218 Applied Statistics for the Life Sciences (4) and STAT 313 (4)</li> <li>• STAT 221 Introduction to Probability and Statistics (5) and STAT 313 (4)</li> <li>• STAT 251 Statistical Inference for Mgmt. I (4) and STAT 252 Statistical Inference for Mgmt. II (4)</li> <li>• STAT 321 Probability and Statistics for Engineers and Scientists (4) and STAT 322 Statistical Analysis for Engineers and Scientists (4)</li> </ul> |              |
| <b>Required of all minors .....</b>  | <b>4</b>     |
| <ul style="list-style-type: none"> <li>• STAT 330 Statistical Uses of Computers (4)</li> </ul>   |              |
| <b>Select one from the following .....</b>   | <b>4</b>     |
| <ul style="list-style-type: none"> <li>• STAT 323 Design and Analysis of Experiments I (4)</li> <li>• STAT 324 Applied Regression Analysis (4)</li> </ul>  |              |
| <b>Select two 400-level STAT courses .....</b>   | <b>6-8</b>   |
| <b>Select one course</b> from outside the Statistics Department, with the approval of the Statistics Department Minor Coordinator, that has substantial statistical applicability .....  | <b>3-4</b>   |
|  | <b>25-29</b> |

**B.S. STATISTICS**

Courses are displayed by Major, Support, General Education, and Electives. Minimum of 60 units upper division required.

|  | Units   |
|--|---|
| <b>MAJOR COURSES</b>   |   |
| * = Courses satisfy General Education requirement                                |   |
| CSC 342 Numerical Analysis I .....   | 3   |
| MATH 141 Calculus I (B2)* .....  | 4   |
| MATH 142 Calculus II (B2)* .....   | 4   |
| MATH 143 Calculus III (Area B)* .....  | 4   |
| MATH 206 Linear Algebra I (Area B)* .....  | 4   |
| MATH 241 Calculus IV (Area B)* .....   | 4   |
| STAT 321 Probability and Statistics for Engineers and Scientists (Area B)* ..... | 4   |
| STAT 322 Statistical Analysis for Engineers and Scientists (Area B)* .....       | 4   |
| STAT 323 Design and Analysis of Experiments I .....                              | 4   |
| STAT 324 Applied Regression Analysis .....                                       | 4   |
| STAT 330 Statistical Uses of Computers .....                                     | 4   |
| STAT 425 Probability Theory .....  | 4   |
| STAT 426 Estimation and Sampling Theory .....                                    | 4   |
| STAT 427 Mathematical Statistics .....   | 4   |
| STAT 461 Senior Project .....  | 2   |
| STAT 462 Senior Project .....  | 2   |
| STAT 463 Undergraduate Seminar .....   | 2   |
| Statistics electives (400 level) .....   | 12  |
|  | <hr style="width: 100%; border: 0.5px solid black;"/> |
|  | 73  |

**SUPPORT COURSES**

|   |   |
|---|---|
| * = Courses satisfy General Education requirement   |   |
| CSC 101 Fundamentals of Computer Science or CSC 110 Computers and Computer Applications: Windows (F1)* .....  | 4   |
| CSC 102 Fundamentals of Computer Science or CSC 234 C and UNIX .....  | 3   |
| MATH 248 Methods of Proof in Mathematics .....  | 4   |
| MATH electives to be selected with adviser's approval from: MATH 242, 306, 335, 336, 406, 412, 431, 437. .... | 8   |
| Adviser approved technical electives .....  | 12  |
|   | <hr style="width: 100%; border: 0.5px solid black;"/> |
|   | 31  |

**GENERAL EDUCATION (GE) ..... 53**

A minimum of 72 units is required for GE; 19 of these units are in Major; a minimum of 56 units is required to satisfy remaining GE requirements.

→See page 77 for complete GE course listing.

→Minimum of 3 GE courses required at the 300-400 level.

**Area A Communication** (minimum 11 units)

Take one course from A1, A2, A3:

A1 Expository Writing

A2 Critical Thinking

A3 Speech

If less than 11 units, take one additional course in:

A4 Argumentative Writing

**Area B Science and Mathematics** (minimum 5 units)

15 units are in Major.

Take one course from B1a and one from B1b; one with lab

B1a Physical Sciences elective

B1b Life Sciences elective

B2 Mathematics and/or Statistics \*see Major

Area B \* see Major

**Area C Arts and Humanities** (minimum 15 units)

Take one course from each Area C category:

C1 Literature

C1 Philosophy

C2 Fine/Performing Arts

C3 Lit/Phil/Arts (300-400 level)

If less than 15 units, take one additional course from C1, C2, C3

**Area D Social, Political, Economic Inst.** (minimum 15 units)

No more than one course in any Area D category.

Take one course from D1a and one from D1b

D1a HIST 202 (USCP) or HIST 204 or LS 211

D1b POLS 110 or LS 212

Take three courses from D2, D3, D4a, D4b

D2 History (300-400 level)

D3 Economics

D4a Social Institutions

D4b Social Institutions (300-400 level)

**Area E Life Understanding** (minimum 3 units)

No more than one course in any Area E category.

Take one course from E1 or E2

E1 PSY 201/PSY 202

E2 Self Development

**Area F Technology** (no additional units required)

4 units are in Support.

F1 Computer Literacy \*see Support

**Additional GE Courses**

To complete 72-unit requirement, select additional courses from Areas A, C, D, E. No more than one additional course per area.

**ELECTIVES ..... 26**



### **EDUC 434 Student Teaching - Multiple Subject Credential**

*From left: Alexandria Quintanar, Amy Watson (student teacher), Katherin Folkerts and Joanna Gonzalez. The students attend the 3rd Grade at Oceano Elementary School. Amy graduated from Cal Poly in 1997 with a BA in Liberal Studies and she is now seeking her multiple subject teaching credential.*

Amy noted the benefits of UCTE's practice of bringing the Cal Poly "learn by doing" philosophy into the classroom. For one project Amy planned an integrated unit with a tidepool theme. The third graders learned about math, science and literature all through the world of tidepools. A few weeks later Amy was pleased that the students had incredible retention of the subject matter through those hands-on projects.

*Photo by Renate Randall and Robin Silver.*

*Special thanks to Mrs. Rapp and her third grade class.*

University Center for  
*Teacher Education*

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# University Center for Teacher Education

Education Bldg. (02), Room 121  
(805) 756-2583

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## Faculty

### Director, Susan Roper

|                   |                      |
|-------------------|----------------------|
| MaryLud Baldwin   | Donald K. Maas       |
| Elaine Y. Chin    | Susan L. McBride     |
| Leonard Davidman  | Patricia A. Mulligan |
| Patricia Davidman | Dennis M. Nulman     |
| Howard Drucker    | Kenneth F. Palmer    |
| Rita M. King      | Carol Scheftic       |
|                   | Bernard A. Troy      |

The following faculty participate with the University Center for Teacher Education and hold academic rank in a department outside the Center:

|                     |                        |
|---------------------|------------------------|
| Doris Acord         | Robert A. Flores       |
| Frederick P. Andoli | Alan W. Holz           |
| Kathleen Balgley    | Robert L. Inchausti    |
| John Battenburg     | William C. Kellogg     |
| Lloyd N. Beecher    | Sarah S. Lord          |
| C. Andrea Brown     | John C. Maxwell        |
| Carl R.V. Brown     | Joseph E. Sabol        |
| Glen R. Casey       | H. Bernard Strickmeier |
| Robert S. Cichowski | Raymond F. Zeuschner   |

## 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 afternoons, evenings and weekends.

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.

## 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. 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> |
|---|--------------|
| <b>Education Core</b> .....                                     | 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)         |              |
| <b>Required in the Area of Specialization</b> .....             | 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)                        |              |
| <sup>1</sup> EDUC 590 Research Applications in Education (4)    |              |
| <b>Electives</b> (to be selected with adviser's approval) ..... | 6            |
|   | 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 curriculum specialists or instructional team leaders; or they may seek employment in the private sector in curriculum development 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> |
|--|--------------|
| <b>Education Core</b> .....  | 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)                |              |
| <b>Required in Area of Specialization</b> .....                        | 26-28        |
| EDUC 501 Problems and Practices in Curriculum Development (3)          |              |
| EDUC 503 Seminar in Language Arts Curriculum and Methods (4)           |              |
| EDUC 504 Seminar in Science and Mathematics Curriculum and Methods (4) |              |
| EDUC 505 Seminar in Social Studies Curriculum and Methods (4)          |              |
| EDUC 506 Models of Instruction (4)                                     |              |
| EDUC 532 Adv. Field Experiences in Education (3)                       |              |
| <sup>1</sup> EDUC 590 Research Applications in Education (4)           |              |
| <b>Electives</b> (selected with adviser's approval) .....              | 4-6          |
|  | 45           |

<sup>1</sup> If EDUC 599 Thesis/Project is selected in lieu of EDUC 590, the 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> |
|---|--------------|
| <b>Education Core</b> .....   | 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)                         |              |
| <b>Required in the Area of Specialization</b> .....                             | 12           |
| EDUC 512 Educational Organization and Management (4)                            |              |
| EDUC 513 Educational Planning Decision Making (4)                               |              |
| <sup>1</sup> EDUC 590 Research Applications in Education (4)                    |              |
| <b>Electives</b> (to enhance candidate career goal, with adviser approval)..... | 20           |
| Possible 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> |
| <b>Education Core</b> .....                                     | 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)         |              |
| <b>Required in Area of Specialization</b> .....                 | 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)            |              |
| <sup>1</sup> EDUC 590 Research Applications in Education (4)    |              |
| <b>Electives</b> (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> |
| <b>Education Core</b> .....                                     | 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)         |              |
| <b>Required in Area of Specialization</b> .....                 | 11           |
| EDUC 547 Atypical Learning Patterns (4)                         |              |
| EDUC 553 Current Issues in Special Education (3)                |              |
| <sup>1</sup> EDUC 590 Research Applications in Education (4)    |              |
| <b>Electives</b> (to be selected with adviser's approval) ..... | 21           |
|   | 45           |

<sup>1</sup> 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 California's Commission on Teacher Credentialing (CCTC), and are subject to change.

Cal Poly is authorized by the California 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 or middle 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 (Professional Clear)

Agriculture Specialist  
 Reading/Language Arts Specialist  
 Special Education  
 Learning Handicapped  
 Severely Handicapped

### Services Credentials

Administrative Services (Preliminary and Professional Clear)  
 Pupil Personnel Services (School Counseling) (Professional Clear)

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 and Communication Department at Cal Poly. For further information or advisement students should communicate with the head of the Agricultural Education and Communication 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 (MSAT) or an approved "Subject Matter" (coursework) statement (Multiple Subject only), 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 | Minimum GPA |
| Division   | 1995-98     |

*Note: GPA's are subject to change.*

*Single Subjects:*

|  |      |
|--|------|
| Agriculture .....  | 2.58 |
| Biological Sciences .....                                      | 2.81 |
| Education/Physical Education .....                             | 2.72 |
| Home Economics (includes Child Development) .....              | 2.78 |
| English (includes Speech) .....                                | 2.84 |
| Mathematics .....  | 2.84 |
| Physical Sciences (includes Chemistry and Physics) .....       | 2.78 |
| Social Sciences (includes History and Political Science) ..... | 3.00 |
| <i>Multiple Subjects</i> .....                                 | 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**

Candidates for the California Multiple or Single Subject teaching credential must verify competence in their teaching field by *one* of the following methods:

1. passing an appropriate examination(s) for the selected subject matter, *or*
2. completing an approved academic program of coursework (or its equivalent) in the selected subject matter area.

Upon completion of Cal Poly's Teaching Credential Program (Multiple or Single Subject), each student must apply for his or her 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* (KINE 250 or KINE 305, and verification of completion of a training program in cardiopulmonary resuscitation (CPR) (American Red Cross Community CPR or American Heart Association “Heart Saver”);
- coursework in *Special Education*, including MAINSTREAMING (EDUC 440, 4 units);
- coursework in *Computer Education* (EDUC 480, KINE 350, MATH 300, or AGED 410), and
- recommendation from a California college or university with a CCTC 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 (Credential program requirements will change January 1, 1997).

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. The 1996–1997 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 -- School Counseling 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*

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## COLLEGES, DEPARTMENTS, UNITS AND COURSE PREFIXES

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**COLLEGE OF AGRICULTURE**

|   |                     |
|---|---------------------|
| Agriculture .....                                 | AG                  |
| Agribusiness .....                                | AGB                 |
| Agricultural Education and<br>Communication ..... | AGED                |
| Animal Science .....                              | ASCI, PM, VS        |
| Bioresource and Agricultural Engineering ....     | BRAE                |
| Crop Science .....                                | CRSC, FRSC,<br>VGSC |
| Dairy Science .....                               | DSCI                |
| Environmental Horticultural Science .....         | OH                  |
| Food Science and Nutrition .....                  | FSN                 |
| Military Science .....                            | MSC                 |
| Natural Resources Management .....                | FNR, REC            |
| 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**

|                             |      |
|-----------------------------|------|
| Business .....              | BUS  |
| Economics .....             | ECON |
| Graduate Programs .....     | GSB  |
| Industrial Technology ..... | IT   |

**COLLEGE OF ENGINEERING**

|  |          |
|--|----------|
| Engineering .....                            | ENGR     |
| Aeronautical Engineering .....               | AERO     |
| Civil and Environmental Engineering .....    | CE, ENVE |
| Computer Engineering .....                   | CPE      |
| Computer Science .....                       | CSC      |
| 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                                  |
| Ethnic Studies .....                   | ES                                    |
| Graphic Communication .....            | GRC                                   |
| History .....                          | HIST                                  |
| Journalism .....                       | JOUR                                  |
| Liberal Studies .....                  | LS                                    |
| Modern Languages and Literatures ..... | FORL, FR,<br>GER, ITAL,<br>JPNS, SPAN |
| Music .....                            | MU                                    |
| Philosophy .....                       | PHIL, RELS                            |
| Political Science .....                | POLS                                  |
| Psychology and Human Development ..... | CD, PSY                               |
| Social Sciences .....                  | ANT, GEOG,<br>SOC, SOCS               |
| Speech Communication .....             | SPC                                   |
| Theatre and Dance .....                | DANC, TH                              |

**COLLEGE OF SCIENCE AND MATHEMATICS**

|  |                          |
|--|--------------------------|
| Science and Mathematics .....            | SCM                      |
| Biological Sciences .....                | BACT, BIO,<br>BOT, ZOO   |
| Chemistry and Biochemistry .....         | CHEM                     |
| Mathematics .....                        | MATH                     |
| Physical Education and Kinesiology ..... | PE, KINE                 |
| Physics .....                            | ASTR, GEOL,<br>PHYS, PSC |
| Statistics .....                         | STAT                     |

**UNIVERSITY CENTER FOR TEACHER EDUCATION**

|                 |      |
|-----------------|------|
| Education ..... | EDUC |
|-----------------|------|

|                        |          |
|------------------------|----------|
| <b>ATHLETICS</b> ..... | PEM, PEW |
|------------------------|----------|

|                                 |     |
|---------------------------------|-----|
| <b>UNIVERSITY LIBRARY</b> ..... | LIB |
|---------------------------------|-----|

## 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>                             |
|---------------|--|---------------|--|
| 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                                      | HIST          | History                                  |
| ASCI          | Animal Science                           | HUM           | Humanities                               |
| ASTR          | Astronomy and Astrophysics               | IME           | Industrial and Manufacturing Engineering |
| BACT          | Bacteriology                             | IT            | Industrial Technology                    |
| BIO           | Biology                                  | ITAL          | Italian                                  |
| BOT           | Botany                                   | JPNS          | Japanese                                 |
| BRAE          | Bioresource and Agricultural Engineering | JOUR          | Journalism                               |
| BUS           | Business                                 | KINE          | Kinesiology                              |
| CD            | Child Development                        | LA            | Landscape Architecture                   |
| CE            | Civil Engineering                        | LIB           | Library                                  |
| CHEM          | Chemistry                                | LS            | Liberal Studies                          |
| CM            | Construction Management                  | MATE          | Materials Engineering                    |
| CPE           | Computer Engineering                     | MATH          | Mathematics                              |
| CRP           | City and Regional Planning               | ME            | Mechanical Engineering                   |
| CRSC          | Crop Science                             | MSC           | Military Science                         |
| CSC           | Computer Science                         | MU            | Music                                    |
| DANC          | Dance                                    | OH            | Ornamental Horticulture                  |
| DSCI          | Dairy Science                            | PE            | Physical Education                       |
| ECON          | Economics                                | PEM           | Physical Education Men                   |
| EDES          | Environmental Design                     | PEW           | Physical Education Women                 |
| EDUC          | Education                                | PHIL          | Philosophy                               |
| EE            | Electrical Engineering                   | PHYS          | Physics                                  |
| ENGL          | English                                  | PM            | Poultry Management                       |
| ENGR          | Engineering                              | POLS          | Political Science                        |
| ENVE          | Environmental Engineering                | PSC           | Physical Science                         |
| ES            | Ethnic Studies                           | PSY           | Psychology                               |
| FNR           | Forestry and Natural Resources           | REC           | Recreation Administration                |
| FORL          | Foreign Language                         | RELS          | Religious Studies                        |
| FR            | French                                   | SCM           | College of Science and Mathematics       |
|               |  | SOC           | Sociology                                |
|               |  | 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                                  |

## 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 (2)

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. Miscellaneous course fee may be required—see *Class Schedule*. 1 lecture, 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 (4)

GEB F.2.

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. 4 lectures.

### AERO 215 Introduction to Aerospace Design (2)

Introduction to problem solving techniques and team-centered design projects in aerospace engineering. Primary emphasis on the solution of design problems in aerospace engineering using computers. 2 laboratories. Prerequisite: AERO 121, CSC 231, 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) (5)

Properties and characteristics of fluids, fluid statics and dynamics, the thermodynamic relations, laminar and turbulent flows, subsonic and supersonic flows as applied to flight vehicles. Introduction to heat transfer. 5 lectures, fall, winter and 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 and Flight Performance (4)

Introduction to theoretical aerodynamics. Primary emphasis in the subsonic region, including compressibility effects. Basic aerodynamic theory: Airfoil theory, wing theory, lift and drag. Team-centered aerodynamic design. Flight performance. 4 lectures. Prerequisite: AERO 215, AERO 301, AERO 315. Concurrent: AERO 302.

### AERO 307 Wind Tunnel and Flight Test Laboratory (2)

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. 2 laboratories. Prerequisite: AERO 302, AERO 306, ENGL 218.

### AERO 315 Aerospace Engineering Analysis (4)

Analysis methods for aerospace engineering problems. Applications of analysis methods to solving problems in aerodynamics, aerospace structures, stability and control, and astronautics. 3 lectures, 1 laboratory. Prerequisite: AERO 215, MATH 242, CE 204, CE 205.

### AERO 320 Fundamentals of Guidance and Control (4)

Introduction to state-space and transfer function models for aircraft, spacecraft, missiles, and helicopters. Elementary classical and modern analysis techniques using computers. 3 lectures, 1 laboratory. Prerequisite: AERO 215. Concurrent: AERO 315.

### AERO 330 Aerospace Structural Analysis (4)

Basic strain, stress and equilibrium equations. 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 shearlag problem and the stability of structures. Numerical methods: Finite difference, finite elements method. 3 lectures, 1 laboratory. Prerequisite: AERO 315.

### 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 303, AERO 306, CHEM 124.

### AERO 404 Gas Dynamics (4)

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. 4 lectures. Prerequisite: AERO 302.

### AERO 405 Supersonic and Hypersonic Aerodynamics (4)

Review of gas dynamics, shock-wave and boundary-layer interaction, aerodynamic design. 2-dimensional supersonic flows around thin airfoil; finite wing in supersonic flow. Local



surface inclination methods for high-speed flight, boundary-layer and aerodynamic heating, viscous interactions. 4 lectures. Prerequisite: AERO 303, AERO 306.

**AERO 407 Reentry Aerodynamics (4)**

Near planet environments. Transition from orbital to aerodynamic motion. Aerodynamic heating and effects on design. 4 lectures. Prerequisite: AERO 405. Concurrent: AERO 451.

**AERO 409 Flight Test and Simulation (4)**

Overview of flight simulators, simulation equations, and supporting facilities. Principles of team-centered flight testing with applications to performance, stability and control, and avionics systems testing. Test planning, instrumentation, data analysis and reports. 2 lectures, 2 laboratories. Prerequisite: AERO 306. Concurrent: AERO 320.

**AERO 416 Principles of Rotary Wing Flight (4)**

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. 4 lectures. Prerequisite: AERO 306 and AERO 315.

**AERO 420 Stability and Control of Aerospace Vehicles (4)**

Stability and control derivatives, reference frames, steady-state static analysis and perturbed dynamic analysis for aircraft and spacecraft. Transfer function, state-space, and modal representations of system dynamics in response to control inputs. Design guidelines and introduction to augmentation systems. 4 lectures. Prerequisite: AERO 306, AERO 320, and ME 212.

**AERO 430 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 composites. 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 434 Aerospace 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 330.

**AERO 442 Preliminary Aircraft Design (4)**

Preliminary definition of an aircraft using design and calculation techniques developed in previous aeronautical engineering courses. Background provided to synthesize knowledge from previous courses into a preliminary aircraft design. Preparation of necessary drawings and a report. 2 lectures, 2 laboratories. Prerequisite: Senior standing, AERO 306, AERO 320, AERO 330, and CAD drawing skills.

**AERO 443, 444, 445 Aircraft Design (2) (4) (4)**

Preliminary layout of a typical aircraft vehicle using design and calculation techniques developed in previous aeronautical engineering courses. Design of a flight vehicle, including its structures and systems. Preparation of necessary drawings and a report. AERO 443: 2 laboratories. AERO 444 and AERO 445: 2 lectures, 2 laboratories. Prerequisite: Senior standing, IME 144, AERO 303, AERO 306, AERO 330. Concurrent: AERO 401, AERO 420, AERIO 430.

**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: IME 144, AERO 303, AERO 306, AERO 330, senior standing. Concurrent: AERO 401, AERO 420, AERO 430, AERO 451.

**AERO 451 Orbital Mechanics I (4)**

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. Restricted 3-body problem. 4 lectures. Prerequisite: ME 212.

**AERO 452 Orbital Mechanics II (4)**

Orbital motion, perturbing forces. Asphericity of the earth, aerodynamic drag, third-body tidal forces, etc. Enke and Cowell solution techniques. Restricted 3-body problem. Satellite attitude dynamics, rigid body-symmetric and asymmetric semirigid bodies. Attitude control, spinning/fixing gravity gradient. Gyroscopic instruments. 4 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 (1-4)**

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 (4)**

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. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**AERO 520 Theoretical Aerodynamics (4)**

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. Panel methods. Boundary-layer effects on aerodynamics. Viscous flow. 4 seminars. Prerequisite: AERO 306, MATH 502, graduate standing or consent of instructor.

**AERO 522 Boundary-Layer Theory (4)**

Concept of boundary-layer. Boundary-layer equations, similarity transformation, integral and differential methods for steady, two-dimensional laminar and turbulent boundary layers. 4 lectures. Prerequisite: AERO 302, graduate standing or consent of instructor. Concurrent: MATH 501.

**AERO 523 Turbulence (4)**

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. 4 lectures. Prerequisite: AERO 302, graduate standing or consent of instructor.

**AERO 525 Computational Fluid Dynamics (4)**

Classification of partial differential equations. Numerical methods applicable to the solution of elliptic, parabolic, and hyperbolic partial differential equations. Consideration of accuracy and stability of numerical methods. Application to the fundamental equations of fluid dynamics, grid generation, turbulence modeling. 4 lectures. Prerequisite: AERO 303, CSC 340, graduate standing or consent of instructor.

**AERO 530 Inelastic Structural Analysis (4)**

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 seminars, 1

laboratory. Prerequisite: Graduate standing or consent of instructor.

**AERO 535 Advanced Aerospace Structural Analysis (4)**

Advanced flight vehicle and fracture mechanics analysis and design. Fundamentals and applications of modern fatigue analysis in the aerospace industry. 3 seminars, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**AERO 540 Elements of Rocket Propulsion (4)**

Thrust and impulse equations, propellant composition and mixture ratios, nozzle expansion ratios, solid and liquid propellant combustion, internal ballistics, thermo-chemical computations, chemical kinetics, and combustion instability, nozzle design and exhaust plumes. 4 seminars. Prerequisite: AERO 303, AERO 401, graduate standing or consent of instructor.

**AERO 541 Aircraft Gas Turbine Engines (4)**

Aerothermodynamics of propulsion systems, power plant selection and design, on-off design performance, component characterization, component design, component matching, optimization, and introduction to power plant and airframe integration systems for aircraft. 4 seminars. Prerequisite: AERO 401 or ME 443, graduate standing or consent of instructor.

**AERO 550 Analysis and Design of Flight Control Systems (4)**

Fundamental principles of flight control design and the application of the Cooper-Harper test and evaluation tool to fly-by-wire modern aircraft. Human factors, issues, and automation, case study of the space shuttle. 3 lectures, 1 laboratory. Prerequisite: AERO 420 or ME 422, graduate standing or consent of instructor.

**AERO 551 Global Positioning Satellite Navigation Systems (4)**

Principles of Global Positioning Satellite navigation systems. Kalman filter design and application to integrated navigation and guidance systems. Statistical evaluation and test methods in aerospace. Interactive computer simulations. 3 lectures, 1 laboratory. Prerequisite: AERO 420, graduate standing or consent of instructor.

**AERO 565 Advanced Topics in Aircraft Design (4)**

Application of advanced analytic engineering methods to aircraft design problems. Analysis and synthesis of advanced topics related to design of aircraft. 4 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 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 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 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 may be required—see *Class Schedule*. 3 lectures.

### AG 301 Agriculture and American Life (4) GEB F.2.

Overview of agriculture and effect on American life; wise use of natural resources; animal and plant production; role of machines, labor, and chemicals in producing food and fiber; processing and marketing of commodities; nature of farm life; leadership development in agriculture. 4 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 439 Internship in Integrated Ranch Operations (6–12) (CR/NC)

Work experience in all activities/projects associated with the production of crops, livestock and timber at Swanton Pacific Ranch. Students will be responsible for all activities associated with ranch operation including supervising. For students working and living at Swanton Pacific Ranch. Credit/No Credit grading only. Total credit limited to 18 units. Prerequisite: Senior or graduate standing and consent of instructor.

### AG 450 Holistic Resource Management (4)

Application of Holistic Resource Management, a goal-oriented, value-driven thought process using guidelines which cause decisions to be made that are ecologically, economically, and socially sound. Holistic approach to management of land-based resources aimed toward greater biodiversity and sustainability. Miscellaneous course fee may

be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: Any life sciences course, and junior standing.

### 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 college 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 (4)**

Orientation to the agribusiness sector of agriculture. An overview of the breadth, size, scope and management aspects of the agricultural business complex. 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 202 Sales, Communication and Leadership in Agribusiness (4)**

Self management, communication, and interpersonal skills necessary in developing managerial abilities, leadership qualities, and facilitating teamwork within the agribusiness sector. Industry opportunities ranging from input and output products and services along with government and special interest groups will be surveyed. 4 lectures. Prerequisite: AGB 101.

### **AGB 212 Agricultural Economics (4)**

Theoretical development of factors affecting demand and supply for food and fiber and for agricultural inputs. Methods of selecting optimal levels of agricultural production and consumption variables. Evaluation of market structure and price formulation for agricultural products and resources. 4 lectures.

### **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.

### **AGB 301 Food and Fiber Marketing (4)**

Food and fiber marketing, examining commodity, industrial, and consumer product marketing from a managerial viewpoint. A global perspective in understanding consumer

needs and developing the knowledge of economic, political, social and environmental factors that affect food and fiber marketing systems. 4 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 (4)**

Financing California's agricultural industry. Sources of credit and types of loans used by agribusinesses. Costs of credit. Financial analysis of agricultural borrowers. Future and present value techniques used in evaluating agricultural investments. Agricultural financial management. Financial capital markets and leasing. 4 lectures. Prerequisite: One quarter of accounting or AGB 321.

### **AGB 312 Agricultural Policy (4)**

Agricultural policy objectives and formulation, resource allocation and production adjustments. Survey of State and Federal agricultural policies as they influence the planning and practices of agribusiness. 4 lectures. Prerequisite: AGB 212; ECON 222, or ECON 201 or ECON 211.

### **AGB 314 Fair and Fair Facility Management (4)**

Fundamentals of the year round operation of a fair facility to include rental opportunities, master planning, and maintenance. Principles and procedures in planning, organizing, operating, and evaluating a fair. One day field trip required. 4 lectures. Prerequisite: Upper division standing.

### **AGB 315 Land Economics (4)**

Economics of agricultural and rural land use. Incorporates production economics with welfare theory to explore society's implicit and explicit land use decisions and problems in California, the West and nationwide. Incorporates land use planning and its implicit economic content. 4 lectures. Prerequisite: AGB 213/equivalent or senior status.

### **AGB 317 Agriculture-Consumer Relationships (2)**

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. 2 seminars. Prerequisite: Upper division standing.

**AGB 318 International Trade and Agriculture (4)**

Global forces shaping U.S. and world agricultural trade. Analysis of U.S., regional, and global agricultural trade policy, exchange rates, and other factors affecting U.S. agricultural trade. Fundamentals of international trade and marketing of agricultural commodities and products. 4 lectures. Prerequisite: AGB 212 or ECON 201, AGB 312.

**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 BUS 212, 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: BUS 212.

**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: BUS 212.

**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 Information Technology (4)**

Use of information technologies and advanced computer applications in agribusiness decision-making. Information search and retrieval technologies. Computer languages and programs developed as tools to assist in agribusiness

problem-solving. 4 lectures. Prerequisite: AG 250 or demonstration of computer proficiency.

**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/No Credit grading only. Prerequisite: Consent of department head or instructor.

**AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (4) USCP**

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 (4)**

Agricultural marketing research data collection and analysis. Emphasis on food sector market segmentation, product positioning, new product testing, sales forecasting, and marketing plan development through secondary and primary data sources. Experimental research design and implementation. 4 lectures. Prerequisite: STAT 221, AGB 301.

**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: BUS 212, 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 Seminar in U.S./World Agricultural Trade Issues (2)**

Comparative analysis of agricultural infrastructures and trade policies of major U.S. trading partners within specific world regions (e.g., Latin America, Asia Pacific, Europe, etc.).

Particular emphasis on cultural and geo-political influences on the development of world agricultural policies. *Class Schedule* will list topic selected. 2 seminars. Prerequisite: AGB 318.

**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. 4 lectures. Prerequisite: AG 250, AGB 213, STAT 221.

**AGB 427 Agricultural Estate Planning (2)**

Principles of estate planning with special emphasis on needs of owners of closely held farming businesses. How wills, property ownership, gifts, trusts and continuation agreements affect estate plans. 2 seminars. Prerequisite: Upper division standing.

**AGB 433 Agricultural Price Analysis (4)**

Application of statistical tools for price analysis. Emphasis on price making process for specific agricultural commodities. Utilization of USDA and CDFA market price reports and production estimate data in price forecasting and analysis. 2 two-hour lectures. Prerequisite: STAT 221 and AGB 213.

**AGB 435 Linear Programming in Agriculture (4)**

Application of linear programming to decision making by contemporary farm businesses. Solutions by graphical and mathematical models including appropriate computer software. Economic interpretation of solutions. Applications for multi-product, multi-function farms. Includes introduction to goal and risk programming, transportation models, and multi-period programming. 4 lectures. Prerequisite: AGB 212, AGB 213, and AG 250.

**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. 4 lectures. 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. 4 lectures. 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. 4 lectures. 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. Research plan is developed. First quarter of Senior Project. 2 seminars. Prerequisite: Senior standing and AGB 213.

**AGB 461 Senior Project (2)**

Completion of a project under faculty supervision. Research topics or projects typical of problems which graduates must solve in the agricultural, food and fiber industries. Project

results are presented in a formal report. Minimum 60 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 485 Cooperative Education Experience in Agribusiness (6) (CR/NC)**

Part-time work experience with an approved Agribusiness firm engaged in production or related business, industry or governmental agency. 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**AGB 495 Cooperative Education Experience in Agribusiness (12) (CR/NC)**

Full time work experience with an approved Agribusiness firm engaged in production or related business, industry or governmental agency. 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**AGB 500 Individual Study in Agribusiness (1-6)**

Advanced independent study planned and completed under the direction of a member of the Agribusiness faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**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 539 Graduate Internship in Agribusiness (1-9)**

Application of theory to the solution of problems of agricultural production or related business in the field of Agribusiness. 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.

**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.

**AGB 570 Selected Topics in Agribusiness (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 9 units. 1 to 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**AGB 571 Selected Advanced Laboratory in Agribusiness (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.

**AGB 581 Graduate Seminar in Agribusiness (3)**

Group study of selected developments, trends and issues in the field of Agribusiness. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**AGB 585 Cooperative Education Experience in Agribusiness (6) (CR/NC)**

Advanced study, analysis and part-time work experience in the 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.

**AGB 595 Cooperative Education Experience in Agribusiness (12) (CR/NC)**

Advanced study, analysis and full-time work experience in the 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.

**AGB 599 Thesis in Agribusiness (1–9)**

Systematic research of a significant problem in Agribusiness. 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.

## 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 and Communication (2)**

Overview of agricultural education career pathways 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 agricultural communication or international agriculture. 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 339 Internship in Agricultural Education (1–12) (CR/NC)**

Selected Agricultural Education 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor.

**AGED 404 Agricultural Leadership (3)**

Emphasis upon equipping current and prospective leaders in agriculture with the background and skills to achieve their potential. Class members will assess their status as leaders and identify means to improve their effectiveness. Focus on the theoretical underpinnings of human motivation, personal leadership, and organizational development. 2 lectures, 1 activity. Prerequisite: PSY 201 or PSY 202.

**AGED 407 Agricultural Publications (3) (CR/NC)**

Integration of writing, editing, and layout skills in producing agricultural publications. Emphasis on using computer applications in desktop publishing. Credit/No Credit grading only. Total credit limited to 9 units; may be in same term. 1 lecture, 2 activities. Prerequisite: AG 250, CSC 113, or JOUR 205.

**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 in Agricultural Communication (3)**

Development, delivery and evaluation of effective means of communication by use of a variety of presentation methods and the use of technology for effective communication. 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 460 Research Methodology in Agricultural Education and Communication (1)**

Introduction of the research process and topic selection as it relates to the design and development of the senior project within the Agricultural Sciences major. 1 lecture. Prerequisite: Junior standing.

**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 (2)**

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 60 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 500 Individual Study in Agricultural Education (1–6)**

Advanced independent study planned and completed under the direction of a member of the Agricultural Education and Communication faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**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 539 Graduate Internship in Agricultural Education (1–9)**

Application of theory to the solution of problems of agricultural production or related business in the field of Agricultural Education. 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.

**AGED 570 Selected Topics in Agricultural Education (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 9 units. 1 to 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**AGED 571 Selected Advanced Laboratory in Agricultural Education (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 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.

**AGED 581 Graduate Seminar in Agricultural Education (3)**

Group study of selected developments, trends and issues in the field of Agricultural Education. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

## 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 (4)**

Development of the diverse human cultures of both the Old and New Worlds from the earliest times until the dawn of history; cultural growth. 4 lectures.

**ANT 203 Biological Anthropology (4)**

Biological aspects of human unity and diversity. Primate and human evolution, including anatomical, physiological and behavioral adaptations. Origin and diversity of modern races. 4 lectures.

**ANT 310 Archaeological Field Methods (4)**

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. 3 lectures, 1 laboratory. Prerequisite: A course in anthropology or consent of instructor.

**ANT 311 Archaeological Laboratory Methods (4)**

Principles of archaeological excavation; recording, stratigraphy, dating, field conservation, and interpretation; cultural resources management. 3 lectures, 1 laboratory. Prerequisite: An anthropology course or consent of instructor.

**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 (4)**

Global perspective on the relationship between culture and health. Ecological factors influencing health and illness. Origins of disease and impact of diseases on society. Diet and nutrition. Classifications of illness causation. Kinds of curers. Relationship of gender and reproduction to illness. Pharmacology. Mental illness. Global health problems. Alternative health care modalities. Health-care needs of U.S. ethnic groups. 4 lectures. Prerequisite: Junior standing.

**ANT 405 Indonesia (4)**

Cultures and societies of Indonesia with particular emphasis on Bali. Topics include art and ritual, kinship, marriage, gender, politics, economics and colonialism. 4 lectures. Prerequisite: One upper division ANT course or consent of instructor.

**ANT 415 Native American Cultures (4) USCP**

Survey of Native American cultures from earliest times to present, emphasizing regional diversity in traditional lifeways. Origins of New World peoples, domestication, war, social organization, trade and gender roles. 4 lectures. Prerequisite: One upper division ANT course or consent of instructor.

**ANT 420 Development Anthropology (4)**

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. 4 lectures. Prerequisite: ANT 201 or consent of instructor.

**ANT 425 Pre-Columbian Mesoamerica (4)**

Cultures and societies of Mesoamerica prior to 1492. Olmec, Maya, Toltec and Aztec civilizations. Religion, politics, warfare, art, writing, calendrics, ecology and trade. The development and collapse of states. 4 lectures. Prerequisite: One upper division ANT course or consent of instructor.

**ANT 433 Language and Culture (4)**

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 political persuasion; language and gender; language and social stratification; dialects; bilingualism and multilingualism; language and ethnic identity. 4 lectures. Prerequisite: Junior standing.

**ANT 435 Pacific Islands Cultures (4)**

Overview of Pacific Islands cultures. Individual cultures in each of the three major cultural and geographic areas – Micronesia, Melanesia, and Polynesia – will be studied in depth using the case study approach. The impact of Western culture on the Pacific from the early explorations through colonialism, World Wars I and II to independence. 4 lectures. Prerequisite: Junior standing.

**ANT 444 Sex, Death and Human Nature (4)**

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. 4 lectures. Prerequisite: One upper division ANT course or consent of instructor.

**ANT 450 Area Studies (4)**

Comparative analysis of cultural diversity and uniformity within a selected region (e.g., Latin America, Sub-Saharan Africa). *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: ANT 201 or consent of instructor.

**ANT 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 topics selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**ARCE–ARCHITECTURAL ENGINEERING**

*Note: All ARCE majors must obtain a grade of C- or better in every ARCE course taken.*

**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 (4)**

Advanced topics of stresses in beams. Plastic bending, unsymmetrical bending. Combined stresses. Stress transformation. Buckling. Deflection of beams. Analysis of indeterminate structures. Material test laboratory. 3 lectures, 1 laboratory. Prerequisite: ARCE 222. Concurrent: ARCE 351.

**ARCE 225 Dynamics (3)**

Dynamics of particles and rigid bodies. 3 lectures. Prerequisite: ARCE 221 and MATH 241.

**ARCE 226 Structural Systems for Architects (3)**

Description, behavior and comparison of structural building systems. Concepts of structural stability, load flow, framing schemes and building configuration related to vertical and lateral loads. For architecture and construction management students. 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. Concurrent: ARCE 352.

**ARCE 303 Steel Design I (3)**

Analysis and design of steel structural members subjected to bending, shear and axial forces. 3 lectures. Prerequisite: ARCE 227. Concurrent: 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 frames. Introduction to finite-element methods. 3 lectures. Prerequisite: ARCE 302. Concurrent: ARCE 353.

**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 Structural Systems (3)**

Concepts related to system behavior; selection; design and construction specific to timber structures. Preliminary member design and detailing. Load flow implications related to building configurations; including vertical and lateral load resisting elements. For architecture and construction management students. 3 lectures. Prerequisite: ARCE 226.

**ARCE 322 Steel Structural Systems (3)**

Concepts related to system behavior; selection; design and construction specific to steel structures. Preliminary member design and detailing. Load flow implications related to building configurations; including vertical and lateral force resisting elements. For architecture and construction management students. 3 lectures. Prerequisite: ARCE 226.

**ARCE 323 Concrete Structural Systems (3)**

Concepts related to system behavior; selection; design and construction specific to concrete structures. Preliminary member design and detailing. Load flow implications related to building configurations; including vertical and lateral force resisting elements. Introduction to issues related to foundation design. For architecture and construction management students. 3 lectures. Prerequisite: ARCE 226.

**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, CSC 231 or CSC 234 or approved equivalent. Concurrent: ARCE 223.

**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. Concurrent: ARCE 302.

**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.  
Concurrent: ARCE 306.

**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 223 and ARCE 227. Co-requisite: ARCE 302.

**ARCE 372 Steel Structures Design Laboratory (3)**

Design project utilizing structural steel. 3 laboratories. Prerequisite: ARCH 231 or ARCE 457, 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 225 or ME 212, MATH 242, CSC 342 and ARCE 302.

**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 or ARCE 451.

**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 302, 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: EDES 113 and CSC 231 or CSC 234 or approved equivalent.

**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 225 or ME 212, ARCE 372, ARCE 412, CSC 342.

**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. Credits to not count toward graduation in the ARCE Degree Program. Prerequisite: Sophomore standing and consent of department head.

**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. Credits to not count toward graduation in the ARCE Degree Program. 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. Credit/No Credit grading only. This requirement may be replaced by a professional elective for upper division transfer students. 2 lectures.

**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 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, prerequisite or concurrent enrollment with 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.

**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 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 Ancient World from prehistory to the Middle Ages. 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 and Colonial 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 in the Modern World 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.

**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 363 Off-Campus Orientation Seminar (2) (CR/NC)**

Preparation for off-campus architectural study programs includes cultural orientation, an introduction to basic language skills, travel and housing protocols as well as academic and financial advising. Credit/No Credit grading only. Total credit limited to 4 units, with a maximum of 2 units per quarter. 2 seminars. Prerequisite: Consent of instructor.

**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.

**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 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.

**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.

**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 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.

**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.

**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.

**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 457 Computer Graphics in Architecture (4)**

Two-dimensional drawing systems in architectural practice with particular emphasis on office productivity in the production side of the design process; includes drawing database administration, local area networks, management and cost issues. 2 lectures, 2 laboratories. Prerequisite: ARCH 250.

**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 457 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 464 Computer Applications in Design (3)**

Exposure to all aspects of two-dimensional computer-aided design. Introduction to three-dimensional CAD through the use of AUTOCAD 12 software. *Class Schedule* will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

**ARCH 465 Design Related Media (3)**

The role of various media of visual communication as tools of documentation, analysis and creation in the design visual environment. Skills in graphics, photography, product design, film, video techniques, and printmaking graphics will be developed in specific relation to environmental design study and presentation. *Class Schedule* will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

**ARCH 466 Topics in Architectural History and Theory (3)**

Design from its beginning with the crafts design period to its expression of industrial design in its present form. Various stages in the evolution of design explored through analyzing the influences and contributions of leading artists. *Class Schedule* will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

**ARCH 467 Undergraduate Research (3)**

Architecture and urban theoretical intentions and results in the context of the Capitol of the United States – Washington, DC. This theoretical and historical study will not occur within the confines of the classroom, but directly within the “laboratory” of the city. *Class Schedule* will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

**ARCH 468 Advanced Environmental Building Systems (3)**

Technologies which provide a “well building” environment by engaging in: weather protection; thermal/moisture control; natural and artificial lighting; and electrical and other “energy source” utility service. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

**ARCH 469 Topics in Design Methods (3)**

Relationship of art and architecture addressed to encourage critical debate. Historically, the “art” and the “architecture” were not as polarized as today. Both historical perspective and practical issues concerning collaboration. *Class Schedule* will list topic selected. Total credit limited to 12 units. 3



lectures. Prerequisite: Junior standing and current participation in the Washington Alexandria Architectural Consortium off-campus program.

**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 College of Liberal Arts. Total credit limited to 36 units. Prerequisite: Junior standing.

**ARCH 481 Senior Architectural Design 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. Miscellaneous course fee may be required—see *Class Schedule*. Total credit limited to 15 units. 5 laboratories. Prerequisite: ARCH 407, ARCH 441, ARCH 442, ARCH 451, ARCH 452, ARCH 453 and 5th-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 492 Senior Design Thesis (3)**

Development of the framework and format of a thesis project proposal related to the specific design option. Work to include: research topic, intent, scope, methodology, assumptions, outline of work program and documentation. To be taken concurrently with first quarter of ARCH 481. 3 seminars. Prerequisite: 5th year standing or permission of instructor.

**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 521 Graduate Architectural Design 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. Miscellaneous course fee may be required—see *Class Schedule*. Total credit limited to 15 units. 5 laboratories. Prerequisite: ARCH 407, ARCH 441, ARCH 442, ARCH 451, ARCH 452, ARCH 453 and 5th-year 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 592 Graduate Design Thesis (3)**

Development of the framework and format of a thesis project proposal related to the specific design option. Work to include: research topic, intent, scope, methodology, assumptions, outline of work program and documentation. To be taken concurrently with first quarter of ARCH 521. 3 seminars. Prerequisite: 5th year standing or permission of instructor.

**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 108 Fundamentals of Sculpture I (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 181 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 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—Ancient to Renaissance (4)**

Development of art from antiquity to the early stages of the Renaissance in Europe. Particular emphasis on European art with appropriate references to sources from antiquity which have been particularly influential on European painting and sculpture. 4 lectures.

**ART 212 Art History—Renaissance through Baroque Eras (4)**

The significant visual expressions of Northern and Southern European art of the Renaissance and Baroque period. Relevant parallel examples of the art of non-European cultures. 4 lectures.

**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 Introduction to Artificial Lighting for Photography (3)**

Tungsten and electronic strobe studio lights are used to introduce the student to contemporary professional studio photography. Quality developing and printing skills required. Introduction to current examples of professional studio lighting. Emphasizes photographic communication and expression of ideas through an understanding of controlled lighting. Color transparency materials are introduced in the studio environment. 2 lectures, 1 laboratory. Prerequisite: ART 222.

**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 240 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. Total credit limited to 6 units. 3 activities. Prerequisite: ART 302.

**ART 304 Intermediate Watercolor (3)**

Transparent watercolor painting. Design and composition of painting, use of drawing and advanced watercolor techniques. Total credit limited to 6 units. 3 activities. Prerequisite: ART 204.

**ART 305 Painting Techniques (3)**

Physical characteristics of painting media, creative understanding of pictorial space and color. Total credit limited to 6 units. 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 308 Intermediate Sculpture (3)**

Advanced studio course in expressive use of form with modeling, casting, carving, and/or assembly. Miscellaneous course fee required—see *Class Schedule*. Total credit limited to 9 units. 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—Nineteenth Century Art (4)**

History of painting and sculpture from the French Revolution to the beginning of the 20th century. Significant movements such as Neo-Classicism, Romanticism, Realism, Impressionism and Post-Impressionism. 4 lectures.

Prerequisite: One lower division Art History course, or consent of instructor.

**ART 312 Art History—Twentieth Century Art (4) GEB C.3.**

History of major art movements from the beginning of the twentieth century to the present. Major emphasis will be placed on Fauvism, Expressionism, Dada, Surrealism, and the period of Post-World War II art in Europe and the United States. 4 lectures. Prerequisite: ART 311 or consent of instructor.

**ART 313 Design History (4)**

Survey of graphic and product design from the Vienna Secession to the present. Emphasis placed on the Russian avant-garde, art deco, streamlining, and development of Modernism. 4 lectures. Prerequisite: Any lower division art history course.

**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 316 Women as Subject and Object in Art History (4)  
(Also listed as WS 316)**

Exploration of the role of women in the visual arts. Women as artists, women as portrayed in art, and feminist theory as it applies to the study of the visual arts and art history. 4 lectures. Prerequisite: ART 111, ART 112 or consent of instructor.

**ART 317 Asian Art Survey (4) GEB C.3.**

Survey of the traditional arts of Asia – primarily India, China and Japan. Emphasis on the connections between the visual arts in Asia and the philosophical, social and cultural environments in which they arose. 4 lectures. Prerequisite: ART 111 or ART 112, or ART 211, or consent of instructor.

**ART 318 Art History – Asian Art Topics: National, Religious and Intellectual Movements (4) GEB C.3.**

In-depth examination of significant art movements in Asia. Each topic will focus on the development of art in Asia within the context of a specific geographical or theoretical framework. Details will vary depending on topic. *Class Schedule* will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: ART 317 or equivalent academic background in Asian history and culture, or consent of instructor.

**ART 324 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 (3)**

Fundamental techniques in color photography. Theory of color, visual concepts, exposing color transparencies and negatives, printing from color negatives, finishing and presentation. Studio electronic flash and available light. 2 lectures, 1 laboratory. Prerequisite: ART 224.

**ART 323 Introduction to Digital Image Making (3)**

Digital modification of color photography using transparency materials. Development of consistent control of 35mm color transparency films. Digital photographic vocabulary as well as theory of color in expression and communication. Survey of contemporary color photography and digital image making. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: ART 181, ART 322 and CSC 113 or consent of instructor.

**ART 325 4x5 Camera Techniques (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 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 required for appropriate problems. 3 activities. Prerequisite: Junior standing. ART 133 or consent of instructor.

**ART 332 Symbology (3)**

Use of symbolism and metaphor in graphic design. Communication of complex or abstract concepts with connotative/denotative imagery. Development of ideas from research, reference materials, and the imagination. Computer applications are required for appropriate problems. 3 activities. Prerequisite: ART 133, ART 331, junior standing.

**ART 333 Corporate Identity (3)**

Design and implementation of corporate logos. Development of a graphic standards manual for use of identity in diverse applications. For Art and Design majors only. Computer applications are required for appropriate problems. 3 activities. Prerequisite: ART 134, 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. Total credit limited to 9 units. 2 lectures, 1 laboratory. Prerequisite: ART 108, ART 134, or consent of instructor.

**ART 340 Glass Fusing and Forming (4)**

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*. Total credit limited to 8 units. 1 lecture, 3 activities. Prerequisite: ART 108 or ART 240 or consent of instructor.

**ART 341 Advanced Selected 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. Miscellaneous course fee required—see *Class Schedule*. Total credit limited to 12 units. 2 lectures, 2 activities. Prerequisite: ART 240 or ART 340, or consent of instructor.

**ART 345 Ceramics II (3)**

Studio course in hand, wheel, mold, extruder, jig, and press forming skills. Design of single and multiple forms and kiln firing procedures. Miscellaneous course fee required—see *Class Schedule*. Total credit limited to 6 units. 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*. Total credit limited to 9 units. 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*. Total credit limited to 9 units. 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 concept and illustration techniques for use in graphic design and advertising. Total credit limited to 6 units. For Art and Design majors only. 3 activities. Prerequisite: ART 204, ART 302, ART 331.

**ART 427 Illustration Photography (3)**

Applied principles of design and color to produce a photograph that sells an idea, product, or service. Both traditional and digital applications used. Joint projects with ART 432, Advertising Design. Emphasis on thinking, planning, interpreting, and presenting an ideaphotographically. 2 lectures, 1 laboratory. Prerequisite: ART 326 and senior standing.

**ART 428 Portfolio Production Photography (1)**

Physical production of final portfolio for the graduating senior in photography concentration. 1 laboratory. Prerequisite: ART 427 and senior standing; concurrent enrollment in ART 462 required.

**ART 430 Advanced Typographic Design (3)**

Advanced principles of letterform design and modification related to the communication of ideas. Continuation of analysis of type characteristics. Emphasis on 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 Art and Design majors only. Computer applications are required for appropriate problems. 3 activities. Prerequisite: ART 333 and senior standing.

**ART 432 Advertising Design (3)**

Development of print advertising from concept to final presentation. Emphasis on art direction, photo direction and copywriting. For Art and Design majors only. Computer applications are required for appropriate problems. 3 activities. Prerequisite: ART 333 and senior standing.

**ART 433 Editorial Design (3)**

Design of editorial material, printed collateral, magazine layouts and annual reports. For Art and Design majors only. Computer applications are required for appropriate problems. 3 activities. Prerequisite: ART 431 and senior standing.

**ART 460 Professional Practices (2)**

Professional practices in the art and design field, including legal and ethical issues, taxes, contracts, fees and copyrights. Current job opportunities are researched and business plan prepared. Course lectures augmented by visiting professionals. For Art and Design majors only. 2 lectures. Prerequisite: Senior standing.

**ART 461 Senior Project (2)**

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 (2)**

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 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 483 Video and Multimedia Production (4)**

Video and computer generated multimedia presentation scripting, editing, storyboarding and sound cutting. Emphasis on effective communication using presentation techniques and application software to create high impact applications. 2 lectures, 2 laboratories. Prerequisite: ART 323.

**ART 484 Animation and Interactive Design (3)**

Creation of in-depth animations and interactive presentations. Advanced scripting, storyboarding and interactive communication techniques. 2 lectures, 1 laboratory. Prerequisite: ART 483.

**ART 486 Advanced Digital Image Making (3)**

Expressive possibilities of latest image manipulation software. Advanced capabilities of this software explored with focus on development of conceptual and expressive abilities in the digital medium. Art and Design majors only. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: ART 181 or ART 323 and senior standing.

**ART 487 Designing for the World Wide Web (3)**

Interactive design for the World Wide Web and CD-ROM's. Introduction to HTML and design software most commonly used in interactive work. Unique design issues and opportunities of the World Wide Web. Art and Design majors only. 2 lectures, 1 laboratory. Prerequisite: ART 181 or ART 323 and senior standing.

**ART 494 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 (4)**

History, status of the horse industry, breeds. Basic anatomy and physiology, unsoundnesses, diseases. Application of management skills, safety, conformation evaluation, hoof and leg conformation and care. Understanding equine behavior. 3 lectures, 1 laboratory.

**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 instructor.

**ASCI 212 Livestock Show Management (2)**

Principles and procedures in organizing, managing and promoting a livestock show. Emphasis placed on the actual management of operating Cal Poly's Western Bonanza Jr. Livestock Show. Total credit limited to 4 units. 2 activities.

**ASCI 214 Equine Management (2)**

Application of safety, risk reduction, horsemanship skills. Develop a working equine/human relationship. Selection and application of nutrition, equipment, preventive health and farrier program, and equitation skills. Miscellaneous course fee may be required—see *Class Schedule*. 2 laboratories. Prerequisite: Consent of instructor.

**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 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 302 or 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 or consent of instructor.

**ASCI 324 Advanced Equine Evaluation (2)**

Appraising the relative merit of individual horses in halter and performance through the application, development and refinement of deductive and inductive logical processes. Oral and written expression of the selection rationale. 2 laboratories. Prerequisites: ASCI 226 and/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 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 339 Internship in Animal Science (1–12) (CR/NC)**

Selected Animal Science 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor.

**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 and ASCI 260 or 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: consent of instructor.

**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 223.

**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 223 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 212 (or CHEM 216 and CHEM 217).

**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 485 Cooperative Education Experience in Animal Science (6) (CR/NC)**

Part-time work experience with an approved Animal Science firm engaged in production or related business, industry or governmental agency. 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**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 495 Cooperative Education Experience in Animal Science (12) (CR/NC)**

Full time work experience with an approved Animal Science firm engaged in production or related business, industry or governmental agency. 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**ASCI 500 Individual Study in Animal Science (1-6)**

Advanced independent study planned and completed under the direction of a member of the Animal Science faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**ASCI 570 Selected Topics in Animal Science (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 9 units. 1 to 3 seminars. Prerequisite: Graduate standing or 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.

**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 326 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., E.2.**

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.**

Anatomy, physiology, metabolism, population dynamics, and genetics of the prokaryote; the host parasite relationship. Laboratory portion to cover basic microbiological techniques and experiments in metabolism and genetics. 3 lectures, 2 laboratories. Prerequisite: BACT 221 and BIO 151.

**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, CHEM 212 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.

**BACT 402 General Virology (5)**

Infective macromolecules (prions, viroids, and viruses) associated with microbes, plants, and animals. Epidemiology, immune responses, pathogenicity, pathogenesis, prevention, diagnoses and treatments. 5 lectures. Prerequisite: BIO 351 or CHEM 373.

**BACT 404 Microbial Diversity and Evolution (4)**

Diversity, taxonomy, systematics, and molecular evolution of microorganisms. Fundamentals of microbial classification, molecular evolution, and tools used in evaluating phylogenetic relationships among microbial groups. 3 lectures, 1 laboratory. Prerequisite: BACT 222.

**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. Recommended: CHEM 212.

**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 222. Recommended: Organic Chemistry.

**BACT 424 Microbial 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 222 and CHEM 313.

**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: BACT 222 and BACT 423.

**BACT 436 Microbial Ecology (5)**

Ecology and interactions of prokaryotic and eukaryotic microorganisms in natural environments. Fundamentals of microbial ecology, microbial evolution, microbes and ecosystem function (bioremediation), practical aspects of microbial interactions, and microbial systematics. 3 lectures, 2 laboratories. Prerequisite: BACT 221.

**BACT 444 Dairy Microbiology (4)**

Microorganisms involved in the fermentation and ripening processes in the dairy industry, as well as those involved in spoilage of milk and dairy products, in the transmission of disease through these products, and indicator systems used to determine sanitary quality of these products. 2 lectures, 2 laboratories. Prerequisite: BACT 221.

**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 207 Resource Survey (3)**

Introduction to survey and analysis methods used in locating and assessing biological resources. Map reading, compass and level surveys, map construction, descriptive statistics, and animal, plant, and social surveys. 2 lectures, 1 laboratory. Prerequisite: MATH 120.

**BIO 220 Physiology and Biological Adaptation (4) GEB B.1.b., 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 227 Wildlife Conservation Biology (4) GEB B.1.b.**

Historical development of the wildlife conservation movement and philosophies. Analysis of management practices applied to game and non-game wildlife. Current problems involving people-wildlife interactions with special reference to endangered wildlife and land-use practices. 4 lectures.

**BIO 228 Wildlife Biology Laboratory (1) GEB B.1.b.**

Recognition of important wildlife resources and presentation of life histories. Emphasis towards those forms that have been historically managed as game species and those currently considered endangered. Investigation of habitats common to various wildlife. 1 laboratory. Prerequisite: Concurrent or previous enrollment in BIO 227.

**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 Conservation and Environmental Science (4) GEB B.1.b.**

Introduction to natural processes regulating renewable and non-renewable physical, chemical, and biological resources. Human population ecology and the influence and interactions of human populations on/with physical, chemical, and non-human biological resources. Principles of management, environmental science, and conservation biology that lead to equilibrium or self-sustaining conditions. 4 lectures. Prerequisite: One course in college biology.

**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 Survey of 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 or STAT 218.

**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 111 or CHEM 128 and one of the following: BIO 101, BIO 151, BOT 121, 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. Concurrent or previous 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. Concurrent or previous 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 327 Wildlife Biology Methods (5)**

Methods for gathering information for management of wildlife. Use of the literature, inventory of plants and animal populations, use of maps, sexing and aging, trapping, handling, and marking techniques, physiological indices, and radio telemetry. 3 lectures, 2 laboratories. Prerequisite: BIO 227 and BIO 228.

**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 334 Limnology (4) GEB B.1.b.**

Biological, physical, and chemical dynamics of aquatic systems surrounded by land. 3 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 351 Principles of Genetics (5) GEB B.1.b.**

Introduction to transmission genetics and to the structure, function and regulation of proteins and nucleic acids. 5 lectures. Prerequisite: BIO 151, BIO 152, BIO 153, and CHEM 313. Biochemistry is recommended.

**BIO 352 Cell Biology (4) GEB B.1.b.**

Introduction to eukaryotic gene regulation, cell development, protein sorting, signaling, cell adhesions, cell junctions, cell cycle and cytoskeleton. 4 lectures. Prerequisite: BIO 351.

**BIO 353 Cell Biology Laboratory (2) GEB B.1.b.**

Techniques used in biotechnology, including plant and animal cell culture, prokaryotic and eukaryotic transformation, restriction digests, cloning, expression vectors, genomic and plasmid DNA extraction. Southern blots, and PCR. 2 laboratories. Prerequisite: BIO 351.

**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 222, and BIO 351 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 (4)**

Scientific evaluation of the theories, mechanisms, and evidences concerning biological evolution. 3 lectures, 1 activity. Prerequisite: BIO 303 or BIO 351.

**BIO 415 Biogeography (4)**

Plant and animal distribution patterns in relation to past and present physical and biotic factors; survey of major biomes with major emphasis on North and South America. 4 lectures. Prerequisite: BIO 325.

**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 427 Wildlife Management (4)**

Important habitats, such as riparian, wetlands, etc. and habitat features important to wildlife, such as vegetation types and snags. Basic concepts of wildlife management. Emphasis on planning and designing habitats to meet the needs of wildlife. 3 lectures, 1 laboratory. Prerequisite: BIO 325.

**BIO 431 General and Cellular Physiology (4)**

Physiological processes in cells and organisms, including membrane phenomena, metabolism, enzyme kinetics, and cellular events associated with excitable cells and tissues. Current theories of biochemical, cellular, and organ system control mechanisms. Classical and current experimental techniques. 2 lectures, 2 laboratories. Prerequisite: BIO 152 or BIO 153, and CHEM 212. Recommended: STAT 218.

**BIO 432 Vertebrate Systems Physiology (4)**

Physiological mechanisms associated with several of the organ systems of vertebrates, including respiration and metabolism, circulation, digestion, water/ion regulation, and excretion. Various functional aspects, including cellular mechanisms, and how the mechanisms are integrated into the organism as a whole. 3 lectures, 1 laboratory. Prerequisite: BIO 431.

**BIO 433 Endocrinology and Reproductive Physiology (4)**

Introduction to the endocrine and reproductive systems of vertebrate animals. Topics include classical actions of hormones, mechanisms of hormone action, relationship between nervous and endocrine systems, assays of hormones, and selected clinical aspects of endocrinology. 3 lectures, 1 laboratory. Prerequisite: BIO 431.

**BIO 434 Environmental Physiology (4)**

Comparative physiological mechanisms involved in the regulation of oxygen uptake, water and ion balance, and temperature regulation in animals. Emphasis is placed on physiological adaptations which maintain or restore homeostasis in animals which are subjected to environmental changes. 3 lectures, 1 laboratory. Prerequisite: BIO 153, CHEM 212. Recommended: BIO 325 and BIO 431.

**BIO 435 Plant Physiology (4)**

Consideration of the principal physiological and biochemical processes of plants with emphasis on water relations, mineral nutrition, photosynthesis, and the physiology of plant development. 3 lectures, 1 laboratory. Prerequisite: BOT 121 or BIO 152, CHEM 212.

**BIO 437 Marine Resources (4)**

Biology of historical, current and potential marine resources including both technical means used to harvest and biological factors important in achieving a sustainable yield. Identification, life histories, ecology, culture and economics of pertinent organisms. 3 lectures, 1 laboratory. Prerequisite: BIO 152, BIO 153.

**BIO 438 Aquaculture (4)**

Propagation and rearing of fishes, invertebrates and algae from marine, freshwater and estuarine habitats. Current methodologies and general life histories. Global perspective including aquacultural development in developed and developing countries. 3 lectures, 1 laboratory. Prerequisite: BIO 153, ZOO 322, ZOO 336 or consent of instructor.

**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 218 or STAT 321 and completion of computer literacy requirement.

**BIO 444 Population Ecology (3)**

Growth, fluctuations, balance, and natural mechanisms controlling terrestrial wildlife populations. 3 lectures. Prerequisite: BIO 325 or one course in ecology.

**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 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, BIO 303 or BIO 351 and CHEM 313 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 (4)**

Consideration of recent studies on energetics, synthesis, regulation, genetics, transport, movements, reproduction, and differentiation of cells. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**BIO 502 Biology of Organisms (4)**

Genes and proteins that regulate the development and evolution of animals and plants. Role of homeotic and nonhomeotic genes. Importance of signal transduction pathways and regulation of the cell cycle. Role of oncogenes and mutant tumor suppressor genes in the development of cancer. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor; BIO 501, BIO 351, or CHEM 373.

**BIO 503 Population Biology (4)**

Considerations of theory and practice in population ecology, evolutionary biology and biosystematics. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**BIO 515 History of Biology (3)**

Analysis of historical attempts to solve biological problems. 3 seminars. Prerequisite: Graduate standing 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 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 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 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 or consent of instructor.

**BIO 575 College Teaching Practicum (4) (CR/NC)**

Part-time teaching assignment in an undergraduate college classroom. Includes teaching and related activities under the supervision of a professor in Biological Science. Total credit limited to 8 units. Credit/No Credit grading only. 4 activities. Prerequisite: Graduate standing and evidence of satisfactory preparation in biology. Department chair and graduate coordinator's approval required.

**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 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. Miscellaneous course fee may be required—see *Class Schedule*. 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 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 Phycology (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 (4)**

Current theory of and approaches to botanical systematics, including use of morphological, cytological, biochemical, ecological and evolutionary data in classification. Literature of systematic botany and rules of botanical nomenclature. 3 lectures, 1 laboratory. Prerequisite: BOT 223.

**BOT 450 Plant Biotechnology (5)**

Principles and methods of plant biotechnology important to industry and basic science. 3 lectures, 2 laboratories. Prerequisite: BIO 435.

## BRAE–BIORESOURCE and AGRICULTURAL ENGINEERING

**BRAE 121 Agricultural Mechanics (2)** **GEB F.2.**  
(formerly AE 121)

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.

**BRAE 124 Small Engines (2)**  
(formerly AG 124)

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.

**BRAE 128 Careers in Bioresource and Agricultural Engineering (2)** (formerly AE 128)

Introduction to careers associated with Bioresource and Agricultural Engineering, and Agricultural Systems Management. Professional engineering registration process. Engineering problem solution and report format. Design procedures. Engineering fundamentals. Laboratory includes visits to facilities relating to career opportunities. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: Majors only, MATH 116 or equivalent, high school drafting or concurrent enrollment in BRAE 133.

**BRAE 129 Laboratory Skills and Safety (1)**  
(formerly AE 129)

Introduction to fabrication and construction materials used in the field of Agricultural Engineering. Fabrication skills in the development of wood, metal, concrete projects, and creative design. Strength tests of wood, fasteners, concrete, and student design projects. 1 laboratory. Prerequisite: BRAE and ASM majors only, MATH 116 or equivalent, high school drafting or concurrent enrollment in BRAE 133.

**BRAE 133 Engineering Design Graphics (3)**  
(formerly AE 133)

Visual communication in engineering design and problem solving. Principles of freehand sketching, engineering graphics, and computer-aided-drafting. Perspective and orthographic sketching, orthographic drawing with instruments and computer, applied descriptive geometry. Not open for credit to students with previous college level drafting course work. 1 lecture, 2 laboratories.

**BRAE 141 Agricultural Machinery Safety (3)**  
(formerly ASM 141)

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.

**BRAE 142 Agricultural Power and Machinery Management (4)** (formerly ASM 142)

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.

**BRAE 143 Power and Machinery (4)**  
(formerly AE 143)

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: BRAE 128, MATH 116 or equivalent.

**BRAE 151 CAD for Agricultural Engineering (1)**  
(formerly AE 151)

Computer aided drafting on a desktop personal 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: BRAE 133 or equivalent.

**BRAE 200 Special Problems for Undergraduates (2–4)**  
(formerly AE 200)

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.

**BRAE 201 Closed Circuit Hydraulics (3)**  
(formerly AG 201)

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: BRAE 141.

**BRAE 203 Agricultural Systems Analysis (3)**  
(formerly ASM 203)

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.

**BRAE 226 Introduction to Principles of Bioresource Engineering (4)** (formerly AE 226)

Introduction to principles of engineering as applied to biological and agricultural systems as found in industry. Engineering properties of conventional and biological materials. Introduction to basic unit processes in industrial, agricultural, and biological systems. Special requirements of agricultural and biological processes. 3 lectures, 1 laboratory. Prerequisite: BRAE 128.

**BRAE 231 Agricultural Building Construction (3)**  
(formerly AG 231)

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: BRAE 128 or consent of instructor.

**BRAE 232 Agricultural Structures Planning (4)**  
(formerly AE 232)

Planning of facilities required in production systems. Materials and processes used in construction of agricultural structures. Environmental factors affecting crop storage structures and animal housing. Design of structural environments to meet the needs of commodities, animals, and plants. 3 lectures, 1 laboratory. Prerequisite: BRAE 128, BRAE 133, PHYS 132.

**BRAE 233 Agricultural Power Transmission and Mechanics (3)** (formerly AG 234)

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: BRAE 142, PHYS 121.

**BRAE 234 Introduction to Mechanical Systems in Agriculture (4)** (formerly AE 234)

Introduction to elements used in the mechanical transmission of power and force in agricultural systems. Power transmission using v-belts, roller chain, gear and shaft drives, hydraulic actuators. Linear and nonlinear actuation devices including linkages, cams, and hydraulic/pneumatic cylinders. 3 lectures, 1 laboratory. Prerequisite: BRAE 128, BRAE 129, PHYS 131.

**BRAE 235 Agricultural Power (3)**  
(formerly AG 235)

Principles of spark ignition and compression ignition engines and related accessories. Service, trouble-shooting, and repair procedures. 1 lecture, 2 laboratories.

**BRAE 236 Principles of Irrigation (4)**  
(formerly AE 236)

Land grading design, operation, management, and evaluation of irrigation methods. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: MATH 141, BRAE 237, SS 121, a computer programming course.

**BRAE 237 Engineering Surveying I (2)**  
(formerly AE 237)

Use and care of tapes, levels, theodolites and Global Positioning System (GPS) receivers. Keeping field notes, measurements by tape. Differential leveling. Turning angles and determining directions of lines. GPS measurements. Map reading. Introduction to electronic distance measurement (EDM), photogrammetry, and land modeling. 1 lecture, 1 laboratory. Prerequisite: MATH 119 or an understanding of trigonometric functions.

**BRAE 238 Engineering Surveying II (2)**  
(formerly AE 238)

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: BRAE 237.

**BRAE 239 Engineering Surveying (4)**

Use and care of tapes, levels, theodolites, Global Positioning system (GPS) receivers, Electronic Distance Measurement

instruments (EDM) and electronic field books. Traverses, triangulation, trilateration, earthwork and associated calculations. Topographic mapping, photogrammetry, map reading and land descriptions. 2 lectures, 2 laboratories. Prerequisite: MATH 119 or equivalent.

**BRAE 240 Agricultural Engineering Laboratory (1)**  
(formerly AE 240)

Individual projects. Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 laboratory. Prerequisite: Consent of instructor.

**BRAE 241 Gasoline Engine Diagnosis (3)**  
(formerly AG 241)

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: BRAE 235.

**BRAE 242 Diesel Fuel Systems (3)**  
(formerly AG 242)

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: BRAE 235 or equivalent or consent of instructor.

**BRAE 244 Project Analysis (5)**  
(formerly AG 244)

Analysis of projects for structural design, applied elements of statics, dynamics, strength of materials, fabrication, and fasteners. 3 lectures, 2 laboratories. Prerequisite: BRAE 133 or equivalent, BRAE 233.

**BRAE 245 Agricultural Equipment Projects (3)**  
(formerly AG 245)

Construction of special agricultural equipment related to any agricultural enterprise. 1 lecture, 2 laboratories. Prerequisite: BRAE 244.

**BRAE 247 Forest Surveying (2) (Also listed as FNR 247)**

Use and care of tapes, staff compass, abney levels, theodolites, and GPS receivers. Keeping field notes, measurements by tape. Closed and open traverse by compass and theodolite. Turning angles and determining directions of lines. Map reading and public land description. GPS measurements. 1 lecture, 1 laboratory. Prerequisite: MATH 119.

**BRAE 312 Hydraulics (4)**  
(formerly AE 312)

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.

**BRAE 321 Agricultural Safety (3)**  
(formerly AE 321)

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.

**BRAE 324 Principles of Agricultural Electrification (4)**  
(formerly ASM 324)

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.

**BRAE 325 Agricultural Energy Systems (3)**  
(formerly ASM 325)

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, BRAE 142.

**BRAE 326 Energy Systems for Agriculture (3)**  
(formerly AE 326)

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: BRAE 143, ME 211, ME 302. ME 302 may be taken concurrently.

**BRAE 328 Measurements and Computer Interfacing (4)**  
(formerly AE 328)

Transducers and engineering measurements in agricultural engineering. Covering transducer characteristics, signal processors and controllers, instrumentation techniques, and the use of the computer in the measurement and control of typical engineering problems. 3 lectures, 1 laboratory. Prerequisite: EE 201, EE 251, CSC 101, CSC 234 or CSC 231.

**BRAE 331 Irrigation Theory (3)**  
(formerly AE 331)

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: BRAE 236, or BRAE 340.

**BRAE 335 Internal Combustion Engines (4)**

Principles of operation of internal combustion engines. Theory of operation and diagnosis evaluation and repair of small engines, gasoline and diesel engines and economics of operation, use and repair. Power analysis and application. 2 lectures, 2 laboratories. Prerequisite: Junior standing.

**BRAE 337 Landscape Irrigation (3)**  
(formerly AE 337)

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.

**BRAE 339 Internship in Bioresource and Agricultural Engineering (1–12) (CR/NC)**  
(formerly AE 339 & ASM 339))

Selected Agricultural Engineering and Agricultural Systems Management 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor.

**BRAE 340 Irrigation Water Management (4)**      **GEB F.2.**  
(formerly AE 340)

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.

**BRAE 345 Aerial Photogrammetry and Remote Sensing (3)**  
(formerly AE 345)

Object recognition, three-dimensional equipment, and interpretation of aerial photographs. Print alignment, stereoscopic viewing, scales, elevation determination, and application. Orthophotos and their relationship to Geographic Information Systems (GIS). Application of aerial photos to regional studies. 2 lectures, 1 laboratory. Prerequisite: MATH 119.

**BRAE 348 Energy for a Sustainable Society (3)**  
(formerly AE 348)

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.

**BRAE 400 Special Problems for Advanced Undergraduates (2–4)** (formerly AE 400)

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.

**BRAE 402 Agricultural Materials (3)**  
(formerly ASM 402)

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: BRAE 325.

**BRAE 403 Agricultural Systems Engineering (4)**  
(formerly AE 403)

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. Professional responsibilities in Agricultural Engineering including ethics, patents, copyrights, liability. 4 lectures. Prerequisite: IME 314, MATH 242.

**BRAE 405 Chemigation (1)**  
(formerly AE 405)

Fertilizer and chemical injection through irrigation systems. Hardware, fertilizer compounds, and distribution uniformity. Matching chemicals and equipment to specific irrigation methods. Safety. Miscellaneous course fee required—see *Class Schedule*. 1 laboratory. Prerequisite: BRAE 236 or BRAE 340.

**BRAE 414 Irrigation Engineering (4)**  
(formerly AE 414)

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: BRAE 331 or BRAE 340; hydraulics.

**BRAE 415 Hydrology (3)**  
(formerly AE 415)

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.

**BRAE 421 Equipment Engineering (3)**  
(formerly AE 421)

Design and construction of specialized agricultural components and equipment. 2 lectures, 1 laboratory. Prerequisite: CE 205, ME 212, IME 142.

**BRAE 422 Equipment Engineering (4)**  
(formerly AE 422)

Design and construction of specialized agricultural components and equipment. 2 lectures, 2 laboratories. Prerequisite: BRAE 421.

**BRAE 425 Computer Controls for Agriculture (3)**  
(formerly ASM 425)

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: BRAE 324, CSC 110 or AG 250.

**BRAE 427 Agricultural Process Engineering (3)**  
(formerly AE 427)

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: BRAE 312, BRAE 333, ME 302.

**BRAE 430 Finite Element Analysis (3)**  
(formerly AE 430)

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.

**BRAE 432 Agricultural Buildings (4)**  
(formerly ASM 432)

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, BRAE 402.

**BRAE 433 Agricultural Structures Design (4)**  
(formerly AE 433)

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: BRAE 232, CE 205.

**BRAE 435 Drainage (3)**  
(formerly AE 435)

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: BRAE 312, BRAE 331, or BRAE 340 or SS 432 and consent of instructor.

**BRAE 437 Conservation Engineering (3)**  
(formerly AE 437)

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: BRAE 312, BRAE 415, SS 121, or consent of instructor.

**BRAE 438 Drip/Micro Irrigation (4)**  
(formerly AE 438)

Drip/micro irrigation hardware and management. Emphasizes agricultural drip/micro irrigation with some landscape application. Filtration, emitters, chemical injection, agronomic constraints, and scheduling. Field trip(s) included. 3 lectures, 1 laboratory. Prerequisite: BRAE 236 or BRAE 340.

**BRAE 440 Agricultural Irrigation Systems (4)**  
(formerly AE 440)

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.

**BRAE 446 CAD Software for Land Modeling (2)**  
(formerly AE 446)

Techniques for preparing data for geographic information systems using TERRAMODEL. Digital data from surveying, orthophotography, and government data sources will be entered, displayed, edited and translated for use in other software packages. Transformation of coordinate systems. Earthwork and hydrologic examples. 1 lecture, 1 laboratory. Prerequisite: BRAE 237, and GEB F.1. computer literacy course.

**BRAE 448 Bioconversion (3)**  
(formerly AE 448)

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.

**BRAE 452 Legal Aspects/Data Accuracy for GIS (3)**  
(formerly AE 452)

Research of boundary descriptions, record maps, and existing survey data. Value and implications of the data. Local and state requirements and restrictions on use of data. Procedures

for incorporation of data into Arc/Info. 2 lectures, 1 laboratory. Prerequisite: BRAE 237.

**BRAE 460 Senior Project Organization (1)**

Selection and organization of senior project. Involves time management, research techniques, budgeting and project presentation. 1 lecture. Prerequisite: ENGL 218, junior standing.

**BRAE 461, 462 Senior Project (2) (2)**  
(formerly AE 461, 462)

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. Prerequisite: BRAE 460.

**BRAE 463 Undergraduate Seminar (1)**  
(formerly ASM 463)

Group discussion of current agricultural engineering topics presented by individual members of the class and visitors. Placement opportunities and requirements. 1 seminar.

**BRAE 464 Professional Practice (3)**  
(formerly AE 464)

Contracts, specifications, and legal aspects of agricultural engineering. Safety and human factors. Engineering ethics and professional registration. 3 lectures. Prerequisite: Senior standing.

**BRAE 470 Selected Advanced Topics (1–3)**  
(formerly AE 470)

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.

**BRAE 471 Selected Advanced Laboratory (1–3)**  
(formerly AE 471)

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.

**BRAE 481 Advanced Agricultural Mechanics (2)**  
(formerly AE 481)

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.

**BRAE 485 Cooperative Education Experience in Bioresource and Agricultural Engineering (6)**  
(CR/NC) (formerly AE 485 & ASM 485)

Part-time work experience with an approved Bioresource and Agricultural Engineering firm engaged in production or related business, industry or governmental agency. 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. Degree credit limited to 6 units. Credit/No Credit

grading only. Prerequisite: Sophomore standing and consent of instructor.

**BRAE 492 Pumps and Pump Drivers (3)**  
(formerly AE 492)

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.

**BRAE 495 Cooperative Education Experience in Bioresource and Agricultural Engineering (12)**  
(CR/NC) (formerly AE 495 & ASM 495)

Full time work experience with an approved Bioresource and Agricultural Engineering firm engaged in production or related business, industry or governmental agency. 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**BRAE 500 Individual Study (1–3)**  
(formerly AE 500)

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.

**BRAE 521 Engineering of Agricultural Systems (4)**  
(formerly AE 521)

Principles and methods of creative problem solving and systems analysis as applied to the design of agricultural systems. Problem solving using the engineering design process to analyze the need, establish boundaries, and generate creative alternative solutions. Examples worked through in feasibility analysis, transportation and network problems, linear programming, project planning, human factors and ergonomics, and system analysis with an emphasis on optimum system operation. 3 lectures, 1 laboratory. Prerequisite: Consent of instructor.

**BRAE 522 Instrumentation Control/Microprocessors (4)**  
(formerly AE 522)

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.

**BRAE 529 Small Farm Mechanization (3)**  
(formerly AE 529)

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: BRAE 143 or equivalent, graduate standing, or consent of instructor.

**BRAE 531 Water Wells (3)**  
(formerly AE 531)

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.

**BRAE 533 Irrigation Project Design (4)**  
(formerly AE 533)

Engineering solutions and social aspects of improved water delivery to farms and canal automation. Flow measurement. Water user associations. Unsteady canal and pipeline controls. PID controls and modeling. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: BRAE 340, hydraulics/fluid mechanics.

**BRAE 570 Selected Topics in Bioresource and Agricultural Engineering (1–3)**  
(formerly AE 570 & ASM 570)

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 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**BRAE 571 Selected Advanced Laboratory in Bioresource and Agricultural Engineering (1–3)**  
(formerly AE 571 & ASM 571)

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.

**BRAE 581 Graduate Seminar in Bioresource and Agricultural Engineering (3)** (formerly AE 581)

Group study of current problems of the bioresource and agricultural engineering industry; current experimental and research findings as applied to field of bioresource and agricultural engineering. *Class Schedule* will list topic selected. Total credit limited to 9 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**BRAE 599 Thesis in Bioresource and Agricultural Engineering (1–9)** (formerly AE 599)

Systematic research of a significant problem in bioresource and agricultural engineering. 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.

## 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 178 Introduction to Human Relations in Business (3)** (formerly MGT 118)

Small group dynamics, leadership, communication, motivation, and perception. The individual in the business organization. For non-Business majors. 3 lectures.

**BUS 200 Special Problems for Undergraduates (1–2)** (formerly MGT 200)

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 area coordinator.

**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 212 Financial Accounting for Nonbusiness Majors (4)** (formerly ACTG 211)

Introduction to financial accounting theory and practice with an emphasis on financial statement preparation and analysis. Not open to Business majors. 4 lectures.

**BUS 214 Financial Accounting (5)** (formerly ACTG 224)

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.

**BUS 215 Managerial Accounting (4)** (formerly ACTG 225)

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 119 or equivalent, and BUS 212 or BUS 214 or consent of instructor.

**BUS 245 Elements of Marketing (4)** (formerly MKTG 204)

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.

**BUS 271 Principles of Management (3)** (formerly MGT 201)

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.

**BUS 276 Principles of Purchasing (3)** (formerly MGT 206)

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.

**BUS 302 International and Cross Cultural Management (4)** (formerly MGT 332)

Dimensions of culture and its variations within and across nations. Impact of culture on managing in a global context. Development of managerial competencies requisite to working in and supervising multicultural groups in international corporations. Frameworks for analyzing cultural and contextual influences on organizational behavior, culture shock and readjustment, expatriation and repatriation, cultural change and innovation, intercultural conflict, and ethical dilemmas. Case studies, behavioral simulations, self-assessments and fieldwork. 4 lectures. Prerequisite: Junior standing and BUS 387 or consent of instructor.

**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 314 Tax Accounting (4)** (formerly ACTG 304)

Federal income taxation of individuals. 4 lectures. Prerequisite: BUS 212 or BUS 214 or consent of instructor.

**BUS 321, 322, 323 Intermediate Accounting I, II, III (4) (4) (4)** (formerly ACTG 321, 322, 323)

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: BUS 214 and junior standing; 322: BUS 321 with minimum grade of C-; 323: BUS 322 with minimum grade of C-.

**BUS 342 Financial Management (4)** (formerly FIN 342)

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. BUS 215 recommended. Junior standing required.

**BUS 346 Principles of Marketing (4)***(formerly MKTG 301)*

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, the equivalent or permission of instructor.

**BUS 347 Marketing Research I (4)***(formerly MKTG 302)*

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: BUS 371.

**BUS 348 Buyer Behavior (4)***(formerly MKTG 303)*

Applied study of behavior that affects marketing decisions in both consumer and industrial markets. 4 lectures. Prerequisite: BUS 346.

**BUS 349 Selling: Building Partnerships (4)***(formerly MKTG 304)*

Basic skills and tools for successfully planning and conducting sales calls, building long-term buyer/seller relationships and territory, time and career management. Emphasis on sales roleplays. 4 lectures. Prerequisite: Junior standing.

**BUS 371 Production and Operations Management (4)***(formerly MGT 301)*

Introduction to operations management and production systems; production models. Planning and control in manufacturing. Quantitative methods and statistical techniques used in production systems management. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 activity. Prerequisite: MATH 131 or MATH 221, and STAT 211 or STAT 252, and junior standing.

**BUS 381 Industrial Management (4)***(formerly MGT 311)*

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.

**BUS 382 Organization and Management Theory (4)***(formerly MGT 312)*

Examination of macro dimensions of organizations including environment, mission, goals, structure, technology, and internal management systems and processes. Case analysis, simulation. Application to business firms, government, voluntary organizations. 4 lectures. Prerequisite: Junior standing.

**BUS 383 Industrial Relations (3)***(formerly MGT 313)*

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.

**BUS 384 Human Resources Management (4)***(formerly MGT 314)*

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.

**BUS 387 Organizational Behavior (4)***(formerly MGT 317)*

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.

**BUS 391 Management Information Systems (4)***(formerly MIS 321)*

Applications of computers in business and industry. Management information systems and integrated systems concepts. Data organizations, file processing, spreadsheets, data base management, and functional information 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. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 activity. Prerequisite: CSC 119 and junior standing.

**BUS 400 Special Problems for Advanced Undergraduates (1–4)***(formerly also ACTG & MGT 400)*

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Senior standing or consent of instructor.

**BUS 401 Seminar in General Management and Strategy (4)***(formerly MGT 414)*

Application of interdisciplinary skills to business and corporate strategy formulation and implementation. Analysis of interdependence between external environments and internal systems. Focus on responsibilities, tasks, and skills of general managers. Case studies, group problem solving. Integrating course of Business core curriculum. 4 seminars. Prerequisite: All 300-level Business core courses and senior standing.

**BUS 402 International Business Management (4)***(formerly MGT 406)*

Managerial concepts and techniques for analysis and decision making within international businesses. Environmental and organizational factors influencing multinational operations. Assessing international market opportunities and entry modes. Complexities of multinational management strategy, structure and systems, especially during initial stages of internationalization. Case studies and simulations. 4 lectures. Prerequisite: Senior standing and completion of all 300-level Business core courses or consent of instructor.

**BUS 403 Advanced Seminar in International Management (4) (formerly MGT 489)**

Integration of management concepts within complex multinational organizations. Interdisciplinary approach to

identifying and assessing multinational and global competitive environments and strategies; structuring and managing interdependent multinational operations; addressing conflicts between domestic and international policies and practices in multinational enterprises. Case studies, simulations, group analysis and problem solving. 4 seminars. Prerequisite: BUS 302 and BUS 402 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 409 Law of Real Property (4)**  
(formerly *FIN 412*)

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. Prerequisite: Senior standing.

**BUS 410 The Legal Environment of International Business (4)** (formerly *BUS 490*)

U.S., foreign, and international law affecting international business transactions. U.S. and foreign cultural, ethical, and political norms and legal institutions, and their effect on law and business. 4 lectures. Prerequisite: Senior standing, a course in American business law, one Political Science course, or consent of instructor.

**BUS 411 Managing Technology in the International Legal Environment (4)**

Practical legal decisions required to conduct business for or with high technology companies. Examination of methods to protect high technology developments in international markets, including copyrights, patents, trade secrets, trademarks and contracts. Case studies. 4 lectures. Prerequisite: BUS 207 or equivalent.

**BUS 412 Advanced Cost Accounting (4)**  
(formerly *ACTG 402*)

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: BUS 215.

**BUS 414 Taxation of Partnerships, Estates and Trusts and Complex Capital Transactions (4)**  
(formerly *ACTG 404*)

Federal income taxation of sales and exchanges, Subchapter S corporations, partnerships, estates and trusts. Federal gift and estate taxes. 4 lectures. Prerequisite: BUS 314.

**BUS 415 Corporate Tax Accounting and Tax Administration (4)** (formerly *ACTG 405*)

Federal income taxation of regular corporations, tax research, tax administration, and IRS practice. 4 lectures. Prerequisite: BUS 314.

**BUS 416 Volunteer Income Tax Assistance (2)**  
(formerly *ACTG 406*)

Training and practice in the preparation of state and federal income tax returns. Under supervision of qualified professionals, tax preparation sites are operated to provide free tax assistance to community residents. Prerequisite: BUS 314.

**BUS 421 Accounting for Business Combinations (2)**  
(formerly *ACTG 421*)

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: BUS 323 with minimum grade of C-, or consent of instructor.

**BUS 422 Accounting for Governments and Not-For Profit Entities (2)** (formerly *ACTG 422*)

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: BUS 321 with minimum grade of C-, or consent of instructor.

**BUS 423 Financial Reporting by Public Companies (2)**  
(formerly *ACTG 423*)

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: BUS 323 with minimum grade of C-, or consent of instructor.

**BUS 424 Professional Accounting (4)**  
(formerly *ACTG 431*)

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: BUS 323 with minimum grade of C-, or consent of instructor.

**BUS 425 Auditing (4)**  
(formerly *ACTG 446*)

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: BUS 323 with minimum grade of C-, or consent of instructor. Recommended: BUS 391.

**BUS 426 Advanced Auditing (4)**  
(formerly *ACTG 447*)

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: BUS 425. Recommended: BUS 391.

**BUS 427 International Accounting (4)**  
(formerly ACTG 453)

Consideration of conceptual, managerial, professional and institutional issues of international accounting. 4 lectures. Prerequisite: BUS 321.

**BUS 428 Accounting Policy (4)**  
(formerly ACTG 489)

Role of management in establishing and directing accounting policy. Coverage includes impact of management decisions on external reporting and taxes and the impact of financial reporting requirements on management decisions. 4 seminars. Prerequisite: BUS 322.

**BUS 430 Internship (2–4) (CR/NC)**  
(formerly MGT 430)

Placement as an employee in a business firm approved by the area coordinator. Periodic written progress reports required. Collateral reading correlated with the work experience. Credit/No Credit grading. Prerequisite: Approval of area coordinator.

**BUS 431 Security Analysis and Portfolio Management (4)**  
(formerly FIN 411)

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: BUS 342.

**BUS 433 International Business Finance (4)**  
(formerly FIN 430)

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: BUS 342.

**BUS 434 Real Estate Finance (4)**  
(formerly FIN 432)

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: BUS 342.

**BUS 435 Real Estate Investment (4)**  
(formerly FIN 434)

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: BUS 342. Recommended: BUS 434.

**BUS 440 Commercial Bank Management (4)**  
(formerly FIN 440)

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, BUS 342, and ECON 337.

**BUS 441 Computer Applications in Finance (4)**  
(formerly FIN 466)

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: BUS 342 and BUS 391.

**BUS 442 Advanced Seminar in Investment (4)**  
(formerly FIN 480)

Current topics in investments. An in-depth analysis of the efficient markets hypothesis and capital market theory. 4 seminars. Prerequisite: BUS 431.

**BUS 443 Case Studies in Finance (4)**  
(formerly FIN 489)

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: BUS 342, BUS 321, and BUS 431.

**BUS 446 International Marketing (4)**  
(formerly MKTG 401)

Marketing activities necessary to direct the flow of a company's goods and services to customers in global markets. 4 lectures. Prerequisite: BUS 346 and senior standing.

**BUS 447 Marketing Research II (4)**  
(formerly MKTG 402)

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: BUS 347 and senior standing.

**BUS 448 Services Marketing (4)**  
(formerly MKTG 404)

Examines service organizations such as banks, hotels, hospitals and professional service organizations, and the distinctive approach required for marketing strategy which is unique to service companies. 4 lectures. Prerequisite: BUS 346 and senior standing.

**BUS 449 Sales Management (4)**  
(formerly MKTG 405)

Management of the field sales force, including staffing, training, directing, evaluating and control of sales personnel. 4 lectures. Prerequisite: BUS 346 and senior standing.

**BUS 450 Promotion Strategies (4)**  
(formerly MKTG 408)

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: BUS 346.

**BUS 451 Direct Marketing (4)**  
(formerly MKTG 450)

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: BUS 347 and senior standing.

**BUS 452 Product Management (4)***(formerly MKTG 409)*

Focuses on developing objectives and strategies for a variety of goods and services throughout their lifecycle. Decisions on price, sales projection, distribution and product (goods and services) to achieve objectives. 4 lectures. Prerequisite: BUS 346 and senior standing.

**BUS 453 Marketing Law (4)***(formerly MKTG 412)*

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.

**BUS 454 Developing and Presenting Marketing Plans (4)** *(formerly MKTG 420)*

Developing and presenting professional marketing plans. Focus on activities most relevant to junior-level managers: analysis of information pertaining to a product's/service's environment, customers and competitors. 4 lectures. Prerequisite: BUS 346, BUS 347 and BUS 348.

**BUS 455 Marketing Management (4)***(formerly MKTG 460)*

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: BUS 347, BUS 348, and senior standing.

**BUS 461, 462 Senior Project (2)***(formerly also ACTG & MGT 461, 462)*

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.

**BUS 470 Selected Advanced Topics (1–3)***(formerly also ACTG, MGT, & MKTG 470)*

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 471 Compensation (4)***(formerly MGT 410)*

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: BUS 384 or consent of instructor.

**BUS 472 Labor Relations (4)***(formerly MGT 412)*

Union organizing. Negotiation and administration of collective agreements. Simulation of bargaining, grievance, and arbitration processes. 4 lectures. Prerequisite: Junior standing.

**BUS 473 Labor Law (4)***(formerly MGT 413)*

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: Senior standing and completion of all 300-level Business core courses or consent of instructor.

**BUS 475 Staffing (4)***(formerly MGT 415)*

Processes by which individuals and organizations become matched to form the employment relationship. Specific issues related to human resources planning, internal and external recruitment and selection. 4 lectures. Prerequisite: BUS 384.

**BUS 476 Employee Training and Development (4)***(formerly MGT 416)*

Design, delivery and evaluation of employee training and human resource development in an organizational setting. 4 lectures. Prerequisite: BUS 384.

**BUS 477 Organization Development (4)***(formerly MGT 417)*

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: BUS 387 or consent of instructor.

**BUS 478 Organization Design (4)***(formerly MGT 418)*

Impact of changing business environment on design of organizations. Alternative design models, redesign processes, and guiding principles. Application to case studies, current redesign projects and field studies. 4 lectures. Prerequisite: BUS 382 or consent of instructor.

**BUS 479 Purchasing and Materials Management (4)***(formerly MGT 442)*

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.

**BUS 480 Operations Planning and Control (4)***(formerly MGT 441)*

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: BUS 371.

**BUS 481 Service Operations Management (4)***(formerly MGT 440)*

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: BUS 371.



**BUS 482 Advanced Operations Management (4)**  
(formerly MGT 445)

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: BUS 371, and senior standing.

**BUS 483 Seminar in Managerial Consultation (4)**  
(formerly MGT 475)

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: Senior standing or 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 487 Seminar in Quality Management (4)**  
(formerly MGT 487)

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, BUS 371.

**BUS 488 Small Business Management (4)**  
(formerly MGT 488)

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.

**BUS 491 Advanced Quantitative Methods and Control in Business (4)** (formerly MIS 418)

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: BUS 391.

**BUS 492 Expert Systems Applications in Business (4)**  
(formerly MIS 419)

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: BUS 391.

**BUS 493 Information Systems Analysis and Design (4)**  
(formerly MIS 422)

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: BUS 498.

**BUS 494 Small Business Information Systems (4)**  
(formerly MIS 425)

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: BUS 391; BUS 214, BUS 215 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 496 Information Systems Design and Implementation (4)** (formerly MIS 432)

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: BUS 498, BUS 493.

**BUS 497 Multimedia Presentation Systems in Business (4)**  
(formerly MIS 435)

Use of front-end software development tools to explore computer multimedia environments with an emphasis on visual programming for business applications. Methods for integrating text, graphics, animation, sound and video to construct desktop presentations. 3 lectures, 1 activity. Prerequisite: BUS 391.

**BUS 498 Information Management and Database Systems (4)** (formerly MIS 412)

Overview of database management and modeling. Entity-Relationship Diagramming (ERD) techniques. 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 103, CSC 233, BUS 391.

## CD-CHILD DEVELOPMENT

**CD 102 Orientation to Child Development (4)**

Introduction to child development, including methods and theories, career opportunities and the program at Cal Poly. Information on intellectual and attitudinal development

during the college years, and a series of assessments to aid in setting goals. 4 lectures. Prerequisite: CD majors only.

**CD 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 CD majors. 3 lectures.

**CD 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.

**CD 128 Program Planning for Nurturing Relationships (3)**

The role of nurturing relationships in human development. Creating educational programs that nurture human beings. 3 activities.

**CD 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.

**CD 200 Special Problems for Undergraduates (1–4)**

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 4 units per quarter.

**CD 203 Family Development (4)**

Examination of how families live out alterations experienced over the life cycle. Emphasis on using family development concepts to clarify central questions facing families over time. A model will be presented that will apply to the diversity found in society. 4 lectures.

**CD 209 Early Development: Conception through Childhood (4)**

Human development from conception through childhood. Discussion and analysis of research and theory regarding physiological, cognitive and psychosocial domains of development, especially as they apply to working with children and families in educational settings. 4 lectures. Prerequisite: CD 102, PSY 201 or PSY 202.

**CD 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: CD 209.

**CD 306 Adolescence (4) (Also listed as PSY 306)**

Psychological analysis of the years from prepubescence to young adulthood. Current research on behavior and development during adolescence with emphasis on physical, affective, cognitive, sociocultural, historical, family, peer and school aspects of life during the post-child, pre-adult years. 4 lectures. Prerequisite: PSY 201 or PSY 202, junior standing.

**CD 309 Learning, Development, and Technology I (4)**

Introduction to relationship between development and learning, and to application of developmental principles to the creation of age appropriate curriculum. Principles

illustrated through examination of sensory-motor development and appropriate activities for promoting gross motor, fine motor, perpetual, and volitional development. 4 lectures. Prerequisite: CD 128, CD 209.

**CD 310 Learning, Development, and Technology II (4)**

Examination of developmental learning and the activities, organizational practices, and methods which promote or hinder it, with a special examination of the influence of development in the process of children learning to read. 4 activities. Prerequisite: CD 309.

**CD 311 Learning, Development, and Technology III (4)**

Examination of the concept of learning competence and its relation to creativity. 4 activities. Prerequisite: CD 310.

**CD 324 Guiding Children and Adolescents (4)**

Group process and guidance techniques for adults working with young children and adolescents in family, community, and educational settings. Examination of cases which require the application of theory to practical situations typically encountered by adults working with children. 4 lectures. Prerequisite: CD 209 and PSY 323 or consent of instructor.

**CD 329 Research Methods in Child Development (3)**

Introduction to research methods in child development. Critically evaluating research literature, generating research questions, and developing expertise in methods of naturalistic and structured observation, testing, structured situations, and interviews with children and adolescents. 2 lectures, 1 activity. Prerequisite: PSY 201 or PSY 202.

**CD 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: CD 230, CD 311, CD 324, PSY 323, KINE 280 or equivalent first aid certification, junior standing and consent of instructor.

**CD 350 Developmental Issues in Education (3)**

Interaction of nature and nurture as related to fundamental issues about how human beings develop and learn. Questions concerning intelligence, temperament, talent, creativity, learning competence, volition, moral development, group process, and the implications these topics have for education. 3 lectures. Prerequisite: CD 209.

**CD 390 Career Planning (2) (CR/NC)  
(Also listed as PSY 390)**

Individual career and graduate school planning. Current employment issues for college graduates such as career profiles, trends and work environments. Credit/No Credit grading only. 2 seminars. Prerequisite: Junior or senior standing or consent of instructor.

**CD 400 Special Problems for Advanced Undergraduates (1–4)**

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 4 units per quarter. Prerequisite: Junior standing.

**CD 401 Perspectives on Childhood Education (4)**

Past, present and future perspectives in theory and practice of childhood education. Analysis of current research issues and

applications. 4 seminars. Prerequisite: CD 330 or consent of instructor.

**CD 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: CD 330.

**CD 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: CD 404.

**CD 430 Advanced Internship (4) (CR/NC)**

Faculty-supervised preprofessional experience in a career-related setting which complements the CD 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: CD or Liberal Studies major, CD 330, and consent of instructor.

**CD 461 Senior Project Seminar (2)**

Senior project expectations and skills. Students then work alone or in groups to identify an appropriate topic and identify methods and background information, to be presented in a series of progress reports. 2 seminars. Prerequisite: CD 330, CD major, completion of GWR and consent of instructor.

**CD 462 Senior Project (2)**

Completion of a project under faculty supervision. Prerequisite: CD 461.

**CD 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. 1–4 lectures. Prerequisite: Consent of instructor.

## CE–CIVIL ENGINEERING

**CE 111 Introduction to Civil Engineering (1) (CR/NC)**

Broad overview of the field of civil engineering, including professional societies and their student chapters, professional licensing and registration, professional codes of ethics, the elements of engineering design, and the scope of analysis and design activities undertaken by private- and public-sector civil design professionals. Credit/No Credit grading only. 1 lecture.

**CE 114 Introduction to CAD in Civil and Environmental Engineering (4)**

The Civil and Environmental Engineering design process. Use of AutoCAD to illustrate and quantify design alternatives. Practice in creating and evaluating typical designs drawn from different specialty areas of the field. Related topics in information technology. Miscellaneous course fee may be required—see *Class Schedule*. 2 lectures, 2 laboratories.

Prerequisite: MATH 141; CSC 110 or equivalent or passing score on qualifying test of basic computer skills.

**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 chair.

**CE 201 Strength of Materials (5)**

Stresses, strains, and deformations associated with axial, torsional, and flexural loading of bars, shafts, and beams. Mohr's Circle representations of the state of stress and strain at a point. Buckling of rigid and deformable columns. Analysis of elementary determinate and indeterminate mechanical and structural systems. Equivalent in content to CE 204 and CE 205. 5 lectures. Prerequisite: ME 211.

**CE 204 Strength of Materials I (3)**

Stresses, strains, and deformations associated with axial, torsional, and flexural loading of bars, shafts, and beams. Analysis of elementary determinate and indeterminate mechanical and structural systems. 3 lectures. Prerequisite: ME 211.

**CE 205 Strength of Materials II (2)**

Mohr's Circle representations of the state of stress and strain at a point. Analysis of beam deflections and rotations. Shear force and bending moment diagrams for indeterminate beams. Buckling of rigid and deformable columns. 2 lectures. Prerequisite: CE 204.

**CE 206 Strength of Materials Laboratory (1)**

Introduction to experimental stress analysis. Verification of analytical equations through strain gage measurements of axially, torsionally, and flexurally loaded specimens. 1 laboratory. Prerequisite or concurrent: CE 201 or CE 205.

**CE 221 Fundamentals of Transportation Engineering (3)**

**GEB F.2.**

The characteristics and functions of highway, air, rail, transit and other modes of urban and intercity transportation. History of transportation design, operations, and planning. Evaluation of costs, benefits, and environmental considerations. 3 lectures. Prerequisite: MATH 141.

**CE 222 Fundamentals of Transportation Engineering Laboratory (2)**

Application of principles of transportation planning, operations, and design. Emphasis on urban transportation planning and operations, and the design of urban and intercity highway and rail facilities. 2 laboratories. Prerequisite or co-requisite: CE 221.

**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 114, 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 351 Structural Analysis (5)**

Analysis for member forces and deflections of determinate and indeterminate structures, including trusses, beams, and frames. General theorems, influence diagrams, and energy methods. 5 lectures. Prerequisite: CE 201 or 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 351.

**CE 381 Geotechnical Engineering (4)**

Engineering geology, elementary mass-volume relations, clay-water interaction, soil classification, soil compaction, geostatic stress distributions, 1-D and 2-D steady-state flow, shear strength under drained and undrained conditions. 4 lectures. Prerequisite: CE 205, ME 341.

**CE 382 Geotechnical Engineering Laboratory (1)**

Use of standard laboratory test methods to determine physical, mechanical, and hydraulic properties of soil. 1 laboratory. Co-requisite: CE 381.

**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 chair.

**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 351, 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 351, ME 212.

**CE 421 Traffic Engineering (4)**

Improvement of urban circulation on freeways, city streets, and parking facilities. Traffic monitoring and control. Traffic data systems. Centralized versus decentralized control. Use of traffic simulation. New technologies. 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 432 Coastal Engineering (3)**

Application of linear wave theory to the analysis of beaches and coastal revetments for wave runoff, overtopping, and structure setback. Design of rip-rap revetments for wave runoff, overtopping, and structure setback. Analysis of wave forces on breakwaters and vertical walls. Application of Catenary theory to ocean and offshore ship moorings. 3 lectures. Prerequisite: CE 431.

**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 351.

**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 351, CE 355, CE 453.

**CE 461, 462 Senior Project (2) (2)**

Completion of a 120-hour integrated civil research, analysis, and/or design project that is representative of those

encountered in professional practice. Prerequisite: Senior standing and consent of the supervising faculty member.

**CE 464 Professional Practice (3)**

Examination of the non-technical issues that are dealt with on a regular basis by the design professional, including professional ethics, marketing and business development, professional engagement, personnel and project management, risk management, professional liability insurance, and dispute resolution. 3 seminars. Prerequisite: Senior 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)**

Immediate settlement, consolidation settlement, rate of consolidation, and creep. Stress distributions beneath loaded areas. Methods for accelerating and/or reducing settlement. Analysis of bearing capacity for generalized conditions. Design of reinforced concrete spread footings. Standard field and laboratory testing. 3 lectures, 1 laboratory. Prerequisite: CE 381, CE 382.

**CE 482 Conventional Subsurface Exploration (4)**

Subsurface exploration and sampling techniques. Laboratory analysis of material variability. Preparation of subsurface exploration reports. 2 lectures, 2 laboratories. Prerequisite: CE 481.

**CE 483 Environmental Geotechnology (4)**

Application of geotechnical engineering principles to environmental engineering problems. Site characterization and assessment. Sampling and monitoring procedures. Design of waste containment systems. Site remediation. Computer-aided analysis. 4 lectures. Prerequisite: CE 481.

**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 chair, 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 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, 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 221, 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 535 Water Resources Systems Planning and Analysis (3)**

Water resources planning, development, system analysis and optimization. Dynamic programming, multi-objective water resource systems. 3 lectures. Prerequisite: CE 336.

**CE 537 Groundwater Contamination (3)**

Sources and types of groundwater contamination, contamination transport mechanisms. Sorption and other chemical reactions. Numerical modeling of contaminant transport. Nonaqueous phase liquids. Groundwater remediation and design. 3 lectures. Prerequisite: CE 114; co-requisite: CE 434 or equivalent.

**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 351, 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 (4)**

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 prestressed concrete components of civil engineering systems for buildings and highway construction. Beams, slabs, columns, continuous systems, walls, connections, and composite systems. 4 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 (4)**

Advanced topics in saturated flow, unsaturated flow, and consolidation. Stress-strain-deformation response of soils under both drained and undrained loading. Soil stabilization, and ground modification. Conventional and advanced field and laboratory strength testing. 2 lectures, 2 laboratories. Prerequisite: CE 481 or graduate standing.

**CE 582 Advanced Geotechnical Testing (4)**

Standard penetration, cone penetration, and flat-plate dilatometer testing. Equipment operation and maintenance. Interpretation of SPT/CPT/DMT sounding data. Stratigraphic analysis. CPT/DMT-based analysis and design of shallow and deep foundations. 2 lectures, 2 laboratories. Prerequisite: CE 481 or graduate standing.

**CE 583 Geotechnical Earthquake Engineering (4)**

Introduction to engineering seismology, dynamic behavior of soils, seismic site response analysis, seismic earth pressures, seismic stability of slopes, soil liquefaction and lateral spreading, and mitigation techniques. Computer-aided analysis. 4 lectures. Prerequisite: CE 481 or graduate standing.

**CE 584 Lateral Support Systems (4)**

Classical and modern earth pressure theories. Lateral earth pressure calculations for general subsurface conditions. Analysis and design of reinforced concrete cantilever walls, sheetpile walls, soldier-pile walls, tie-back walls, and mechanically-stabilized earth. Computer-aided analysis and design. 4 lectures. Prerequisite: CE 481 or graduate standing.

**CE 585 Slope Stability Analysis (4)**

Analysis of stability by planar, circular arc, piecewise-linear, and composite-surface techniques. Analysis of earth-fill dams and reservoirs for static, steady flow, sudden drawdown, and seismic loading conditions. Field instrumentation. Methods for slope remediation and stabilization. Computer-aided analysis. 4 lectures. Prerequisite: CE 481 or graduate standing.

**CE 586 Analysis and Design of Deep Foundations (4)**

Bearing capacity and settlement analysis of drilled shafts and driven piles. Analysis and design of single piles and pile groups for vertical, lateral, and combined loading. Construction procedures, field inspection, and load-testing. Computer-aided analysis and design. 4 lectures. Prerequisite: CE 481 or graduate standing.

**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 110 World of Chemistry – Essentials (4) GEB B.1.a.**

Fundamentals of chemical cause and effect – structure/function relationships. Basic principles of chemistry and their applications to solving human problems in organic materials science, biochemistry, toxicology, environmental science, agriculture, nutrition, and medicine. 3 lectures, 1 laboratory. Prerequisite: Must satisfy ELM requirement.

**CHEM 111 Survey of Chemistry (5) GEB B.1.a.**

Introduction to atomic theory, chemical reactions, bonding, stoichiometry, nomenclature, and solutions. Intended for students who are preparing for CHEM 212. 4 lectures, 1 laboratory. Prerequisite: CHEM 106 or equivalent, intermediate algebra, appropriate score on ELM. Not open to students with credit for CHEM 128.

**CHEM 124 General Chemistry for the Engineering Disciplines (4) GEB B.1.a.**

General chemistry concepts presented using a materials science approach with engineering applications. Thermochemistry, atomic theory, bonding, solid state structures, fundamentals of organic chemistry including polymers. Laboratory work is closely coordinated with theory; computers integrated into the curriculum for data collection as well as multimedia work and tutorials. Guided inquiry and collaborative methods are emphasized. Not open to students with credit for CHEM 111 or CHEM 127. 3 lectures, 1 laboratory. Prerequisite: High school chemistry, CHEM 106 or comparable college course, minimum of intermediate algebra.

**CHEM 125 General Chemistry for the Engineering Disciplines (4) GEB B.1.a.**

A continuation of general chemistry designed for engineering students. Topics include solution chemistry, thermodynamics, kinetics, equilibrium, acids and bases, electrochemistry, and nuclear chemistry. Integration of laboratory with theoretical concepts. Use of computers for data acquisition and multimedia resources. Guided inquiry and collaborative methods emphasized. Not open to students with credit for CHEM 128. 3 lectures, 1 laboratory. Prerequisite: A grade of C– or better in 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 College of Science and Mathematics. Not open to students with credit in CHEM 111 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 College of Science and Mathematics. Not open to students with credit in 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 College 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 111, 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 111, CHEM 124, or CHEM 127 and consent of department head.

**CHEM 212 Survey of Organic Chemistry (5) GEB B.1.a.**

Structure, isomerism, nomenclature, fundamental reactions of major functional groups and applications of organic chemicals in agriculture, medicine, industry, and the home. Not open to students with credit in CHEM 216. 4 lectures, 1 laboratory. Prerequisite: CHEM 111, or CHEM 128, or equivalent.

**CHEM 216 Organic Chemistry I (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 125 or CHEM 128.

**CHEM 217 Organic Chemistry II (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 216.

**CHEM 231 Quantitative Analysis I (5)** **GEB B.1.a.**  
Theory and application of chemical equilibrium to analytical problems. Survey of important analytical methods with stress placed on the theory and application associated with titrimetric and spectrophotometric analysis. 3 lectures, 2 laboratories. Prerequisite: CHEM 129.

**CHEM 252 Laboratory Glassblowing (1)**  
Techniques of glassblowing applied to the making of simple laboratory apparatus. 1 laboratory. Prerequisite: CHEM 111, CHEM 124 or CHEM 127.

**CHEM 305 Physical Chemistry (3)** **GEB B.1.a.**  
Fundamentals and applications of chemical thermodynamics of particular interest to engineers. Chemical and phase equilibria. 3 lectures. Prerequisite: PHYS 123 or PHYS 133, CHEM 125 or CHEM 129, MATH 143.

**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, or CHEM 351 or ME 302.

**CHEM 313 Survey of Biochemistry and Biotechnology (5)** **GEB B.1.a.**  
Chemistry of biomolecules including carbohydrates, proteins, fats, vitamins, enzymes and hormones. Basic molecular biology with applications to biotechnology and genetic engineering. Practical intermediary metabolism of prokaryotic and eukaryotic systems. 4 lectures, 1 laboratory. Prerequisite: CHEM 212 or equivalent.

**CHEM 318 Organic Chemistry III (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 217.

**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 231.

**CHEM 337 Clinical Chemistry I (2)** **GEB B.1.a.**  
Basic principles of physiological chemistry including clinical significance of medical laboratory data. Introduction to the clinical aspects of carbohydrate, lipid and protein metabolism. 2 lectures. Prerequisite: CHEM 313 or CHEM 371; CHEM 231 recommended.

**CHEM 338 Clinical Chemistry I Laboratory (1) CR/NC** **GEB B.1.a.**  
Medical laboratory techniques in analysis of serum, blood and urine for glucose, protein and lipids. Basic principles of physiological chemistry including clinical significance of medical laboratory data. Credit/No Credit grading only. 1 laboratory. Corequisite: CHEM 337. Prerequisite: CHEM 313 or CHEM 371. CHEM 231 strongly recommended.

**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 212 or CHEM 216.

**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 212 or CHEM 216.

**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 212 or equivalent.

**CHEM 351 Physical Chemistry I (3)** **GEB B.1.a.**  
Basic physical chemistry for the study of chemical and biochemical systems. Kinetic-molecular theory, gas laws, principles of thermodynamics. Not open to students with credit in CHEM 305. 3 lectures. Prerequisite: PHYS 123 or PHYS 133; MATH 143.

**CHEM 352 Physical Chemistry II (3)** **GEB B.1.a.**  
Application of physical chemistry to chemical and biochemical systems. Electrochemistry, kinetics, viscosity, surface and transport properties. Not open to students with credit in CHEM 306. 3 lectures. Prerequisite: CHEM 305 or CHEM 351.

**CHEM 353 Physical Chemistry III (3)** **GEB B.1.a.**  
Principles and applications of quantum chemistry. Chemical bonding and molecular structure. Spectroscopy and diffraction. 3 lectures. Prerequisite: CHEM 352, or CHEM 306, or consent of instructor.

**CHEM 354 Physical Chemistry Laboratory (2)**  
Experimental studies of gases, solutions, thermochemistry, chemical and phase equilibria, electrochemistry, chemical and enzyme kinetics, computational methods and applications to chemistry and biochemistry. 2 laboratories. Prerequisite: CHEM 231 and CHEM 306 or CHEM 352.

**CHEM 357 Physical Chemistry III Laboratory (1)**  
Experimental and computational investigations of quantum chemistry, spectroscopy, symmetry and statistical chemistry. 1 laboratory. Corequisite: CHEM 353.

**CHEM 359 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 laboratory. Prerequisite: CHEM 216 or CHEM 212.

**CHEM 371 Biochemical Principles (5) GEB B.1.a.**

Chemical and physical factors in biological processes. Chemistry and function of major cellular constituents: proteins, lipids, carbohydrates. 4 lectures, 1 laboratory. Prerequisite: CHEM 212 or CHEM 217. Recommended: CHEM 231.

**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) GEB B.1.a.**  
(Also listed as BIO 375)

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 222, and BIO 351 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 313 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 216, CHEM 231.

**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 405 Advanced Physical Chemistry (3)**

Selected advanced topics in physical chemistry, which may include statistical mechanics, computational chemistry, nonequilibrium thermodynamics, lasers in chemistry, solid-state and/or advanced spectroscopy. Total credit limited to 6 units. 3 lectures. Prerequisite: CHEM 353 or consent of instructor.

**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 437 Clinical Chemistry II (3)**

Advanced principles of physiologic chemistry including clinical significance of medical laboratory data. Theoretical and practical aspects of biochemical profiling. Theory of biochemical techniques in clinical chemistry and pathology, metabolic and organ-specific investigations and interpretation of results, clinical instrumentation, serum enzyme and hormone assay techniques. 3 lectures. Prerequisite: CHEM 337 or CHEM 372.

**CHEM 438 Clinical Chemistry Laboratory II (1) CR/NC**

Theory and practice of biochemical techniques in clinical chemistry and pathology. Overview of clinical instrumentation. Credit/No Credit grading only. 1 laboratory. Prerequisite: CHEM 338 or CHEM 372; corequisite: CHEM 437.

**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 231, CHEM 354. Recommended: CHEM 353.

**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 217.

**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 217.

**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 305 or CHEM 351 or course in engineering thermodynamics.

**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 444, CHEM 445.

**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 217 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 212 or CHEM 216.

**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 217.

**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, including senior project, in chemistry. 2 seminars. Prerequisite or corequisite: CHEM 359 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 60 hours for each course. Prerequisite: CHEM 459.

**CHEM 465 College Teaching Practicum (1-2) CR/NC**

Teaching assignment in an undergraduate college classroom. Includes teaching and related activities under the direction of a permanent faculty member in the Department of Chemistry and Biochemistry. Total credit limited to 4 units. Prerequisite: Junior standing, CHEM 231 (or permission of instructor), evidence of satisfactory preparation in chemistry. Department chair approval required.

**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 305, or CHEM 351, or CHEM 217 or 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 313 or CHEM 371.

**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, BIO 303 or BIO 351 and CHEM 313 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, or CHEM 352, and CHEM 231 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 313 or CHEM 372 or consent of instructor.

## CM-CONSTRUCTION MANAGEMENT

**CM 211 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.

**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: BUS 212 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 (4)**

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. 4 activities. Prerequisite: Third-year standing.

**CM 353 Building Support System Construction Practices (4)**

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. 4 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 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 activities. 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 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 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 463 Professional Practice for Senior Construction Project Managers (4)**

Practical application of construction management theory and practice solving problems in a simulated professional environment. Computer applications used in the decision

making process. 4 laboratories: Prerequisite: CM 443, CM 452, CM 454.

**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.

## CPE—COMPUTER ENGINEERING

### CPE 100 Computer Engineering Orientation (1) (CR/NC)

Introduction to the computer engineering discipline. Success skills and curricular information. Career paths and opportunities. Professional aspects of engineering and computer science. Interaction with upper division students, alumni, faculty and staff. Introduction to computer software and hardware. Credit/No Credit grading only. 1 lecture.

### 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, address modes and the underlying computer architecture. Intended for CPE and CSC majors. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CPE 219 and CSC 102.

### 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. Two-level logic realizations of SOP and POS functions, and an introduction to multi-level logic. Multiple function synthesis using PLDs and gate arrays. Combinational circuit design as it applies to computers. Sequential circuit elements, flip-flops, counters and shift-registers. 3 lectures. Prerequisite: CSC 101 or CSC 234. Concurrent: CPE 259.

### CPE 259 Logic and Switching Circuits Laboratory (1) (Also listed as EE 259)

Laboratory synthesis of combinational logic circuits and counters. Introduction to laboratory equipment such as logic state analyzers. Use of software (both off-the-shelf and customized) for logic simulation and design. Introduction to use of PLDs and hardware description languages in combinational design and testing. 1 laboratory. Concurrent: CPE 219.

### CPE 315 Computer Architecture II (4) (Also listed as CSC 315)

Intermediate architecture topics. Levels of virtual machines and their languages. Special emphasis on data paths and microprogramming. Design of conventional machines; study of tradeoffs in various designs. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CSC 103, CSC 215, CPE 219.

### CPE 316 Computer Architecture III (4) (Also listed as CSC 316)

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 the design of digital systems utilizing state-machines; analysis and synthesis of state-machines. Design of synchronous, asynchronous, and pulse mode sequential logic circuits. Practical considerations of digital system design and implementation. Emphasis on the use of PLDs and hardware description language for implementation technology. Considerations of testing of digital systems as a part of design. 3 lectures. Prerequisite: CPE 219, EE 307. Concurrent: CPE 359.

### 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 103.

### CPE 359 Digital System Design Laboratory (1) (Also listed as EE 359)

Laboratory synthesis of combination and sequential logic circuits. Implementation with PLDs and hardware description language. Sequential 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: 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 415 Microcomputer Systems (4)

Recent advances in microcomputer architectures. RISC, parallel processing advances, and component communication. 3 lectures, 1 laboratory. Prerequisite: CPE 316.

### CPE 436 Microprocessor System Design Methodologies (3) (Also listed as EE 436)

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 476.

### CPE 437 Digital Computer Subsystems (3) (Also listed as EE 437)

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 438 Digital Computer Systems (3) (Also listed as EE 438)

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 437 or consent of instructor.

**CPE 439 Computer Peripheral Interfacing (3) (Also listed as EE 439)**

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 436, 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: CPE 315, CPE 319, CPE 359.

**CPE 464 Computer Networks (4) (Also listed as CSC 464)**

Communications architectures and distributed systems; multicomputer complexes and interprocessor communications; communications media, message switching, and communications protocol standards. 3 lectures, 1 laboratory. Prerequisite: CSC 141 and CSC 453.

**CPE 465 Computer Networks II (4) (Also listed as CSC 465)**

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 464.

**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 476 Microprocessor Interfacing Laboratory (1) (Also listed as EE 476)**

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 436.

**CPE 478 Digital Computer Systems Laboratory (1) (Also listed as EE 478)**

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 437 or CPE 439 or 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 488 Performance Analysis (4) (Also listed as CSC 488)**

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 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 and principles of visual and environmental design; analysis, program development, problem solving and design. Implications of design decisions and solutions. Assignments of object, project and system scale in an urban 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 215 Planning for Multiple Publics (4)**

Social and political underpinnings and implications of planning practice and theory. The relationship between planning and implied and implicit political philosophies, minority/majority relations, gender relations, urban design, relocation strategies, and both intended and unintended consequences of action. 4 lectures.

**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, ECON 211, ECON 212, ENGL 215 or 218.

**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 347 (for CRP 348).

**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, planning 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, ENGL 215 or ENGL 218, ECON 211, ECON 212.

**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 402 History of Urban Design in North America (4)**

Cultural dimensions and manifestations in the organization and design of early and contemporary cities in Western regions of the US and Central America, including the settlements of Native Americans, Mayas, Toltecs, and Aztecs, as well as the Spanish influence and impact on traditions of the indigenous societies. Impact of major ethnic and cultural groups on the design of contemporary cities. 4 lectures. Prerequisite: ENGL 114.

**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)**

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 314, CRP 353, FNR 306.

**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 460 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 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 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. 3 seminars, 1 laboratory. 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, hillside, 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*. 3 seminars, 1 laboratory. 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 (1) (CR/NC)**

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. Credit/No Credit grading only. 1 lecture.

#### **CRSC 202 Enterprise Project (2–4) (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. 1 lecture, variable practicum. 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 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 111 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 331 Commercial Seed Production and Conditioning (4)**

Production and conditioning of field and vegetable seed. Seed technology, germination, quality control, seed enhancement, storage and handling of seed, and seed laws. Field trip to a seed conditioning/seed enhancement facility required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC 131, CRSC 230 or VGSC 230, OH 121 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 111\*\*, CRSC 133, SS 221 or consent of instructor.

**CRSC 339 Internship in Crop Science (1–12) (CR/NC)**

Selected Crop Science 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship 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 Management (2–4) (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. 1 lecture, variable practicum. 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 212.

**CRSC 411 Experimental Techniques and Analysis (4)**

Principle experimental designs in agriculture and methods of statistical analysis of data collected from each. Practice with statistical software. Field practice in planning and layout of typical experiments. 3 lectures, 1 laboratory. Prerequisite: Junior standing and MATH 117 or equivalent, and STAT 218 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 and Subtropical Crop and Fruit Production (4) (also listed as FRSC 422)**

Production, distribution and utilization of major agronomic, vegetable, fruit and nut crops of economic importance in tropical and subtropical areas. Weather systems, climates, soils, and cropping systems of tropical and subtropical areas. Field trip required. 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 311 or consent of instructor.

**CRSC 441 Biological Control of Insects (4)**

Biological control of insects to include history of classical methods, biology, augmentation and inundative release of beneficial arthropods. Identification of beneficial arthropods to appropriate taxonomic level. Technology, laws and regulations governing use of biocontrol agents. Field trips to insectaries, quarantine facilities and/or crop production areas. 3 lectures, 1 laboratory. Prerequisite: CRSC 311 or consent of instructor.

**CRSC 444 Precision Farming (4)**

Precision agriculture applications. Integrating GIS, GPS, and remote sensing technologies with site-specific farming practices to optimize agricultural productivity. Field trip required. 3 lectures, 1 laboratory. Prerequisite: CRSC 230 or other plant production course.

**CRSC 445 Cropping Systems (4)**

Classification and description of agricultural systems of the world. Cropping systems as land management plans. 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 activity. 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. Prerequisite: Senior standing.

**CRSC 470 Selected Advanced Topics (2–4)**

Directed group study of selected topics for advanced undergraduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 2–4 lectures. Prerequisite: Consent of instructor.

**CRSC 500 Individual Study in Crop Science (1–6)**

Advanced independent study planned and completed under the direction of a member of the Crop Science faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**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 539 Graduate Internship in Crop Science (1–9)**

Application of theory to the solution of problems of agricultural production or related business in the field of Crop Science. 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.

**CRSC 570 Selected Topics in Crop Science (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 9 units. 1–3 seminars. Prerequisite: Graduate standing or consent of instructor.

**CRSC 571 Selected Advanced Laboratory in Crop Science (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.

**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.

**CRSC 599 Thesis in Crop Science (1–9)**

Systematic research of a significant problem in Crop Science. 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.

**CSC—COMPUTER SCIENCE****CSC 100 Computer Science Orientation (2)**

Introduction to the computer science discipline for majors. Computer problem solving and the use of computers. Success skills for computer science majors. Career paths and opportunities. Ethical behavior in the computer science discipline. Interaction with upper division students, alumni and faculty. 2 seminars. Prerequisite: Computer science major.

**CSC 101 Fundamentals of Computer Science I (4) (formerly CSC 118) GEB F.1.**

Basic principles of algorithmic problem solving and programming using methods of top-down design, stepwise refinement and procedural abstraction. Basic control structures, data types, and input/output. Introduction to the software development process: design, implementation, testing and documentation. The syntax and semantics of a modern programming language. 3 lectures, 1 laboratory. Prerequisite: CSC 100 or CSC 111 or consent of instructor.

**CSC 102 Fundamentals of Computer Science II (4) (formerly CSC 218)**

Continuation of the software development process: requirements analysis, specification, design, implementation and testing of abstract data types. Application development using abstract data types. Introduction to the analysis of algorithms. Software design case studies and practice. 3 lectures, 1 activity. Prerequisite: CSC 101. Corequisite: CSC 141.

**CSC 103 Fundamentals of Computer Science III (4) (formerly CSC 345)**

Continuation of material from CSC 102: abstract data types specification and implementation, the analysis of algorithms and the software development process. Introduction to a specific high level design notation. Recursive algorithms. Software design case studies and practice. Software testing and program verification. 3 lectures, 1 activity. Prerequisite: CSC 102 and CSC 141.

**CSC 109 Accelerated Introduction to Computer Science (5)**

Accelerated coverage of the material in CSC 101, CSC 102, and CSC 103. 4 lectures, 1 activity. Prerequisite: CSC 141, significant background in computer science, and consent of instructor.

**CSC 110 Computers and Computer Applications: Windows (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. Miscellaneous course fee may be required—see *Class Schedule*. 2 lectures, 1 activity.

**CSC 111 Introduction to Computer Applications for the Sciences (3) GEB F.1.**

Use of computers in science, with examples from biology, physics and chemistry. Credit not allowed for CSC majors. 2 lectures, 1 laboratory.

**CSC 113 Computers and Computer Applications: Macintosh (3)** GEB F.1.

The computer as a problem-solving tool. A working introduction to microcomputers, timeshared computer systems and fundamental computer concepts. Use of applications software for word processing, spreadsheets and communications. Credit not allowed for CSC majors. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 activity.

**CSC 119 Principles of Business Data Processing (4)** (formerly CSC 120) 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. Miscellaneous course fee may be required—see *Class Schedule*. 4 lectures. Prerequisite: High school algebra.

**CSC 141 Discrete Structures I (4)** (formerly CSC 245)

Introduction to structures of computer science: numbers, sets, relations, functions and trees. Propositional and predicate logic. Applications of predicate logic: preconditions, postconditions, invariants, guards. Inductive proofs. Applications to verification of algorithms. Introduction to complexity of algorithms. 4 lectures. Corequisite: CSC 102. Prerequisite: MATH 118 and MATH 119, or high school equivalent.

**CSC 142 Discrete Structures II (4)**

Advanced structures of computer science: sequences, strings, graphs, networks. Recursion and recurrence relations. Introduction to combinatorics. Proof techniques. Complexity of algorithms. Advanced application to verification of algorithms. 4 lectures. Prerequisite: CSC 102 and CSC 141.

**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 205 Software Engineering I (4)** (formerly CSC 440)

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. Graphical User Interface Design. Technical presentation methods and practice. Software design case studies and practices. Ethical and societal issues in software engineering. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CSC 103.

**CSC 206 Software Engineering II (4)** (formerly CSC 441)

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. Technical presentation methods and practice. Ethical and societal issues in software engineering. 3 lectures, 1 laboratory. Prerequisite: CSC 205.

**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, address modes and the underlying computer architecture. Intended for CPE and CSC majors. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CPE 219 and CSC 102.

**CSC 231 Fortran for Engineering Students (2)** GEB F.1. (formerly CSC 251)

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 121 or PHYS 131.

**CSC 233 COBOL Programming (3)** (formerly CSC 203)

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 234 C and UNIX (3)** (formerly CSC 204) GEB F.1.

The C programming language. Operators, standard I/O functions, strings, pointers and arrays, data types and storage classes. The Unix programming environment: shell features, shell programming and system calls. Credit not allowed for CSC majors. 3 lectures.

**CSC 239 Selected Programming Languages (3)** (formerly CSC 209)

A programming language will be selected from languages of current interest. Intended for proficient programmers who want to learn another programming language. *Class Schedule* will list topic selected. 3 lectures. Prerequisite: Knowledge of a programming language.

**CSC 270 Computer Graphics Applications (4)** (formerly CSC 255)

Use of common graphics applications packages. Business graphics, figure editing, animation and image editing, photorealistic image generation, scientific visualization and multimedia. 2 lectures, 2 activities.

**CSC 300 Professional Responsibilities (4)**

The responsibilities of the computer science professional. The ACM Code of Ethics, software economics, quality tradeoffs, software safety, intellectual property, history of computing and the social implications of computers in the modern world. Technical presentation methods and practice. 4 lectures. Prerequisite: CSC 206.

**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. Technical elective credit not allowed for CSC majors. 3 lectures. Prerequisite: junior standing and F.1. computer literacy course.

**CSC 315 Computer Architecture II (4) (Also listed as CPE 315)**

Intermediate architecture topics. Levels of virtual machines and their languages. Special emphasis on data paths and microprogramming. Design of conventional machines; study of tradeoffs in various designs. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CSC 103, CSC 215, EL 219.

**CSC 316 Computer Architecture III (4) (Also listed as CPE 316)**

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: CSC 315.

**CSC 330 Programming Languages I (4)**  
(formerly CSC 351)

Comparison of structure and semantics of various high level programming languages. BNF grammars. Language design issues and techniques, including parameter passing, storage allocation, storage mapping and binding concepts. 4 lectures. Prerequisite: CSC 315.

**CSC 334 Advanced Topics in Unix (4)**  
(formerly CSC 241)

Advanced topics in Unix, system calls, library functions, shell scripts, and selected Unix tools. 4 lectures. Prerequisite: CSC 103 or CSC 234.

**CSC 341 Numerical Engineering Analysis (4)**  
(formerly CSC 311)

An intensive survey of numerical analysis techniques used for solving engineering problems. Topics include solution of nonlinear equations, solution of linear systems, interpolation, numerical quadrature, ordinary differential equations and boundary value problems. Not open to students who have completed CSC 342. 4 lectures. Prerequisite: MATH 143 and knowledge of FORTRAN or C.

**CSC 342 Numerical Analysis I (3)**  
(formerly CSC 332)

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 and knowledge of FORTRAN, Pascal, Ada, or C.

**CSC 343 Numerical Analysis II (3)**  
(formerly 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 342 or equivalent.

**CSC 349 Design and Analysis of Algorithms (4)**

Intermediate and advanced algorithms and their analysis. Mathematical, geometrical, and graph algorithms. NP-complete problems. Additional topics will be chosen from pattern matching, file compression, cryptology, dynamic and linear programming, and exhaustive search. 4 lectures. Prerequisite: CSC 103, MATH 142 and completion of all mathematics/statistics support courses.

**CSC 358 Computer System Administration (2)**  
(formerly CSC 248)

Fundamental concepts of Unix system administration. Use of shell scripts and utilities. Techniques of networks and data communications. Methods of system maintenance and accounting. 2 seminars. Prerequisite: CSC 103 or permission of instructor.

**CSC 361 File Structures (4)**  
(formerly CSC 346)

External storage devices. Character, record, and block I/O. Blocking and buffering. File structures: sequential, indexed sequential, B trees, hashing, multi-key and linked. Primary and secondary indexing. Design and implementation of record and object storage managers. Data compression. Multi-media file formats. 4 lectures. Prerequisite: CSC 103.

**CSC 365 Introduction to Database Systems (4)**  
(formerly CSC 347)

Basic principles of database management systems (DBMS) and of DBMS application development. 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 103.

**CSC 366 Database Modeling, Design and Implementation (4)**

The database modeling problem. Database modeling levels: external, conceptual, logical and physical. Database models: entity-relationship, relational, object-oriented, semantic, and object-relational. Normal forms. Distributed database design. Functional analysis of database applications and transaction specification, design, and implementation. 3 lectures, 1 laboratory. Prerequisite: CSC 365.

**CSC 369 Introduction to Distributed Computing (4)**

Introduction to distributed systems as a computing paradigm, the client-server model, distributed algorithms, interprocess communication, distributed computing environment, data replication and fault tolerance. Emphasis on distributed software above the operating system layer. 3 lectures, 1 laboratory. Prerequisite: CSC 103.

**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 instructor.

**CSC 430 Programming Languages II (4)**  
(formerly CSC 450)

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 330 and CSC 445.

**CSC 431 Programming Languages III (4)**  
(formerly CSC 451)

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 laboratory. Prerequisite: CSC 430.

**CSC 435 Introduction to Object Oriented Design Using Graphical User Interfaces (4)**

Principles of object-oriented design, with emphasis on use of these principles in the design of graphical interfaces. Comparison and contrasting of two major object-oriented languages and their corresponding GUI class libraries. Language-independent object-oriented design methods, and application of these methods in the construction of a GUI-based project. 3 lectures, 1 laboratory. Prerequisite: CSC 103 or equivalent.

**CSC 436 Graphical User Interface Systems (4)**  
(formerly CSC 443)

Further study of graphical user interface (GUI) programming systems. Structure of tools and underlying systems to build such interfaces. Human factors including considerations of good and bad interfaces. 3 lectures, 1 laboratory. Prerequisite: CSC 435.

**CSC 445 Theory of Computing (4)**

Finite state machines and regular languages. Pushdown automata and context-free languages. Turing machines. Computation theory and computational complexity. Proofs of classical theorems and the theory of computation. 4 lectures. Prerequisite: CSC 103.

**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. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CSC 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 459 Real-Time Systems (4)**  
(formerly CSC 401)

Analysis and synthesis of robust real-time systems including imbedded systems, real-time architectures, and programming, parallel processing, specification techniques, algorithms for guaranteeing stringent timing constraints. Understanding of the trade-offs between robustness and response times of time-critical systems. 3 lectures, 1 laboratory. Prerequisite: CSC 315.

**CSC 464 Computer Networks I (4) (Also listed as CPE 464)**  
(formerly 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 141 and CSC 453.

**CSC 465 Computer Networks II (4) (Also listed as CPE 465)** (formerly 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: CSC 464.

**CSC 468 Database Management Systems Implementation (4)** (formerly CSC 447)

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, 1 laboratory. Prerequisite: CSC 365.

**CSC 471 Introduction to Computer Graphics (4)**  
(formerly CSC 455)

Graphics hardware and primitives. Modeling and rendering, geometric transforms, hidden-surface removal, the graphics pipeline, scan-conversion and graphics applications. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CSC 103 and CSC 141.

**CSC 473 Advanced Rendering Techniques (4)**  
(formerly CSC 456)

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 471.

**CSC 474 Computer Animation (4)**

Basic and advanced algorithms for generating sequences of synthetic images. Interpolation in time and space, procedural and keyframe animation, particle systems, dynamics and inverse kinematics, morphing and video. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CSC 471.

**CSC 475 Multimedia Tool Development (4)**

Algorithms and techniques for creating multimedia applications. Topics include audio and video compression techniques, multimedia network architectures, synchronization of audio and video, multimedia toolkits, user interfaces and file systems. 3 lectures, 1 laboratory. Prerequisite: CSC 471.

**CSC 477 Computer Vision (4)**  
(formerly CSC 484)

Fundamental issues in computer vision. Convolution, edge detection and image segmentation. Pattern classification methods and neural networks. Stereoscopic vision and optical flow. 3 lectures, 1 laboratory. Prerequisite: CSC 103 and MATH 206.

**CSC 479 Computer Graphics Seminar (2)**  
(formerly CSC 458)

Current topics in computer graphics. Total credit limited to 4 units. 2 seminars. Prerequisite: CSC 471.

**CSC 480 Artificial Intelligence (4)**  
(formerly CSC 420)

Programs and techniques that characterize artificial intelligence. Programming in LISP. 3 lectures, 1 laboratory. Prerequisite: CSC 103 and CSC 141.

**CSC 481 Knowledge Based Systems (4)**  
(formerly CSC 421)

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 480.

**CSC 488 Performance Analysis (4) (Also listed as CPE 488)**  
(formerly CSC 410)

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.

**CSC 490 Selected Advanced Topics (1–3)**  
(formerly CSC 470)

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 491, 492 Senior Project (2) (3)**  
(formerly CSC 461, 462)

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: CSC 206 and consent of instructor.

**CSC 494 Cooperative Education Experience (6) (CR/NC)**  
(formerly CSC 485)

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 508 Software Engineering I (4)**

In-depth study of requirements engineering, software project management, formal specifications and object-oriented analysis. 4 seminars. Prerequisite: CSC 205.

**CSC 509 Software Engineering II (4)**

In-depth study of software modeling and design. Formal design methodologies. Design patterns. Detailed case studies of existing projects. Tools and methods for designing large software systems. 4 seminars. Prerequisite: CSC 508.

**CSC 520 Computer Architecture (4)**  
(formerly CSC 504)

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 and graduate standing, or consent of instructor.

**CSC 530 Languages and Translators (4)**  
(formerly CSC 501)

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 431 and graduate standing, or consent of instructor.

**CSC 540 Theory of Computing (4)**  
(formerly CSC 505)

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 and graduate standing, or consent of instructor.

**CSC 541 Numerical Methods (4)**  
(formerly CSC 531)

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 340 and graduate standing, or consent of instructor.

**CSC 550 Operating Systems (4)**  
(formerly CSC 503)

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 and graduate standing, or consent of instructor.

**CSC 560 Database Systems (4)**  
(formerly CSC 502)

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 468.

**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 580 Artificial Intelligence (4)**  
(formerly CSC 506)

Current research in the field of artificial intelligence with emphasis on cooperative agents, distributed agents, and decision making in complex, concurrent environments. AI programming in a distributed environment. 3 lectures, 1 laboratory. Prerequisite: CSC 481.

**CSC 583 Computer-Based Educational Systems (3)**  
(formerly CSC 527)

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: Consent of instructor.

**CSC 587 Computer Simulation I (4)**  
(formerly CSC 507)

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 588 Computer Simulation II (4)**  
(formerly CSC 517)

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 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 594 Cooperative Education Experience (6) (CR/NC)**  
(formerly CSC 585)

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 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 Labonotation. 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 Latino sources. 3 lectures. Prerequisite: One DANC activity class or consent of instructor.

**DANC 332 Modern Dance Repertory (2)**

Intermediate to advanced dance skills learned through the study and performance of selected modern dance repertory. Addresses problems in advanced performance technique. Informal presentation in performance situation. Total credit limited to 6 units. 2 activities. Prerequisite: Intermediate dance technique level 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 Promotion and Marketing (4)**

National and state dairy promotional programs, advertising and merchandising. Marketing and pricing of milk and dairy products at the state and national level. 4 lectures. Prerequisite: DSCI 134 or consent of instructor.

**DSCI 223 Frozen Dairy Foods (4)**

Technology, equipment, mix calculations and preparation required to process, freeze, package, harden and distribute ice cream and related products. 3 lectures, 1 laboratory. Prerequisite: DSCI 134.

**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 Inspection (4)**

Composition and properties of fluid milk and its constituents. Equipment used to handle, process, and distribute fluid milk and related products. California dairy codes used for dairy farms and plants, with practice inspections of dairy farms and factories. 3 lectures, 1 laboratory. Prerequisite: DSCI 134.

**DSCI 234 Dairy Foods Evaluation (2)**

Basic principles of sensory evaluation of dairy foods, physiology of 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, 1 laboratory.

**DSCI 241 Dairy Cattle Selection, Breeds, Fitting and Showing (4)**

Selection of dairy cattle on type conformation and the correlation between type and production. Dairy cattle breeds and breed comparisons. Techniques to properly condition, groom and present dairy cattle for evaluation and merchandising. 2 lectures, 2 activities. Prerequisite: DSCI 121 or DSCI 230.

**DSCI 301 Dairy Cattle Nutrition (4)**

Principles of dairy cattle nutrition and management and their application to economical feeding practices and computerized ration formulation. 3 lectures, 1 activity. Prerequisite: DSCI 101 and DSCI 121 or DSCI 230.

**DSCI 321 Lactation Physiology (4)**

Mechanisms of milk component secretion, including protein, lactose and fat metabolism. Disorders of the mammary gland (mastitis) and control strategies. Endocrine aspects of mammary gland development and lactogenesis. 4 lectures. Prerequisite: DSCI 101, DSCI 121, BIO 151, CHEM 111.

**DSCI 330 Artificial Insemination and Embryo Biotechnology (4)**

Techniques in the collection, evaluation and processing of semen, along with embryo culturing and manipulation. Insemination procedures, fertility problems, record keeping, estrous synchronization, endocrine control of reproduction, treating reproductive disorders and embryo transfer. 3 lectures, 1 laboratory. Prerequisite: DSCI 121 or DSCI 230 or VS 223 or consent of instructor.

**DSCI 333 Dairy Cattle Management, Safety and Animal Well-Being (4)**

Modern dairy management techniques, livestock handling and animal comfort. Dairy safety and development of an injury illness prevention program. Animal well-being issues and the Pasteurized Milk Ordinance. 3 lectures, 1 activity. Prerequisite: DSCI 121 or DSCI 230.

**DSCI 339 Internship in Dairy Science (1–12) (CR/NC)**

Selected Dairy Science 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor.

**DSCI 350 Dairy Industry Communications (2)**

Application of information and computer technology to creation of dairy publications. Exploration of Web resources for dairy-related current events and information. Financial, promotional, creative and technical aspects of producing dairy brochures, catalogs, annuals and pamphlets. Total credit limited to 8 units. 2 activities. Prerequisite: ENGL 114, DSCI 121, AG 250 or consent of instructor.

**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 (4)**

Composition, structure and properties of milk and milk products. Physical and chemical changes that occur during processing and storage of dairy products. Objective measurement of chemical and physical properties. 3 lectures, 1 laboratory. Prerequisite: CHEM 212 or consent of instructor.

**DSCI 402 Quality Assurance and Control of Dairy Products (4)**

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. 3 lectures, 1 laboratory. Prerequisite: DSCI 233 and BACT 221.

**DSCI 422 Breeding and Genetics 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: DSCI 241.

**DSCI 431 Advanced Dairy Herd Management Field Studies (2) (CR/NC)**

Visitation of large dairy farms in California. Attendance at selected herd management conferences and evaluation of large herd economics and management. Credit/No Credit grading only. Prerequisite: DSCI 101, DSCI 121, DSCI 301, DSCI 241. Recommended: DSCI 432.

**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. 4 lectures. Prerequisite: DSCI 301, DSCI 241, DSCI 330, and DSCI 422. Recommended: DSCI 431.

**DSCI 433 Dairy Plant Management and Equipment (4)**

Basic management principles applied to the dairy industry. Industrial organization and control. Dairy plant design, facilities, layout. Inventory control and records. Milk pooling and stabilization records. Maintenance and operation of equipment. 3 lectures, 1 laboratory. Prerequisite: DSCI 233, DSCI 434.

**DSCI 434 Cheese and Fermented Dairy Foods (4)**

Scientific methods, ingredients, and equipment used in the manufacture of various fermented dairy products, including cheeses, buttermilk, sour cream, and yogurt. 3 lectures, 1 laboratory. Prerequisite: DSCI 134, BACT 221.

**DSCI 435 Concentration/Fractionation and Butter Technology (4)**

Technology of evaporation, drying and membrane separation processes applied to dairy fluids. Design and performance of evaporators, driers, and membrane processing systems. Equipment, ingredients, and methods needed to manufacture butter and dairy spreads. 3 lectures, 1 laboratory. Prerequisite: DSCI 134.

**DSCI 444 Dairy Microbiology (4)**

Microorganisms involved in the fermentation and ripening processes in the dairy industry, as well as those involved in spoilage of milk and dairy products, in the transmission of disease through these products, and indicator systems used to determine sanitary quality of these products. 2 lectures, 2 laboratories. Prerequisite: BACT 221.

**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 seminars.

**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 500 Individual Study in Dairy Science (1–6)**

Advanced independent study planned and completed under the direction of a member of the Dairy Science faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**DSCI 522 Bioseparation Processes in Dairy Product Technology (4)**

Physical and chemical principles governing bioseparation processes in dairy product technology. Factors influencing mass transport phenomena as it relates to filtration, chromatography, ion exchange, dialysis, centrifugation, adsorption, crystallization and other unit operations. Laboratories to emphasize application of bioseparations of

commercial importance. Field trips to be required. 3 lectures, 1 laboratory. Prerequisite: DSCI 401 or FSN 407, FSN 444.

**DSCI 539 Graduate Internship in Dairy Science (1–9)**

Application of theory to the solution of problems of agricultural production or related business in the field of Dairy Science. 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.

**DSCI 570 Selected Topics in Dairy Science (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 9 units. 1 to 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**DSCI 571 Selected Advanced Laboratory in Dairy Science (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.

**DSCI 581 Graduate Seminar in Dairy Science (1–3) (CR/NC)**

Current findings and research problems in the field and their application to industry. Group study of current problems of industry. Current experimental and research findings as applied to production and marketing. Credit/No Credit grading only. 1 or 3 seminars. Credit/ no credit grading only. Prerequisite: Graduate standing or consent of instructor.

**DSCI 585 Cooperative Education Experience in Dairy Science (6) (CR/NC)**

Advanced study, analysis and part-time work experience in the 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.

**DSCI 599 Thesis in Dairy Science (1–9)**

Systematic research of a significant problem in Dairy Science. 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.

**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.

**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.

**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.

**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. Not open to students with credit in ECON 212 or equivalent. 4 lectures.

**ECON 222 Macroeconomics (4) GEB D.3.**

Macroeconomics analysis and principles. Aggregate output, employment, prices, and economic policies for changing these variables. Not open to students with credit in ECON 211 or equivalent. 4 lectures. Prerequisite: ECON 221.

**ECON 303 Economics of Poverty, Discrimination and Immigration (4) GEB D.4.b. USCP**

Economic analysis of the cause, extent and impact of poverty, discrimination and immigration and of the policies designed to address these socioeconomic issues. Introduction to the measurement of poverty, welfare reform, glass ceilings in the workplace, affirmative action and equal opportunity programs, and assimilation and adaptation of immigrants. Emphasis on the experience of African-Americans, Latinos and women in the United States. 4 lectures. Prerequisite: ECON 201, ECON 212 or 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 119 and STAT 252.

**ECON 310 Quantitative Methods in Economics (4)**

Applications of quantitative techniques to topics in microeconomic and macroeconomic theory. Use of multivariate calculus and linear algebra in formulating static economic models. Applications of statistical inference, estimation and forecasting in economic models. 4 lectures. Prerequisite: CSC 119, MATH 221, STAT 252, ECON 221, ECON 222.

**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 310. For ECON 312: ECON 311.

**ECON 313, 314 Intermediate Macroeconomics (4) (4)**

Analysis of national income, price level, employment, international trade and economic growth. Development of the theory of national income determination. Evaluation of roles of monetary and fiscal policy. Applications of computer simulation for analysis, forecasting and control. ECON 313: Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 activity. Prerequisite: ECON 211 or ECON 222, MATH 221, STAT 252. For ECON 314: ECON 313.

**ECON 323 Economic History of the Advanced World (4)**

Analysis of the growth of economic institutions from about 600. Includes the spread of economic structures and institutions to colonies. Analyzes the internal development of the industrial economy in Europe and its expansion to other parts of the globe. 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 agriculture, transportation, industrial and government sectors and their interconnections. 4 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 221 or ECON 222.

**ECON 325 Economics of Development and Growth (3) GEB D.4.b.**

Analysis of economic systems and conditions in developing countries. Economic models of growth, population, rural to urban migration, unemployment, industrialization and international trade as applied to developing countries. 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.

**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. Miscellaneous course

fee may be required—see *Class Schedule*. 3 lectures, 1 activity. Prerequisite: CSC 119, 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 222, 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 312.

**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. 4 lectures. Prerequisite: ECON 312, CSC 119.

**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 212 or ECON 221.

**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 406 Sustainable Environments (4)**

Collaboration of interdisciplinary faculty and guest speakers/panelists. Introduction, illustration and analysis of concepts and principles for sustainability to be used in all aspects of environmental design. Integration and application of knowledge of human and natural systems with environmental, social and economic concerns, from a global-to-local perspective. 4 lectures. Prerequisite: Third or fourth year or graduate standing, or consent of instructor.

**EDES 408 Implementing Sustainable Principles (3)**

A primarily project-based course, intended to aid students who wish to collaborate with the purpose of implementing sustainability principles by developing tools, process or designs, for community-based projects and proposals at various scales of planning, architecture and design of the human environment to address social, environmental and economic issues. 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. 2 lectures, 1 activity.

**EDUC 302 Multicultural Education in the Secondary School (3)**

Multicultural education in American society and schools; examination of multicultural elements which influence the learning environment in American secondary schools; review of successful programs aimed at making fundamental changes in rules, roles and relationships in schools. 2 seminars, 1 activity. Prerequisite: Any course in GEB Area D.

**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 306 Introduction to Effective Teaching and Classroom Management in a Pluralistic Society (4)**

Theory, knowledge and skills that serve as guidelines for effective teaching in a pluralistic society. Multicultural education, classroom management and discipline. 3 seminars, 1 activity. Prerequisite: EDUC 300 or LS 230, junior standing.

**EDUC 307 Introduction to the Learner's Culture, Language and Identity (4)**

Introductory knowledge and understanding of cultural concepts, first and second language development, cognitive development and how all interact and influence language acquisition, emotional development, and learning. Miscellaneous course fee may be required—see *Class Schedule*. 3 seminars, 1 activity. Prerequisite: EDUC 300 or LS 230.

**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 403 Literacy in the Content Areas (5)**

Application of reading comprehension strategies, instructional methods, and content area study skills for teaching in secondary schools. Includes supervised field experience, observation and instructional participation. 3 seminars, 2 activities. Prerequisite: EDUC 305, or consent of instructor.

**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 (Single Subject only). 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 (Single Subject only). 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 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 430 Teaching Reading and Language Arts with a Multicultural Perspective (6)**

Development of knowledge and skills for planning, implementing, and evaluating the teaching of reading and language arts in the elementary grades with attention to children of all abilities and backgrounds. State and national trends. Language development. Miscellaneous course fee may be required—see *Class Schedule*. 4 seminars, 2 activities. Prerequisite: EDUC 306, EDUC 307, and application for Multiple Subject Credential program.

**EDUC 431 Teaching Social Science and the Arts with a Multicultural Perspective (4)**

Development of knowledge and skills related to planning, implementing and evaluating integrated social science units of instruction; effects of culture on the selection and implementation of curriculum; knowledge and integration of physical education, art, and music. Miscellaneous course fee may be required—see *Class Schedule*. 2 seminars, 2 activities. Prerequisite: EDUC 306, EDUC 307, and application for Multiple Subject Credential program.

**EDUC 432 Teaching Science and Mathematics with a Multicultural Perspective (4)**

Curriculum and methods in teaching science and mathematics. Selecting, organizing, presenting science and mathematics lessons at the appropriate level throughout the curriculum. Emphasis on thinking processes, manipulative and process skills within the context of the curriculum frameworks. Miscellaneous course fee may be required—see *Class Schedule*. 2 seminars, 2 activities. Prerequisite: EDUC 306, EDUC 307; MATH 327, MATH 328, and application for Multiple Subject Credential program.

**EDUC 433 Bilingual, Crosscultural, Language and Academic Development (2)**

Limited to students seeking BCLAD Certification. Theories, methods, and techniques in bilingual education. This course will be taught in Spanish. Miscellaneous course fee may be required—see *Class Schedule*. 2 seminars. Prerequisite: EDUC 306, EDUC 307, and application for Multiple Subject Credential program; pass Spanish Proficiency Exam.

**EDUC 434 Student Teaching – Multiple Subject Credential (10) CR/NC**

Field assignment involving observation, teaching, research and related activities in public elementary and middle school classrooms. Credit/No Credit grading only. Concurrent: EDUC 435. Prerequisite: EDUC 430, EDUC 431, EDUC 432.

**EDUC 435 Issues in the K–8 Classroom (4)**

Curriculum, community and school site issues related to the K–8 curriculum in multicultural settings. Teacher responsibilities, unit development, and lesson implementation. 3 seminars, 1 activity. Concurrent: EDUC 434. Prerequisite: EDUC 306, EDUC 307, EDUC 430, EDUC 431, EDUC 432.

**EDUC 436 Advanced Student Teaching – Multiple Subject Credential (10) CR/NC**

Observation, teaching, research and related activities in public elementary and middle school classroom and school sites. Credit/No Credit grading only. Concurrent: EDUC 437. Prerequisite: EDUC 434, EDUC 435.

**EDUC 437 Inquiries into the Teaching Profession (4)**

Research-based examination of contemporary issues and their impact upon elementary and middle schools. Exploration of issues which accompany the transition to the first year of teaching, including hiring practices, school politics, and professionalism. 3 seminars, 1 activity. Concurrent: EDUC 436. Prerequisite: EDUC 434, EDUC 435.

**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 CD 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 488 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 (4)**

Language arts curriculum: objectives, methods, content, materials, evaluation, current trends, research and field work activities. 3 seminars, 1 activity. 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 may be required—see *Class Schedule*. 3 seminars, 1 activity. Prerequisite: Graduate standing.

#### **EDUC 505 Seminar in Social Studies Curriculum and Methods (4)**

In-depth study of the social studies curriculum: objectives, methods, content, materials, evaluation, current trends and field work activities. 3 seminars, 1 activity. 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 (4)**

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, 1 activity. Prerequisite: Graduate standing or consent of instructor.

#### **EDUC 511 Educational Law and Governance (4)**

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, 1 activity. 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 (4)**

Supervision, management, and evaluation of educational curriculum and educational programs. Current trends in program management including mapping, monitoring, alignment. 3 seminars, 1 activity. Prerequisite: EDUC 501 and 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 533 Internship (3) CR/NC**

Supervised experience as an employed professional. Supervision conducted cooperatively with university and employer. Setting must be approved in advance. Limited to candidates in approved internship programs. Total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: EDUC 440, graduate standing.

**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)**

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. 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 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 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. Concurrent or prerequisite: PHYS 133.

**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. Not for electrical engineering majors. 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. Concurrent: EE 248.

**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. Two-level logic realizations of SOP and POS functions, and an introduction to multi-level logic. Multiple function synthesis using PLDs and gate arrays. Combinational circuit design as it applies to computers. Sequential circuit elements, flip-flops, counters and shift-registers. 3 lectures. Prerequisite: CSC 101 or CSC 234. Concurrent: EE 259.

**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: EE 201.

**EE 259 Logic and Switching Circuits Laboratory (1) (Also listed as CPE 259)**

Laboratory synthesis of combinational logic circuits and counters. Introduction to laboratory equipment such as logic state analyzers. Use of software (both off-the-shelf and customized) for logic simulation and design. Introduction to use of PLDs and hardware description languages in

combinational design and testing. 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. Concurrent: EE 341.

**EE 302 Linear Control Systems (3)**

Automatic feedback control systems. Analysis of linear dynamic systems. 3 lectures. Prerequisite: EE 301. Concurrent: EE 342.

**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. Concurrent: EE 347.

**EE 308 Electronic Circuits (3)**

Analysis and design of linear small-signal amplifiers. 3 lectures. Prerequisite: EE 208, EE 301. Concurrent: EE 348.

**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 307, EE 308. Concurrent: EE 349.

**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. Concurrent: EE 353.

**EE 319 Digital System Design (3) (Also listed as CPE 319)**

Introduction to the design of digital systems utilizing state-machines; analysis and synthesis of state-machines. Design of synchronous, asynchronous, and pulse mode sequential logic circuits. Practical considerations of digital system design and implementation. Emphasis on the use of PLDs and hardware description language for implementation technology. Considerations of testing of digital systems as a part of design. 3 lectures. Prerequisite: EE 219, EE 307. Concurrent: EE 359.

**EE 321 Electronics (3)**

Semiconductor devices and circuits. Instrumentation amplifiers, power control rectifiers, feedback, pulse circuits, digital logic circuits. Not for 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. Concurrent: EE 365.

**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 electric and magnetic fields and their sources. Poisson's and Laplace's equations, and boundary value problems. Time-varying electromagnetic fields and Maxwell's equations. Plane wave propagation in free space and in materials. 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 248, EE 341. Concurrent: EE 308.

**EE 349 Integrated Electronic Circuits Laboratory (1)**

Design of electronic subsystems using integrated circuits. 1 laboratory. Prerequisite: EE 342, EE 347, EE 348. Concurrent: EE 309.

**EE 353 Signal Transmission Laboratory (1)**

Transmission and reflection measurements. Impedance matching techniques. 1 laboratory. Prerequisite: EE 341. Concurrent: EE 313.

**EE 359 Digital System Design Laboratory (1) (Also listed as CPE 359)**

Laboratory synthesis of combination and sequential logic circuits. Implementation with PLDs and hardware description language. Sequential 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: 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: 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 (1-5)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 5 units. Prerequisite: Consent of department chair.

**EE 401 Electromagnetic Fields II (3)**

Reflection and transmission of normal incident plane waves at plane boundary interface(s) between two (and multiple) media. Reflection and refraction of oblique incident plane waves at a plane boundary interface between two different media. Waveguides. 3 lectures. Prerequisite: EE 334.

**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 334 or 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 308.

**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. System model representation of the synchronous machine, symmetrical faults, electrical insulation, grounding. Load flow analysis, economic operation of power systems. 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, symmetrical components, unbalanced faults, power system stability, 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 349, EE 325/EE 365.

**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)**

Advanced design of electronic circuits and subsystems. Design as a process. Implementation of specific design projects. Automated test using GPIB instruments. 3 lectures, 1 laboratory. Prerequisite: CSC 234, EE 309/EE 349.

**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 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 334 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: CSC 234, 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: EE 307.

**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 359, EE 307/EE 347 and EE 308/EE 348 or consent of instructor.

**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, EE 328. Concurrent: EE 472.

**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 436 Microprocessor System Design****Methodologies (3) (Also listed as CPE 436)**

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, EE 319, or consent of instructor. Concurrent: EE 476.

**EE 437 Digital Computer Subsystems (3) (Also listed as CPE 437)**

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: EE 319.

**EE 438 Digital Computer Systems (3) (Also listed as CPE 438)**

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: EE 437 or consent of instructor.

**EE 439 Computer Peripheral Interfacing (3) (Also listed as CPE 439)**

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: EE 436, or consent of instructor.

**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. Concurrent or prerequisite: 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 High Frequency 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 348. 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 341, 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: EE 419.

**EE 460 Senior Seminar (1) (CR/NC)**

Discussion of senior project topics in electrical and computer engineering. Development of senior project proposal. Employment opportunities and professional issues are also discussed. 1 seminar. Credit/No Credit grading only. Prerequisite: EE 301/EE 341, EE 307/EE 347.

**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 309/EE 349, EE 319/EE 359, EE 325/EE 365, EE 334, EE 460.

**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 472 Digital Control Systems Laboratory (1)**

Design and programming of microprocessor-based digital controls for electro-mechanical plants. Topics include digital control laws, translation of transfer functions into algorithms, assembly language programming, real-time software design, sample rate selection, finite word-length considerations. 1 laboratory. Prerequisite: EE 342. Concurrent: EE 432.

**EE 476 Microprocessor Interfacing Laboratory (1) (Also listed as CPE 476)**

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: EE 436.

**EE 478 Digital Computer Systems Laboratory (1) (Also listed as CPE 478)**

Laboratory analysis and synthesis of digital computer subsystems. Microprogramming of a simple digital computer via computer simulation. Interfacing with digital systems. 1 laboratory. Prerequisite: EE 359, and EE 437 or EE 439 or 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 502 Microwave Engineering (4)**

Application of Maxwell's equations and boundary value problems to waveguide structures. Striplines and microstrip lines. S-parameters. Microwave equivalent circuit theorem. Passive microwave devices. Charge and field interactions in oscillators and amplifiers. Transferred electron devices, avalanche transit-time devices, and microwave transistors. Circuits associated with oscillators and reflection type amplifiers. 4 seminars. Prerequisite: EE 401.

**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)**

Summary course covering five selected graduate-level topics in automatic control theory and practice; implementation issues in digital control, nonlinear control theory and design, LQ and time optimal control, variable structure control, and fuzzy logic/model-free control. 4 seminars. Prerequisite: EE 513 or equivalent, EE 328 or similar course on discrete-time linear systems.

**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 437, 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 436, 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 Photonic 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 533 Antennas (4)**

Principles of antenna theory. Antenna parameters, radiation integrals. Duality and reciprocity theorems. Wire antennas. Antenna arrays. Traveling wave antennas. Broadband and frequency independent antennas. Aperture and reflector antennas. Microstrip antennas. Antenna design. 4 seminars. Prerequisite: EE 401.

#### **EE 541 Advanced Microwave Laboratory (2)**

Experimental measurement in waveguide and microstrip circuits employing the advanced Network Analyzer. Design

of both passive and active microwave circuits using microstrip. Graphical and analytical design techniques as well as the use of computer-aided design codes. 2 laboratories. Prerequisite: EE 401. Concurrent or prerequisite: EE 502 or consent of instructor.

#### **EE 563 Graduate Seminar (1) (CR/NC)**

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. Credit/No Credit grading only. 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.

## **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 a 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 203 Core I: Old English/Medieval (4)**

Representative canonical and non-canonical readings in the literature of the period. Selections will include *Beowulf*, Dante, the Pearl Poet, Chaucer, Medieval theater, and others, as chosen by the instructor. 4 lectures. Prerequisite: ENGL 114 and ENGL 215 or ENGL 218, and ENGL 251; for English majors only.

**ENGL 204 Core II: Renaissance (4)**

Representative canonical and non-canonical readings in the literature of the period. Selections will include Shakespeare, Spenser, Milton, Donne, Jonson, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 203; for English majors only.

**ENGL 205 Core III: 1660–1798 (4)**

Representative canonical and non-canonical readings in the literature of the period. Selections will include Pope, Swift, Austen, representative American Puritan writers, one playwright, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 204; for English majors only.

**ENGL 215 Writing: Argumentation (4) GEB A.4.**

Instruction in the drafting, revising, editing and proofreading of effective argumentative prose; technique of discovery, evaluation, and the incorporation of secondary sources in effective arguments. Discussion of the elements of argument in written prose. Critical reading of modes of effective argument. Not open for A4 credit 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 in professional situations. Composing and conveying technical information using both traditional methods and electronic media. Work in business situations. Graphic design and layout. Not open for A4 credit 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. Includes works by such authors as Chaucer, Shakespeare, Spenser, Donne, Milton, Swift, Pope, and Johnson. 4 lectures. Prerequisite: ENGL 114 and ENGL 215 or ENGL 218, or consent of instructor.

**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 authors as Wordsworth, Keats, Tennyson, Shaw, Yeats, Woolf, and Eliot. 4 lectures. Prerequisite: ENGL 114 and ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 240 American Tradition in Literature (4) GEB C.1.**

Selected readings in American literature from the Colonial period to the Twentieth Century. Literary expression of such philosophies as Puritanism, Deism, Transcendentalism, Naturalism and Modernism. Works by such authors as Franklin, Emerson, Poe, Whitman, Dickinson, Twain, Frost, and Faulkner. 4 lectures. Prerequisite: ENGL 114 and ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 251 Great Books of World Literature: Classical and Ancient World (3) GEB C.1.**

Selected readings from the earliest epics through the literature of Greece and Rome. Includes such works as *Gilgamesh*, and such authors as Homer, Aeschylus, Sophocles, Euripides, Virgil and Ovid. 3 lectures. Prerequisite: ENGL 114 and ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 252 Great Books of World Literature: Middle Ages, Renaissance and Enlightenment (3) GEB C.1.**

Selected readings from the fall of the Roman Empire to the Eighteenth Century. Includes such authors as Hsiyu Chi, Chrétien de Troyes, Chaucer, Dante, Cervantes, Shakespeare, Molière, Voltaire and Swift. 3 lectures. Prerequisite: ENGL 114 and ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 253 Great Books of World Literature: Romanticism and the Modern World (3) GEB C.1.**

Selected works from Romanticism up to the present. Literary expression of movements such as Realism, Naturalism, and Existentialism. Includes such authors as Goethe, Hugo, Wordsworth, Keats, Flaubert, Balzac, Dostoevsky, Woolf, Joyce, Beckett, and Achebe. 3 lectures. Prerequisite: ENGL 114 and ENGL 215 or ENGL 218, 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 and ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 290 Introduction to Linguistics (4)**

Introduction to the nature of language; concepts and methods of linguistic science. 4 lectures. Prerequisite: ENGL 114 and ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 302 Writing: Advanced Composition (4)**

Writing and analysis of expository and argumentative papers at an advanced level. Special attention paid to issues of style and voice. Critical reading of models of effective writing. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

**ENGL 303 Core IV: 1798–1865 (4)**

Representative canonical and non-canonical readings in the literature of the period. Selections will include Wordsworth, Coleridge, Keats, Emerson, Hawthorne, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 205; for English majors only.

**ENGL 304 Core V: 1865–1914 (4)**

Representative canonical and non-canonical readings in the literature of the period. Selections will include Dickinson, Whitman, Arnold, James, Hardy, and others, as chosen by the instructor. 4 lecture. Prerequisite or concurrent: ENGL 303; for English majors only.

**ENGL 305 Core VI: 1914–Present (4)**

Representative canonical and non-canonical readings in the literature of the period. Selections will include Yeats, Joyce, Woolf, Eliot, Faulkner, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 304; for English majors only.

**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 318 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 326 Literary Theory (4)**

Theory and practice from the various perspectives common in current criticism covering fundamental issues about literature and its contexts, including the nature of literary "truth," the autonomy of texts, relationships between literature and history and the role of ideology, among others. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 327 Creative Writing: Fiction (4)**

Instruction and practice in writing, revising, and evaluating fiction. Total credit limited to 8 units. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 328 Creative Writing: Poetry (4)**

Instruction and practice in writing, revising, and evaluating poetry. Total credit limited to 8 units. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 329 Creative Writing: Drama (4)**

Instruction and practice in writing, revising, and evaluating drama. Total credit limited to 8 units. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, or consent of instructor.

**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: One of the following: ENGL 230, ENGL 231, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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. Representative writers include Conrad, Joyce, Woolf, Waugh, Drabble, Yeats, Eliot, Smith, and Stoppard. 4 lectures. Prerequisite: One of the following:

ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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. Miscellaneous course fee may be required—see *Class Schedule*. Not open for C3 credit to students with credit in ENGL 339. 3 lectures, 1 activity. Prerequisite: One of the following: ENGL 230, ENGL 231, ENGL 251, ENGL 252, or ENGL 253, or consent of instructor.

**ENGL 339 Introduction to Shakespeare (4) GEB C.3.**

Readings from such works as *Hamlet*, *King Lear*, *A Midsummer Night's Dream* and the sonnets. Not open for C3 credit to students with credit in ENGL 338. 4 lectures. Prerequisite: One of the following: ENGL 230, ENGL 231, ENGL 251, ENGL 252, or 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 Puritan 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or ENGL 253, or consent of instructor.

**ENGL 345 Women Writers (4) GEB C.3. USCP**

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 they affect the creative process. 4 lectures. Prerequisite: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or ENGL 253, or consent of instructor.

**ENGL 346 Ethnic American Literature (4) GEB C.3. USCP**

Literature by African American, Asian American, and Native American writers, and American writers of Mexican descent.

Socio-cultural impact on the creative process. Historical contexts which served as a background to particular literary trends. Relationships of such writers to the American canon and a revised canon. 4 lectures. Prerequisite: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or ENGL 253, or consent of instructor.

**ENGL 353 Drama in London (4) GEB C.3.**

Reading in drama of the Twentieth Century and/or earlier periods, exclusive of Shakespeare, with special emphasis on form and ideas. Attendance at play performances required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 activity. Prerequisite: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or ENGL 253, or consent of instructor.

**ENGL 355 The Bible as Literature (4)**

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. 4 lectures. Prerequisite: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or ENGL 253, or consent of instructor.

**ENGL 360 Literature for Adolescents (3)**

Readings in literature suitable for use in secondary schools. 3 lectures. Prerequisite: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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. Repeatable to 12 units. 3 lectures, 1 laboratory. Prerequisite: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or 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: One of the following: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, or ENGL 253, or consent of instructor.

**ENGL 390 The Linguistic Structure of Modern English (4)**

Linguistic analysis of the English language, including phonology, morphology, syntax, and style and dialect variation. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 391 Topics in Applied Linguistics (4)**

Topics in applied linguistics including sociolinguistics, first and second language acquisition, literacy, bilingualism, and dialectology. Applications to teaching the English language. *Class Schedule* will list topic selected. Repeatable to 8 units. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 395 History of the English Language (4)**

Linguistic approach to the history of the English language: evolution of phonology, morphology, lexicon, syntax, and semantics within the changing cultural context of the last 2000 years. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, or consent of instructor.

**ENGL 399 Tutor Training (2) (CR/NC)**

Studies of approaches to 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. Credit/No Credit grading only. 1 lecture, 1 laboratory. Prerequisite: ENGL 114, ENGL 215, and ENGL 315.

**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 the department chair.

**ENGL 408 Internship (2–12) CR/NC**

Advanced study and part-time work experience; current innovation, practices, and problems in administration, supervision, and organization. Must be able to do independent work in career field. Weekly reports and evaluation by work supervisor required. Repeatable to 12 units. Credit/No Credit grading only. Prerequisite: Consent of instructor.

**ENGL 411 Writing Interactive Documents (4)**

Computer-based writing in theory and practice: hypertext, e-mail, online documentation, multimedia, networked group editing; compound electronic documents, interdocument linking. Technical, business, scholarly, pedagogical and creative applications. Repeatable to 8 units. 4 lectures. Prerequisite: Appropriate background: advanced skills in writing and/or graphics, and/or computer programming; upper-division standing.

**ENGL 418 Technical Communication Practicum (2–4) (CR/NC)**

Supervised work experience in government, corporate, or volunteer setting, as approved by department chair. 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 and two technical writing courses.

**ENGL 423 Writing in Secondary Schools (4)**

Methods of teaching writing in secondary schools, with emphasis on how writing may be integrated into the overall English curriculum. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, admission to the teaching credential program, or consent of instructor.

**ENGL 424 Teaching English in Secondary Schools (4)**

Methods of teaching English in secondary schools, with emphasis on practical approaches in a literature centered curriculum. 4 lectures. Prerequisite: ENGL 215 or ENGL 218, admission to teacher education program, or consent of instructor.

**ENGL 427 Advanced Creative Writing: Fiction (4)**

Instruction and practice in advanced writing, revising and evaluating of fiction. Repeatable to 8 units. 4 lectures. Prerequisite: ENGL 327 or consent of instructor.

**ENGL 428 Advanced Creative Writing: Poetry (4)**

Instruction and practice in advanced writing, revising and evaluating of poetry. Repeatable to 8 units. 4 lectures. Prerequisite: ENGL 328 or consent of instructor.

**ENGL 429 Advanced Creative Writing: Drama (4)**

Instruction and practice in advanced writing, revising and evaluating of drama. Repeatable to 8 units. 4 lectures. Prerequisite: ENGL 329 or consent of instructor.

**ENGL 430 Chaucer (4)**

Selected readings from *Canterbury Tales* and Chaucer's other major poems. 4 seminars. Prerequisite: One of the following: ENGL 330, ENGL 331, ENGL 332, ENGL 333, ENGL 334, or ENGL 335, or consent of instructor. English majors must have completed ENGL 201.

**ENGL 431 Shakespeare (4)**

Representative comedies, tragedies, and histories. 4 seminars. Prerequisite: One of the following: ENGL 330, ENGL 331, ENGL 332, ENGL 333, ENGL 334, or ENGL 335, or consent of instructor. English majors must have completed ENGL 204.

**ENGL 432 Milton (4)**

*Lost, Paradise Regained, Paradise and Samson Agonistes*, with some attention to the minor poems. 4 seminars. Prerequisite:

One of the following: ENGL 330, ENGL 331, ENGL 332, ENGL 333, ENGL 334, or ENGL 335, or consent of instructor. English majors must have completed ENGL 204.

**ENGL 439 Significant British Writers (4)**

Selected British writers, as individual writers or in groups. *Class Schedule* will list topics selected. Repeatable to 12 units. 4 seminars. Prerequisite: One of the following: ENGL 330, ENGL 331, ENGL 332, ENGL 333, ENGL 334, or ENGL 345, or consent of instructor. English majors must also have completed the MAJOR CORE in the relevant period.

**ENGL 449 Significant American Writers (4)**

Selected American writers, as individual writers or in groups. *Class Schedule* will list topic selected. Repeatable to 12 units. 4 seminars. Prerequisite: One of the following: ENGL 340, ENGL 341, or ENGL 342, or consent of instructor. English majors must also have completed the MAJOR CORE in the relevant period.

**ENGL 459 Significant World Writers (4)**

Selected world writers, as individual writers or in groups. *Class Schedule* will list topic selected. Repeatable to 12 units. 4 seminars. Prerequisite: 12 units of literature courses, and consent of instructor. English majors must also have completed the MAJOR CORE in relevant period.

**ENGL 461 Senior Project (1)**

One-unit adjunct course which must be taken concurrently with ENGL 411, ENGL 418, ENGL 427, ENGL 428, ENGL 429, ENGL 430, ENGL 431, ENGL 432, ENGL 439, ENGL 449 or ENGL 459, ENGL 495, ENGL 497, or ENGL 498 during the last two quarters of the student's undergraduate career. English majors only.

**ENGL 465 Computer Resources for English Teachers (4)**

Computer as problem-solving, teaching, research, communication, and administrative tool in English education. Lesson planning and integration of technology into the secondary English classroom, including networked communication, the World-Wide Web, educational software and appropriate hardware. Attention to ethical, rhetorical, and phenomenological implications of the use of technology in English education. 3 seminars, 1 laboratory. Prerequisite: Completion of computer literacy requirement GEB F.1.

**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. Repeatable to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**ENGL 486 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 495 Topics in Applied Language Study (4)**

Application of linguistics to human communications, human relations, and language policy and planning, or literature. *Class Schedule* will list topic selected. Repeatable to 12 units. 4 seminars. Prerequisite: ENGL 290, ENGL 390 or 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 courses or consent of instructor.

**ENGL 498 Approaches to Teaching English as a Second Language/Dialect (4)**

Approaches to teaching English as a second language. Attention to materials development and testing. 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 classroom under supervision of a cooperating teacher. Teaching materials development and curriculum design. Credit/No Credit grading only. 1 seminar, 1 supervision. Prerequisite: 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 and on-line 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 in English.

**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. Repeatable to 8 units. 4 seminars. Prerequisite: Graduate standing in English.

**ENGL 503 Graduate Introduction to Linguistics (4)**

Introduction to linguistics for graduate students. Phonology, morphology lexicon, syntax, and variation within language; application of linguistics to real-world issues. 4 seminars. Prerequisite: Graduate standing in English.

**ENGL 504 Seminar in English Linguistics (4)**

Examination of varying theoretical approaches to the structure of English, or applications of linguistic methods in the study of literature, dialectology, language acquisition, literacy, bilingualism, or discourse analysis. *Class Schedule* will list topic selected. Repeatable to 12 units. 4 seminars. Prerequisite: Graduate standing in English, ENGL 290, ENGL 390, or ENGL 503, or consent of instructor.

**ENGL 505 Seminar in Composition Theory (4)**

Special problems in composition. Direct application of composition and rhetorical theory to composition instruction. 4 seminars. Prerequisite: Graduate standing in English, or consent of instructor.

**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 classroom organization and management. Discussion of research into the nature and resolution of student writing problems. Required of all new teaching assistants in English. Credit/No Credit grading only. 4 seminars. Prerequisite: Graduate standing in English and ENGL 505, or consent of instructor.

**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. Repeatable to 16 units. 4 seminars. Prerequisite: Graduate standing in English. ENGL 501 strongly advised.

**ENGL 511 Seminar in American Literary Periods (4)**

American periods. Written and oral reports of individual investigation. *Class Schedule* will list topic selected. Repeatable to 20 units. 4 seminars. Prerequisite: Graduate standing in English. ENGL 501 strongly advised.

**ENGL 512 Seminar in British Literary Periods (4)**

British periods. Written and oral reports of individual investigation. *Class Schedule* will list topic selected. Repeatable to 20 units. 4 seminars. Prerequisite: Graduate standing in English. ENGL 501 strongly advised.

**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. Repeatable to 16 units. 4 seminars. Prerequisite: Graduate standing in English. ENGL 501 strongly advised.

**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. Repeatable to 8 units. Prerequisite: Graduate standing in English and 8 units of successful graduate work.

**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: Graduate standing in English and ENGL 318, or consent of instructor.

**ENGL 527 Graduate Seminar in Creative Writing:  
Fiction (4)**

Graduate instruction in writing, revising, and evaluating fiction. Repeatable to 8 units. 4 seminars Prerequisite: Graduate standing in English and ENGL 427, or consent of instructor.

**ENGL 528 Graduate Seminar in Creative Writing:  
Poetry (4)**

Graduate instruction in writing, revising, and evaluating poetry. Repeatable to 8 units. 4 seminars. Prerequisite: Graduate standing in English and ENGL 428, or consent of instructor.

**ENGL 590 Directed Study (2–4)**

Supervised independent or group study of special problems in selected areas of language, composition, or literature. Repeatable to 12 units. Prerequisite: Graduate standing in English and the permission of the graduate adviser.

**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 210 Technical Group Study Training (2) (CR/NC)**

Approaches to facilitated small group study. Practice facilitating under supervision in the MEP Technical Study Center. Review academic and interactive group communication skills. Minimum two hour facilitated group lab. CRLA International Tutor Program Certification. Total credit limited to 6 units. Credit/No Credit grading only. 1 lecture, 1 laboratory. Prerequisite: Grade of B or better at Cal Poly in course student will be facilitating.

**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 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 chair.

**ENVE 304 Thermodynamics of Processes (3)**

Material and energy balances, liquids and mixtures, vapor-liquid equilibria, solubility and absorption, equilibrium in chemical reactions. 3 lectures. Prerequisite: ME 302, CHEM 125; prerequisite or co-requisite: ENVE 331.

**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 114, MATH 241, PHYS 133, and CSC 234 or CSC 231.

**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 (4)**

Description and quantification of water quality characteristics important for water and wastewater treatment, and local and global water quality standards. Introduction to the modeling of constituent fate and transport, and to the use of flowsheets describing processes that modify water quality. 4 lectures. Prerequisite: CHEM 125, MATH 242, 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 chair.

**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 304, ME 341 ENVE 325, and ENVE 331.

**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 304, ENVE 325, ENVE 331, ME 313, and 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 212, STAT 312, and ENGL 218.

**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 212, and ENVE 330 or ENVE 331.

**ENVE 436 Introduction to Hazardous Waste Management (3)**

Overview of industrial processes that 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 and ENVE 331, or equivalent.

**ENVE 437 Industrial and Hazardous Waste Treatment Technologies (4)**

Theory and experiments for innovative physical/chemical industrial and hazardous waste treatment processes. Advanced Oxidation Processes, membrane separation units, catalytic and non-catalytic reactions. Computer simulations. Analytical chemistry instrumentation. 3 lectures, 1 laboratory. Prerequisite: ENVE 304, ENVE 436, ENVE 438, STAT 312.

**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: ENVE 330 or ENVE 331, and 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 331, ENVE 411, ENVE 438 and ME 451.

**ENVE 443 Bioenvironmental Engineering I (4)**

Biologically mediated environmental remediation and pollution prevention is an emerging field. Introduction to the engineering aspect of the new technology, such as various in-site remediation technologies and state-of-the-art pollution prevention technologies. 3 lectures, 1 laboratory. Prerequisite: ENVE 421.

**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 chair.

**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 or consent of instructor.

**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: ENVE 535, and graduate standing or consent of instructor.

**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 or consent of instructor.

**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)**

GEB D.4.a. USCP

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. 3 lectures.

**ES 114 Racism in American Culture (4)**

USCP

Survey and analysis of racism in the development of American institutions and its effect upon ethnic groups, women, and society. 4 lectures.

**ES 200 Special Problems for Undergraduates (1–2)**

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

**ES 210 United States Cultural Heritage (3)**

GEB D.4.a. USCP

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 300 Chicano/a Literature (4)**

GEB C.3. USCP

Overview of contemporary Chicano/a literature since 1848. Aztlán as literary myth, thematic concerns, literary techniques, historical and socio-economic factors shaping Chicano/a poetry, short stories, novels, drama, and non-fiction narrative and essay as literary forms. Instructor reserves option to focus upon one or more genres per course. 4 lectures. Prerequisite: ES 110, ENGL 240, or consent of instructor.

**ES 320 American Cultural Images (3) GEB D.4.a. USCP**

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, Asian Americans, and Mexican Americans/Latinos. See *Class Schedule* for group selected. 3 lectures. Prerequisite: ES 110.

**ES 321 American Cultural Images:  
American Indians (3)**

GEB C.3. USCP

Comparative study of stereotypical and archetypal impressions, images, and projections of American Indian cultural/ethnic minority/majority groups in American popular opinion and consciousness. 3 lectures. Prerequisite: ES 110.

**ES 325 African American Women's Experiences (3)**

USCP

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 330 The Chinese American Experience (3)**

GEB D.4.b. USCP

History and current status of Chinese Americans, with emphasis on international contexts, organizations and institutions of Chinese America, demographic compositions, spatial patterns, and cultural, socioeconomic and political adaptation experience. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**ES 350 Asian American and African American Environments (3)**

USCP

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 110, 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.

**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 Introduction to Forest Ecosystem Management (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) (Also listed as REC 203)**

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 (3)**

Fire control techniques used on various wildland fuels. Elementary fire physics, fuels, weather, fire behavior, tactics and fire suppression techniques, line construction, "mop-up", fire line safety, air operations and fire organization. Meets basic wildland fire fighter certification requirements for the USDA Forest Service. Partially meets California Department of Forestry Firefighter I requirements. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 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 121 or BIO 152.

**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 247 Forest Surveying (2) (Also listed as BRAE 247)**

Use and care of tapes, staff compass, abney levels, theodolites, and GPS receivers. Keeping field notes, measurements by tape. Closed and open traverse by compass and theodolite. Turning angles and determining directions of lines. Map reading and public land description. GPS measurements. 1 lecture, 1 laboratory. Prerequisite: MATH 119.

**FNR 260 Forest Harvesting and Utilization (3)**

Relationships between forest ecosystem management, harvesting methods, timber harvest planning, components of forest harvesting, harvesting effects; cost analysis of

harvesting methods; safety management; value-added forest utilization; and road location. Miscellaneous course fee may be required—see *Class Schedule*. Overnight or weekend field trips required. 2 lectures, 1 laboratory.

**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) (Also listed as REC 300)**

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. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: AG 250 or CSC 113, junior standing or consent of instructor.

**FNR 306 Natural Resource Ecology and Habitat Management (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 307 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 306 or ecology course, and FNR 204 or consent of instructor.

**FNR 311 Environmental Interpretation (4) (Also listed as REC 311)**

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 315 Forest Mensuration and Sampling (4)**

Principles and methods of sampling and measurement for forest and natural resource quantities and qualities. Modeling and estimation for tree volumes, stand structure and composition, and related forest vegetation. Applications in sampling, statistical and inventory techniques. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Overnight field laboratories required. Prerequisite: MATH 120, STAT 218, BRAE/FNR 247.

FNR 318 Applications of GIS in Natural Resources (3) (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*. 1 lecture, 2 laboratories. Prerequisite: Junior standing, and AG 250 or CSC 113 or consent of instructor.

**FNR 326 Natural Resources Economics and Valuation (4)**

Principles of efficient use of renewable and nonrenewable natural resources, including methods for attaching value to marketable and non-market natural resources. Key resource sectors treated in detail: timber, water resources, wildlife/fisheries, and wildland recreation. 3 lectures, 1 laboratory. Prerequisite: MATH 118, AGB 212, FNR 201.

**FNR 335 Human Resources and Conflict Management in Natural Resources (4)**

Application of behavioral science principles and techniques in the management of natural resource systems. Management of internal and external human resource issues and concerns in natural resources organizations is emphasized. 3 lectures, 1 laboratory. Prerequisite: FNR 201, PSY 201 or PSY 202.

**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 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 355 or consent of instructor.

**FNR 355 Hardwood and Woodlot Management (4)**

Regeneration, management and improvement of farm and urban interface forest holdings. Design and production of wood biomass for wood fiber, fuel and Christmas trees, etc. Emphasis on hardwood/oak woodland management, biodiversity, and land ethics. Integration with range, wildlife and recreation values. Weekend or full-day field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 201, FNR 208, FNR 315.

**FNR 360 Survey and Management of Mediterranean Ecosystems (4)**

Woody vegetation found in worldwide Mediterranean ecosystems. Distribution, historical development and uses of these ecosystems. Emphasis on chaparral management

techniques and effects of management on fire, water production, biomass potential. 3 lectures, 1 laboratory. Prerequisite: FNR 306 or equivalent.

**FNR 365 Silviculture and Vegetation Management (3)**

Integrating ecological science and communication as the primary means of implementing ecosystem management. Growth and development of individual plants and plant communities and their interaction with the environment. Vegetation manipulation and reforestation methods; effects and outcomes of silvicultural prescriptions. Miscellaneous course fee required—see *Class Schedule*. Overnight and/or weekend field trips required. 2 lectures, 1 laboratory. Prerequisite: FNR 208, FNR 306, FNR 315.

**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 402 Forest Health (4)**

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. Course offered at Swanton Pacific ranch beginning Fall Quarter 2000 contingent on facilities. 3 lectures, 1 laboratory. Prerequisite: FNR 208, FNR 306 and department head approval.

**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 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 410 Resource Recreation Management (4) (Also listed as REC 410)**

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 412 Forest and Natural Resources Senior Assessment Project (4)**

Principles and practices of integrated sampling and inventory of resource values in forested ecosystems. Comprehensive timber harvest planning to address multiple forest values: silvicultural prescriptions for watershed and wildlife management culminating in a student project report. Course

offered at Swanton Pacific ranch beginning Fall 2000 contingent on facilities. 2 lectures, 2 laboratories. Prerequisite: FNR 326, FNR 365 and department head approval.

**FNR 414 Timber Management (4)**

Physical, biological, economic, social and political influences on optimal forest management for purposes of producing wood products. Growth and yield modeling; timber investment analysis; sustainable timber production; harvest schedule modeling. 3 lectures, 1 laboratory. Prerequisite: FNR 326, FNR 365, FNR 412.

**FNR 416 Environmental Impact Analysis and Management (4)**

National Environmental Policy and California Environmental Quality Acts as applied to natural resource management processes. Intent, purpose and history of the laws; differences between laws identified. Request for proposals and preparation of environmental documents covered. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: FNR 306 or equivalent.

**FNR 417 Resource Recreation Planning (3) (Also listed as REC 417)**

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. Miscellaneous course fee may be required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: FNR 112 or consent of instructor.

**FNR 419 Watershed Management (4)**

Hydrologic cycle concepts and measurement. Analysis and measurement of watershed processes. Watershed management and protection including rehabilitation, erosion, sedimentation, cumulative watershed effects, stream habitat assessment. Saturday and weekend field trip required. 3 lectures, 1 laboratory. Prerequisite: SS 121, FNR 306, FNR 318.

**FNR 420 Advanced Watershed Hydrology (4)**

Sources of streamflow and processes by which watersheds undergo change from natural and anthropogenic processes. Fluvial processes, sediment transport and channel restoration techniques. Influences of forest and range management on water resources including water quality and analytical techniques. Weekend field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 419.

**FNR 425 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 416 or senior standing.

**FNR 434 Wood Properties and Products (5)**

Principles of wood properties and efficient use of renewable wood resources including methods for using wood as an energy source. Weekend or full-day field trips required. 3 lectures, 2 laboratories. Prerequisite: FNR 201 and FNR 260 or consent of instructor.

**FNR 435 Natural Resources Policy Analysis (4)**

Policy process approach to understanding the efforts to resolve natural resource problems in the public and private sector. Principles and techniques used to analyze the effects of policy changes on natural resources management. 3 lectures, 1 laboratory. Prerequisite: FNR 326, FNR 335.

**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 465 Ecosystem Management (4)**

Applied integration of forestry and natural resources management knowledge. Principles, concepts and techniques designed to utilize resources while sustaining forest health and habitat within acceptable limits of change. Ecosystem management planning project. 3 lectures, 1 laboratory. Prerequisite: FNR 416, FNR 414, FNR 419.

**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 472 Leadership Practice (1) (Also listed as REC 472)**

Leadership styles used in the natural resources management and recreation administration professions. Study and practice in setting goals and objectives; developing, evaluating and implementing an entrepreneurial project plan; decision making and problem-solving. 1 laboratory. Prerequisite: Junior standing or 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; overgrazing 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 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 530 Social Systems in Forest Resources Management (3)**

Theories and methods for incorporating community in the management of forest resources. Approaches to conflict resolution between resource owners and community stakeholders using tools such as GIS. 2 lectures, 1 laboratory. Prerequisite: Graduate standing and consent of instructor.

**FNR 532 Forestry Applications in Biometrics and Econometrics (4)**

Quantitative methods in modeling biological and economic processes associated with managing forested ecosystems. Biometric modeling of stand growth and inventory. Econometric modeling of market and non-market natural resource values. 3 lectures, 1 laboratory. Prerequisite: Graduate standing, and consent of instructor.

**FNR 534 Forest Ecosystem Management and Modeling (3)**

Methods and modeling approaches used in quantifying ecological processes and conditions associated with forested ecosystems, such as fire behavior, hydrologic processes, terrestrial and aquatic habitat condition using GIS and other models. 2 lectures, 1 laboratory. Prerequisite: Graduate standing, and consent of instructor.

**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 200 Special Problems for Undergraduates (1)**

Individual investigation, research, studies, or surveys of selected problems at the lower division level. *Class Schedule* will list topic selected. Total credit limited to 8 units per quarter. Prerequisite: Consent of instructor.

**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 (1–4)**

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: 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 121, 122 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 122 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 122 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 122, 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 (2–4) (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. 1 lecture, variable practicum. 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. Field trip required. 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 339 Internship in Fruit Science (1–12) (CR/NC)**

Selected Fruit Science 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship 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 Management (2–4) (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. 1 lecture, variable practicum. 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. 3 lectures, 1 laboratory. Prerequisite: One production class in either fruits, vegetables or ornamentals, or consent of instructor.

**FRSC 422 Tropical and Subtropical Crop and Fruit Production (4) (Also listed as CRSC 422)**

Production, distribution and utilization of major agronomic, vegetable, fruit and nut crops of economic importance in tropical and subtropical areas. Weather systems, climates, soils, and cropping systems of tropical and subtropical areas. Field trip required. Miscellaneous course fee may be required—see *Class Schedule*. 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 500 Individual Study in Fruit Science (1–6)**

Advanced independent study planned and completed under the direction of a member of the Fruit Science faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**FRSC 539 Graduate Internship in Fruit Science (1–9)**

Application of theory to the solution of problems of agricultural production or related business in the field of Fruit Science. 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.

**FRSC 570 Selected Topics in Fruit Science (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 9 units. 1 to 3 seminars. Prerequisite: Graduate standing or consent of instructor.



**FRSC 571 Selected Advanced Laboratory in Fruit Science (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.

**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.

**FRSC 599 Thesis in Fruit Science (1–9)**

Systematic research of a significant problem in Fruit Science. 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.

**FSN–FOOD SCIENCE AND NUTRITION****FSN 101 Orientation to Nutritional Science (1) (CR/NC)**

Understanding the depth and breadth of the Nutritional Science program. Emphasis on curriculum and career planning. 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 111.

**FSN 125 Introduction to Food Science (5)**

Basic principles of 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*. 4 lectures, 1 laboratory.

**FSN 154 Basic Calculations in Food Processing (4)**

Introduction to basic calculations needed for food plant operations. Calculations dealing with units, material balance, heat balance, steam heating, psychrometry, vacuum and pressure. 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 instructor.

**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

125, FSN 209, FSN 211 or FSN 230 and consent of instructor.

**FSN 204 Food Processing Operations (4)**

Applied food manufacturing and processing technology emphasizing unit operations. Water removal in foods (dehydration, spray drying, vacuum concentration), heat removal (refrigeration, freezing), and osmotic preservation. Students produce processed foods in a pilot plant. 3 lectures, 1 laboratory. Prerequisite: FSN 154.

**FSN 209 Animal Food Products (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 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 Meats (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 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 244 Cereal and Bakery Science (4)**

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. Optimization and management of manufacturing line operations. Comparative nutritional evaluation of flours, grains, and finished products. Product development concepts. 3 lectures, 1 laboratory. Prerequisite: FSN 125.

**FSN 250 Food and Nutrition: Customs and Culture (3) GEB E.2. USCP**

Historical perspective of traditional and contemporary food customs and culture as shaped by environment, society, politics, religion, health beliefs, and gender. Major emphasis of this course will be on U.S. cultures including American Indian, Hispanic American, African American, and Asian American. 3 lectures.

**FSN 251 Food and Nutrition: Customs and Culture Laboratory (1)**

Procurement, preparation, consumption of ethnic foods within their cultural context. Application of food science and nutrition principles to the traditional and contemporary preparation of ethnic cuisines. Focus on Native American, Hispanic American, African American, Asian American foods and customs. Miscellaneous course fee may be required—see *Class Schedule*. 1 laboratory. Prerequisite or concurrent: FSN 250.

**FSN 274 Food Plant Sanitation and Safety (4)**

Development, organization, management and operation of a food plant sanitation program. FDA inspection and legal issues affecting food plant operations. Chemistry and applications of soaps, detergents, surfactants, insecticides, rodenticides; legal requirements. 4 lectures. Prerequisite: FSN 125; FSN 230 for non-Food Science majors.

**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 325 Food Quality Control (5)**

Fundamentals of quality control programs for the food industry. TQM, SQC, HACCP, GMP. Organization and management of quality control programs. Miscellaneous course fee may be required—see *Class Schedule*. 4 lectures, 1 laboratory. Prerequisite: FSN 204, STAT 218, and CHEM 212; FSN 230 for non-Food Science majors.

**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 313, ZOO 240, ZOO 241.

**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 334 Food Packaging (3)**

Function of food packaging in food processing and preservation. Packaging materials and forms. Regulations and testing of food packaging material. Oral presentation required. 3 lectures. Prerequisite: FSN 125 and FSN 204.

**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 354 Packaging Function in Food Processing (3)**

Basic food spoilage and preservation mechanisms. The role of food packaging in food processing. Package and food compatibility. For non-Food Science majors. 3 lectures. Prerequisite: Junior standing.

**FSN 364 Food Chemistry (4)**

Chemical and biochemical properties of food components. Basic principles of food enzymology and the chemical and biochemical changes occurring in food systems as a function of different food processing conditions. Mechanisms of reactions affecting food quality and nutritional value. Laboratory focus on assessment of food chemical systems. 3 lectures, 1 laboratory. Prerequisite: FSN 125, CHEM 313.

**FSN 374 Food Laws and Regulations (4)**

Federal, state, and local laws and regulations affecting the production, processing, packaging, marketing, and distribution of food. Emphasis on FDA, USDA and California codes. 4 lectures. Prerequisite: FSN 125; FSN 230 for non-Food Science majors.

**FSN 384 Processed Meat and Poultry Products (4)**

Physical, chemical and functional characteristics of meat food raw materials. Science and technology of value-added processing including curing, sausage manufacture, low moisture products, and restructuring. Quality assurance and related current industry topics. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: FSN 209 or FSN 211, junior standing.

**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 instructor.

**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 410 Nutritional Aspects of Food Processing (3)**

Effects of food manufacturing practices on the nutritional quality of food products. Nutrient databases for raw and processed foods. Kinetics of nutrient losses. New developments in research and technology in the field. 3 lectures. Prerequisite: Senior standing, one course in Food Processing, FSN 210 or equivalent, 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 Nutrition Education and Communications (4)**

Application of appropriate behavior and learning theories to bring about positive health outcomes in population groups. Use of effective techniques and materials. Computer-based technology to augment learning activities. 3 lectures, 1 laboratory. Prerequisite: FSN 329 and senior standing.

**FSN 416 Community Nutrition (4)**

Federal, state and local nutrition assessment activities and program services for at-risk populations. Emphasis on health promotion and disease prevention concepts. Develop skills in assessing community nutrition problems and planning service interventions. 4 lectures. Prerequisite: FSN 415 and senior standing.

**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, and senior standing.

**FSN 429 Clinical Nutrition I (4)**

Application of the nutritional care process to organic, functional, and metabolic disorders which may alter nutritional requirements or require dietary modifications. Nutritional care process, GI disorders, and diabetes mellitus. 3 lectures, 1 laboratory. Prerequisite: FSN 329 and senior standing.

**FSN 430 Clinical Nutrition II (4)**

Application of the nutritional care process to organic, functional, and metabolic disorders which may alter nutritional requirements or require dietary modifications. Atherosclerosis, hyperlipidemias, metabolic stress, liver disease, cancer, renal disease, AIDS, and parenteral and enteral nutrition. 3 lectures, 1 laboratory. Prerequisite: FSN 429.

**FSN 434 Food Analysis (4)**

Principles of chemical and biochemical methods and techniques for measuring food protein, carbohydrates, lipids, water, vitamins, minerals and other components of foods, wine analysis. Application of AOAC approved methods for determining nutrients as they relate to nutritional labeling legal requirements. 3 lectures, 1 laboratory. Prerequisite: FSN 374.

**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 444 Engineering Concepts in Food Processing (4)**

Engineering concepts relevant to food processing. Heat transfer, evaporation, dehydration and refrigeration calculation principles. 4 lectures. Prerequisite: FSN 154, FSN 204; FSN 230 for non-Food Science majors.

**FSN 455 Product Development and Sensory Evaluation (5)**

How food products are created and tested by scientists and technologists. Sensory tests, consumer acceptance, experimental design. Fat replacement and the use of ingredients and additives. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 2 activities. Prerequisite: FSN 325 and senior standing; FSN 230 for non-Food Science majors.

**FSN 461, 462 Senior Project (2–3) (2–3)**

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 120 hours (Nutritional Science majors) or 180 hours (Food Science majors) 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 474 Advanced Food Processing (4)**

Advanced topics in processing operations with emphasis on thermal processing. Non-traditional processing technology such as microwave, ionizing radiation, and Pascalization. Oral presentation required. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: FSN 154 and FSN 204; FSN 230 for non-Food Science majors.

**FSN 485 Cooperative Education Experience in Food Science and Nutrition (6) (CR/NC)**

Part-time work experience with an approved Food Science and Nutrition firm engaged in production or related business, industry or governmental agency. 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**FSN 494 Food Engineering (4)**

Engineering concepts and unit operations used in the food industry. Materials balance and heat balance, heat transfer, steam heat, fluid flow, water removal and refrigeration. 3 lectures, 1 laboratory. Prerequisite: PHYS 104, MATH 131, MATH 132.

**FSN 495 Cooperative Education Experience in Food Science and Nutrition (12) (CR/NC)**

Full time work experience with an approved Food Science and Nutrition firm engaged in production or related business, industry or governmental agency. 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. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**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)**

Digestion, absorption and metabolism of lipids with emphasis on lipoprotein metabolism, regulation of lipid metabolism, essential fatty acid requirements and functions. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**FSN 570 Selected Topics in Food Science and Nutrition (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 9 units. 1 to 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**FSN 571 Selected Advanced Laboratory in Food Science and Nutrition (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.

**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 Introduction to Cultural 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 250 Physical Geography (4)**

Addresses the origins and patterns of the earth's diverse assemblage of climates, landforms, biota and soils. A major focus on relationship between human cultures and these earthly environments. 4 lectures.

**GEOG 305 Political Geography (4)**

Spatial influences on man's political behavior. Geopolitics, boundaries, significance of resources on power politics, internal spatial structure of the nation–state, relationships between nation–states. 4 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 (4)**

Presentation of geographic concepts, principles, and generalizations related to urban functions, forms, distribution, and growth. Location, areal extent, and interaction among the various urban functions. 4 lectures. Prerequisite: Junior standing.

**GEOG 315 Geography of Resource Utilization (4)**

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. 4 lectures. Prerequisite: Junior standing.

**GEOG 325 Climate and Humanity (4)**

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. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**GEOG 333 Human Impact on the Earth (4)**

Global assessment of the impact of humans on the earth's vegetation, animals, soil, water and atmosphere. Emphasis on problems stemming from the interactions of human attitudes, technologies, and population with natural resources. 4 lectures.

**GEOG 340 Geography of California (4)**

Physical environment of California; patterns of settlement and historic development; current problems. 4 lectures. Prerequisite: Junior standing.

**GEOG 350 Geography of the United States (4)**

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 landscape evolution and alteration, regional cultural distinctiveness, and current problems. 4 lectures. Prerequisite: Junior standing.

**GEOG 360 Geography of Europe (4)**

The population, land utilization, and economic development viewed against the background of the physical environment. Topically and regionally organized. Pervading themes include landscape evolution and alteration, regional cultural distinctiveness, and current problems. Emphasis on Western Europe. 4 lectures. Prerequisite: Junior standing.

**GEOG 370 Geography of Mexico and Central America (4)**

Detailed study of Mexico and Central America; patterns of settlement and development, economic issues and resource utilization; physical environment. 4 lectures. Prerequisite: Junior standing.

**GEOG 401 Area Geography (4)**

Directed study of geographic characteristics of a selected world area. *Class Schedule* will list topic descriptive of the particular world area to be studied. Total credit limited to 12 units. 4 lectures. Prerequisite: Junior standing.

**GEOG 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 12 units. 1–4 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 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 121, 122 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 122 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 122, 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 122 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 (3)**

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. 3 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 instructor.

**GRC 201 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.

**GRC 202 Image Capture and Manipulation (3)**

Optical and digital methods of image capture and image manipulation for the graphic arts. Photographic materials and equipment for the graphic arts. Densitometry, light sources, pin register, film assembly, exposure and development control. Contact frame, camera, and scanner theory and practice. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: GRC 101 and GRC 201.

**GRC 203 Electronic Prepress (4)**

Terminology, materials, equipment, facilities and methods used in electronic prepress. File formats, fonts, imposition, trapping, screen angling. Preflight, PostScript output, imagesetters, proofing, and platemaking. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: GRC 202.

**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. Prerequisite: GRC 201

**GRC 210 Implementing Quality Management in the Graphic Arts (4)**

Applied theory and practices of total quality management in the graphic arts industry. Emphasis on quantifying and meeting customer needs and expectations. Development of specifications, standard operating procedures, uses of statistical process control tools, capability studies, process improvement techniques, and employee empowerment. 3 lectures, 1 activity. Prerequisite: GRC 101, GRC 201, and STAT 217.

**GRC 211 Substrates and Ink (4)**

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. 3 lectures, 1 laboratory. Prerequisite: GRC 101.

**GRC 212 Substrates and Ink: Applications (3)**

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. 3 lectures. Prerequisite: GRC 101.

**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. Prerequisite: GRC 201.

**GRC 260 Introduction to Research Methods in Graphic Communication (3)**

Introduction to research methods for preparing scholarly and defensible papers and projects, and in conducting qualitative and quantitative evaluations, testing and research in graphic communication. Methods covered include the Scientific Method, historical and descriptive research, questionnaires, Elite and Specialized Interviewing, content analysis, and sampling. Design of research projects for each method taught. 2 lectures, 1 activity. Prerequisite: GRC 101

**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*. 3 lectures, 1 laboratory. Prerequisite: GRC 101 and GRC 201.

**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. 3 lectures. Prerequisite: GRC 201.

**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: GRC 201.

**GRC 322 Advanced Typography (3)**

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*. 2 lectures, 1 laboratory. Prerequisite: GRC 300 or consent of instructor.

**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 201.

**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 201.

**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 101 and GRC 201.

**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 laboratory. 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 210 and GRC 415.

**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 415 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 415.

**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 instructor.

**GRC 401 Printing Marketing and Sales (4)**

Printing marketing and sales management. Graphic communication market determination, market strategy, and

implementation. Strategic sales management, personal selling, forecasting and planning for printed products. 3 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: 415.

**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 415 and GRC 416.

**GRC 411 Pricing, Costing and Web Estimating (4)**

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, management information systems, and innovative management practices. 3 lectures, 1 activity. Prerequisite: GRC 415.

**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 203, GRC 211 and CHEM 111.

**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. Miscellaneous course fee may be required—see *Class Schedule*. 4 lectures, 1 laboratory. Prerequisite: GRC 203.

**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 415, 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 415.

**GRC 429 Digital Media (3)**

Current digital media and electronic publishing systems, including CD ROM and Internet publishing. Industry standards, including SGML, HTML, and PostScript. Multimedia authoring. Current issues in high-resolution imagesetting and digital proofing. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: GRC 415.

**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 415.

**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 or consent of instructor.

**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*. 3 lectures, 1 laboratory. Prerequisite: GRC 203.

**GRC 439 Electronic Origination: 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 Electronic Origination: 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 217.

#### **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: GRC 460.

#### **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 500 Independent Study (1–4)**

Advanced study planned and completed under the direction of the Director of Graduate Management Programs. Open only to graduate students who have demonstrated ability to do independent work. Prerequisite: Formal petition with approval.

#### **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 Seminar in General Management and Strategy (4)**

Application of interdisciplinary skills to business and corporate strategy formulation and implementation. Analysis of interdependence between external environments and internal systems. Focus on responsibilities, tasks, and skills of general managers. Case studies, group problem solving. Integrating course of MBA core curriculum. Course satisfies comprehensive examination requirement. 4 seminars. Prerequisite: Must be taken within last 24 units prior to graduation and after completion of all MBA first-year required GSB courses or equivalent.

**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 and Management (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: GSB 513.

**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 International Business Management (4)**

Managerial concepts and techniques appropriate for analysis and decision making within international businesses.

Environmental and organizational factors influencing multinational operations. Assessing international market opportunities and entry modes. Complexities of multinational management strategy, structure and systems. Case studies and simulations. 4 seminars. Prerequisite: Second-year standing or consent of instructor.

**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 Designing and Managing Sociotechnical Systems (4)**

Designing organizations as sociotechnical systems. 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 Managing Change (4)**

Managing planned change within complex organizations. Managing change and 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 college 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.

## HIST–HISTORY

**HIST 110 Western Civilization: Ancient to Renaissance (4)**

Beginnings of western civilization from the river valley societies of the Middle East, circa 3,000 BCE to the Renaissance in Western Europe to 1500 CE. Political, economic, social, intellectual, and artistic development of that period. 4 lectures.

**HIST 111 Western Civilization: Reformation to Twentieth Century (5)**

Development of western civilization from 1500 CE to 1900 CE. Comparison of liberal modernization of the West with the retarded, conservative modernization in Central, East and

Southeast Europe. Political, economic, social, intellectual, and artistic developments of that period. Particular attention to understanding dynamics that produce pluralistic mass societies in the West and authoritarian mass societies elsewhere, with goal of preparing a foundation for HIST 315. 5 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 202 American Cultures: Consensus and Conflict (4) GEB D.1. USCP**

Multicultural and gender perspectives combined with traditional historical themes. Conflict and consensus viewed as defining the American experience. 4 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 303 Research and Writing Seminar in History (5)**

Designed to develop students' ability to research and write an interpretive paper on a specific topic. Seminar participants practice the skills of library research, historical and historiographical analysis, and writing and revising. Paper in lieu of final examination. *Class Schedule* will list topic selected. 4 lectures and research project. Prerequisite; Junior standing or permission of instructor, ENGL 114, and ENGL 125 or PHIL 125 or SPC 125.

**HIST 304 Historiography (4)**

Theories of history: past and present. 3 seminar meetings and research project. Prerequisite: HIST 303/301.

**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 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 (4)**

Political, social, and economic development of the Middle Eastern countries in the context of regional history and international politics since the birth of Islam. Particular attention to the resurgence of religious movements and their connection with nationalism and anti-colonialism in the region. 3 lectures and research project. Prerequisite: Junior standing.

**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) USCP**

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) USCP**

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) USCP**

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) USCP**

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 America (4)**

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 and research project. Prerequisite: Junior standing.

**HIST 340 History of Modern Latin America (4)**

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 and research project. Prerequisite: Junior standing.

**HIST 341 History of Modern Central America (4)**

An analysis of 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 and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 343 Ancient Greece and Rome (4)**

Foundations of western civilization through study of the origins of the sociopolitical institutions, philosophy, art, science, and technology that shaped the modern world; from the perspective of the two ancient cultures of the Mediterranean. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 346 Medieval Europe (4)**

Medieval Europe from the fall of Rome to the plague, with topics including the Barbarian Kingdoms, the early Church, Charlemagne, medieval art and Gothic architecture, Church fathers and Scholasticism, medieval philosophy, agricultural and commercial revolutions, and the Great Plague. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 347 Renaissance and Reformation Europe (4)**

Europe from 1348 to 1620, with topics including the urban milieu, Renaissance philosophy and artistic expression, the new prince, the educational revolution, the Renaissance Church, Martin Luther, Jean Calvin, and the monumental economic, social, and political changes of the sixteenth century. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 348 Religious Wars and Absolutism (4)**

Europe from 1559 to 1715 CE, focusing on the Catholic-Protestant conflict, the rise of the Absolutist state (especially Louis XIV), the "Crisis of the Seventeenth Century," the Thirty Years War, the English Civil War and Cromwell, and the Newtonian Paradigm. 3 lectures and research project. 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 381 Precolonial African History (4)**

Survey of African history from earliest times. Ancient African civilizations, Moslem penetration, the rise of indigenous kingdoms and the continuous impact of Atlantic slave trade. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 382 Modern African History (4)**

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 and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 383 History of American Thought (4)**

Thought and culture in America since the Puritans. 3 lectures and research project. 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 387 History of United States Foreign Relations (4)**

History of American foreign policy from 1900 to the present. Emergence of the United States as a world power early in the century, the retreat following the Great War, Franklin Roosevelt's diplomacy leading to and through the Second World War, atomic diplomacy and the Cold War, four decades of Containment and the search for a new post-Cold War strategy. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 390 American Presidency (4)**

Examination of the American presidency with emphasis on its role in American society since the beginning of the twentieth century. From the era of congressional government through the Imperial Presidency of the post-World War II period, and beyond, using presidential biography as a historical source. 3 lectures and research project. 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 and the New Nation (4)**

Background to the imperial dispute, events leading to the Revolution, Articles of Confederation, Constitution, impact on the national economy, women, African-Americans, Loyalists, Native Americans. *Class Schedule* will list topic selected. 3 lectures and research project. 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 408 The Age of Roosevelt: Depression and World War, 1929-50 (4)**

Examination of principle forces affecting the nation's political, social and economic life during the Age of Franklin Roosevelt. Included are the politics of the New Deal, government regulation of the economy and response to the Depression, the rise of the modern presidency, racial and ethnic conflict, the politics of class and gender, the home front at war and post-war tension. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 409 Vietnam War at Home and Abroad (4)**

Interaction of revolutionary Vietnamese nationalism with U.S. foreign policy. Analysis of the conduct of the war. Assessment of the impact of the war on U.S. society. 3 lectures and research project. Prerequisite: Junior standing.

**HIST 410 Recent America Since 1950: Shattering of the American Consensus (4)**

Political, social and economic forces that have shaped American life since 1950. Subjects included are the Red Scare, suburbanization, the civil rights movement, the Great Society, the politics and culture of protest, recasting the welfare state, and de-industrialization. Emphasis of racial, ethnic and gender issues in the collapse of the American Consensus. 3 lectures and research project. 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 (4)**

Political, social, intellectual and economic roots of Russian Absolutism. Emergence of Russia as an imperial power, reform, reaction and revolution - 1689-1914. 3 lectures and research project. Prerequisite: Junior standing.

**HIST 427 Soviet Russia (4)**

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; Civil War; the "experimental" 20s; forced collectivization and industrialization; the Purges; "engineering" a new Soviet Woman and Man for a new communist world; War: Second and Cold. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 430 South African History (4)**

Historical origins of South Africa's system of apartheid. Combination of a survey of South African history from the time of the first human settlement through white conquest and the discovery of gold and diamonds with an analysis of its current problems. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 434 American Women's History to 1870 (4)**  
(Also listed as WS 434)

Female ideology and experience from the colonial period through the American Civil War. Use of a variety of sources, including women's own writing, in order to understand the history of women as it both reflects and shapes American culture and society. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 435 American Women's History from 1870 (4)**  
(Also listed as WS 435)

The female past in the 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 lectures and research project. Prerequisite: Junior standing or consent of instructor.

USCP

**HIST 437 Nazi Germany (4)**

Background of German Romantic Nationalism; national unification and defeat in World War I; the failure of Weimar Democracy and political radicalization; the Nazi political, economic, and social revolution 1933-1939. 3 lectures and 1 activity. Prerequisite: Junior standing.

**HIST 440 Topics and Issues in the History of the United States (4)**

Selected topics and issues in United States history. Descriptive subtitles assigned to each course. *Class Schedule* will list topic selected. May be repeated to 8 units. 3 lectures and a research project. Prerequisite: Junior standing or consent of instructor.

**HIST 441 Topics and Issues in European History (4)**

Selected topics and issues in European history. Descriptive subtitles assigned to each course. *Class Schedule* will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 442 Topics and Issues in Latin American History (4)**

Selected topics and issues in Latin American history. Descriptive subtitles will be assigned to each course. *Class Schedule* will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 443 Topics and Issues in Asian History (4)**

Selected topics and issues in Asian history. Descriptive subtitles will be assigned to each course. *Class Schedule* will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 444 Topics and Issues in African History (4)**

Selected topics and issues in African history. Descriptive subtitles will be assigned to each course. *Class Schedule* will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 445 Topics and Issues in Comparative History (4)**

Selected topics and issues in comparative history. Descriptive subtitles will be assigned to each course. *Class Schedule* will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**HIST 450 History Internship (8-12) (CR/NC)**

Supervised work experience using skills of the discipline of history in a public agency ranging from 24 to 36 hours per week. Interns work directly under the supervision of an employee of the agency and are subject to the professional responsibilities typical of the state. Credit/No Credit grading only. Prerequisite: Junior standing. Completion of HIST 303 with grade of B or better and consent of internship coordinator.

**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 250 Computer Applications in the Liberal Arts (4) GEB F.1.**

The computer as a problem-solving tool in Liberal Arts research, teaching, data management, scholarship, writing, and other forms of electronic communication. An introduction to microcomputers, networked computer systems, appropriate software, and Internet and WWW resources. The ethical and phenomenological implications of the burgeoning use of technology in the humanities. 3 seminars, 1 laboratory. Prerequisite: ENGL 114.

**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 319 London: Its Life, Culture and Institutions (2)**

Analytical and interpretive survey of the principal center of the English speaking world. The development of London from Roman administrative capital to modern cultural, financial and political colossus. 2 activities. Prerequisite: limited to London Study students.

**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 403 Ethical Issues in Cyberspace (3) GEB C.3.**

The ethical debates and issues connected to the rise of online communications technology. The impact of the Internet on freedom of speech, privacy, property rights, and other democratic values. Effect of online communications technology on the quality of personal and interpersonal life. Open to all majors. 3 lectures. Prerequisite: Junior standing and ENGL 215 or ENGL 218.

**HUM 410 Values, Media, Culture (3) GEB C.3.**

Ways in which mass media and popular culture challenge the traditional high culture of art and literature. Comparison of great books to popular entertainments. Ways in which both attempt to influence our values and beliefs. 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. 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 130 Technical Foundations (2) (CR/NC)**

Introduction to visualization, sketching, and drafting. Basic hand-tools, shop practices, and materials. Clearances and fits, threads and fasteners. Safety. Open to all majors. Credit/No Credit grading only. 1 lecture, 1 laboratory.

**IME 140 CAD and Modeling (2)**

CAD/CAM on UNIX workstations using parameter-driven, surface-bounded solid modeling with total bi-directional associativity between design, drafting, and manufacturing tools. Introduction to Computer-Aided Engineering (CAE) as driven by the CAD solid model. 1 lecture, 1 laboratory. Prerequisite: IME 130 or high school drafting.

**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 144 Introduction to Design and Manufacturing (4)**

CAD/CAM on Unix workstations using parameter-driven, surface-bounded solid modeling with integration between design, drafting, and manufacturing tools. Introduction to conventional machining processes on lathes and mills, computer numerical control, cutting tool design, machining parameters, quality control, production methods, and design for manufacturing. Open to all majors. 2 lectures, 2 laboratories. Prerequisite: IME 130 or high school drafting.

**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 IME 144 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: IME 144, CSC 234 or CSC 231 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 Manufacturing Process Design I (1)**

Chip formation, tool geometry, feed and speed rates. Introductory metal cutting process design projects with emphasis on test report writing, documentation, and inspection methods. 1 laboratory. Prerequisite: IME 143 or IME 144, MATH 142.

**IME 242 Manufacturing Process Design II (4)**

Advanced turning and milling processes; grinding and non-traditional processes. Thread and gear manufacturing,

producibility, machinability, part and tool materials, cutting fluids, and tool life testing. Finishes and measurement of surface roughness. Process design projects. 2 lectures, 2 laboratories. Prerequisite: IME 241, PHYS 131.

**IME 243 Manufacturing Process Design III (4)**

Engineering analysis of sheet metal fabrication, coating and finishing, powder metallurgy and ceramics, plastics and composites, deformation, and material joining processes. Advanced process design projects. 2 lectures, 2 laboratories. Prerequisite: IME 242.

**IME 251 Introduction to Manufacturing Engineering Analysis (3)**

State of the art methods and processes in mechanical and electronic manufacturing. Selection of materials for manufacturing. Process control methods and metrology. Coordinate measuring machines and surface profile analysis. Product design and manufacturability. Value engineering, group technology and parts codification. 2 lectures, 1 laboratory. Prerequisite: IME 143 or IME 144, 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 234 or CSC 231.

**IME 314 Engineering Economics (3)**

Economic analysis of engineering decisions. Determining rates of return on investments. Effects of inflation, depreciation and income taxes. Sensitivity, uncertainty, and

risk analysis. 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, CSC 231 or a course in a high level computer language.

**IME 335 Computer-Aided Manufacturing I (4)**

Wire-frame, surface, and solid model generation. Benefits, limitations, and selection of CAD and CAM systems. CAD as an input to CAM. Manual, language-based, and graphics-based NC programming. Configuration of CAD/CAM software; post-processor generation. 3 lectures, 1 laboratory. Prerequisite: IME 251, CSC 234.

**IME 336 Computer-Aided Manufacturing II (4)**

Automated production of parts: computerized part programming, post-processor generation and use, and CNC machining center operation. Introduction to flexible manufacturing systems and robotics. 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 210.

**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: 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 210, MATE 215, 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 234 or CSC 231.

**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 (MRP II) including demand forecasting, production planning, master scheduling, bill-of-material, and inventory master file. Capacity requirements planning and shop floor control. JIT approach to inventory control through pull production system. 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. Industrial design projects. Field trip to manufacturing centers. 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 Organizations (3)**

Theory and principles for manufacturing organizations. Competitive advantage. Strategic planning and operations management for organizations and teams in a rapidly changing environment. Engineering management concepts and practices. Team-based projects and cases. 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 427 Process Optimization through Designed Experiments (4)**

Experiments for optimization of industrial processes: process variables, response, measurements, analysis and interpretations. Statistical principles in design. Design approaches: conventional methods, response surface methodology, and Taguchi methods. Type of experiments: factorial, fractional factorial, mixture, and orthogonal arrays. Design projects using real world problems. 3 lectures, 1 laboratory. Prerequisite: IME 426 and IME 251 or consent of instructor.

#### **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, design of experiments 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. Specifications and standards. 4 lectures. Prerequisite: IME 426 or equivalent.

#### **IME 431 Supplier Quality Engineering (4)**

Customer-supplier partnership. Functions of Supplier Quality Engineering. Supplier selection, development, process qualification, concurrent engineering, value engineering. Process characterization, repeatability, consistency, process control. Quality system standards. Supplier survey, audit, rating, measurement of quality, delivery performance and certification. Customer service, corrective action approaches. 3 lectures, 1 laboratory. Prerequisite: IME 251, IME 430 or consent of instructor.

#### **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)**

Team-based approach to human factors assessment of consumer and industrial products, systems, and information technology. Team building principles and techniques; performance measurements and monitoring. Usability analysis and ergonomics auditing through experimental methods. 2 lectures, 1 laboratory. Prerequisite: IME 319, IME 426 or equivalent.

**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 223, IME 251, IME 305, IME 319, 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 516 Mechatronics Systems Analysis (4)**

Overview of smart products and intelligent manufacturing systems. Tools and technologies utilized in the design, manufacturing, and operations of such products and systems.

Artificial Intelligence Technologies and Fuzzy Logic. Design of smart products and intelligent systems. Case studies. Team projects and formal presentations. 3 seminars, 1 laboratory. Prerequisite: IME 416 or ME 405 or equivalent.

**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 and managing change in organizations. 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 change in competitive environments, relationship to business, strategic, and technology plans of firms. Past, present and technological evolution and operational changes. Technological and competitive impact assessment and business/technology strategy development. Use of case studies and company experiences. 4 seminars. Prerequisite: IME 503 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 591, 592 Integrated Product Development I, II (4) (4)**

Team taught course addressing: product opportunity identification, customer needs analysis, concept definition, requirements definition, product-process analysis, product specification, design/process description, prototyping, project management, packaging, product promotion/introduction, and manufacturing ramp-up. Team projects in partnership with industry sponsors, field-trips and formal presentations. 3 seminars, 1 laboratory for each. Prerequisite: second year MS/MBA.

**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 137 Electronic Systems (4)**

Introduction to electronics and electric circuit fundamentals. Essential information for technical managers regarding the universal law, theory, principles, application and troubleshooting of AC, DC, circuits and devices. Familiarity with concepts used extensively in most areas of manufacturing and production as well as the countless electronic products produced. Understanding of inductance, capacitance, resistance, integrated circuit components and the relationship they have with each other. Extensive strategic decision and problem solving skills developed using electronics as the environment. 3 lectures, 1 laboratory.

**IT 141 Plastics Processes and Applications (3) GEB F.2.**

Global, cultural and social implications and applications of plastics. Uses, capabilities, and operational characteristics of plastics machinery and processes including plastic resource management and toxicity. Injection molding, extrusion, compression molding, rotational molding, forming, casting, and plastic fabrication. Miscellaneous course fee may be required—see *Class Schedule*. 2 lectures, 1 laboratory.

**IT 150 Mechanical Systems (4)**

Introduction to the systems that supply energy, convert energy to power and transmit energy and power, including fossil, atomic and solar resources. Conversion by current power technology systems including reactors, internal and external combustion and direct conversion. Power transmission systems including electrical, refrigeration, pneumatic 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 260 Manufacturing Processes (4)**

Application of manufacturing processes and testing using metals and ceramics including base material preparation, forming, fastening and finishing processes. Emphasis on current methods of manufacturing, equipment use, safety and material standards. Miscellaneous course fee may be required—see *Class Schedule*. 2 lectures, 2 activities.

**IT 300 Symposium Management (2) (CR/NC)**

Managing the development of a technical information symposium from concept through symposium presentation. Organization of facilities, speakers, dinner meeting, professional meetings, industrial displays, food services, personnel, finances, and advertising. Credit/No Credit grading only. Total credit limited to 6 units. 2 seminars. Prerequisite: ENGL/PHIL/SPC 125 or equivalent.

**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 111\*\* or consent of instructor.

**IT 303 Industrial Quality Management (4)**

Principles and techniques of quality management as applied to organizations. Emphasis on competitive implications with the integration of fundamental quality assurance techniques and new quality management. Technologies focused on continuous organizational improvement. 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 326 Product Evaluation (4)**

Practical application of value engineering. Systematic application of recognized techniques which identify the function of a product or service, establish the monetary value for that function, and provide the necessary function reliably at the lowest overall cost. 3 lectures, 1 activity. Prerequisite: IT 150 and junior standing.

**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 329 Industrial Materials (4)**

Structure, properties, applications and limitations of select industrial materials to include ferrous and nonferrous metals, ceramics, glasses, composites, and organic materials. Materials testing and material selection. 3 lectures, 1 activity. Prerequisite: \*\*CHEM 111\*\* or equivalent.

**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 and international 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 Electrical Power Systems (4)**

Industrial operational facility management of electrical power systems providing a broad overview of production, distribution, control, conversion and measurement of electrical power. Specific management and operational strategies including advantages and disadvantages of economics, safety, conservation, design and maintenance. Familiarity with electronic devices and industrial motor controls. Electrical power system technology including generators, transformers, motors, inductive loads, conductors, distribution systems and power generation. Use of design and analysis software packages for strategic management decisions. 3 lectures, 1 laboratory. Prerequisite: IT 137, MATH 131/141/221, PHYS 122.

**IT 333 Introduction to CAD and MIS (4)**

Computer aided decision making and problem solving in industry utilizing CAD and other computer and communication applications software. Introduction to the essentials of management information systems, grounding in the fundamentals of organizational information systems and their effect on the industrial organization and its employees. 2 lectures, 2 laboratories. Prerequisite: CSC 119.

**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)**

Applied production management using the framework of a broad international perspective, production in a facility like most small manufacturing industries and the management tools and techniques of today's international production

management. Linkages with marketing, purchasing, design, cost analysis, equipment use, quality control, jig and fixture design and use to solve production management problems. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 activities. Prerequisite: IT 260 and BUS 371 or consent of instructor.

**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 computer presentation and visual aid generation, video tape, transparencies, slides, charts, and other media. Computer and other media development techniques 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: BUS 346 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: BUS 346 or equivalent, 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)**

Production planning and control. Linking production planning systems and manufacturing technologies in a global economy. 3 lectures, 1 activity. Prerequisite: BUS 387, IT 333, 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 428 Industrial Management and Strategy (4)**

International and strategic dimensions of managerial concepts as they relate to industrial work forces, resources and industrial management leadership, knowledge, skills and methods. Investigate management systems and practices, ethics, industrial decision making tools and concepts, and management analysis through the use of case studies and individual and team projects. 4 lectures. Prerequisite: BUS 371, IT 410 or consent of instructor.

**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 Facility Equipment and Systems (4)**

Develop an understanding of how major mechanical equipment and systems are incorporated in the utility and production support systems of a modern industrial facility. Includes field trips to industrial/commercial facilities. 4 lectures. Prerequisite: IT 150 or consent of instructor.

**IT 453 Facility Maintenance and Construction Management (4)**

Maintenance, construction, repair and operation of industrial/commercial facilities, including preventive and remedial maintenance, job control systems, CMMS, work estimating, budgeting, and other essential services. Field trips to industrial facilities. 3 lectures, 1 activity. Prerequisite: IT 451 or consent of instructor.

**IT 454 Facilities Management (4)**

Management of physical facilities and equipment as related to plant layout/design, regulatory and environmental compliance, safety/security, energy conservation, and process improvement. 4 lectures. Prerequisite: IT 451 and IT 453 or consent of instructor.

**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 and conduct experimental projects using research techniques. 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 (4)**

Survey of historical influences in the development of today's journalism. Contributions of women and minorities to American mass media. Rise of technology in the communication industry. 4 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 (4)**

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. Writing on agriculture-related issues. 3 lectures, 1 activity.

**JOUR 218 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 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 (4) USCP**

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. Emerging minority groups from developing countries and their media. 4 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)**

Experience leading to advanced skills in reporting and writing stories about contemporary issues, government and courts. Field and laboratory assignments focusing on beat reporting, coverage of speeches and meetings, investigative techniques and interpretive reporting. 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 331 Contemporary Advertising (4)**

Principles of advertising, copy, layout, and production for print and broadcast media. Economic, political, and social function of advertising in a free market society. Advertising ethics. Social responsibility of advertising in a multicultural environment. Emerging advertising technologies. Advertising on the Internet. 4 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 335 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 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 and Production (4)**

Broadcast skills including writing, announcing, editing, and production. Editing and production of news wraps, promos, public service announcements, commercials and interviews. 3 lectures, 1 activity. Prerequisite: JOUR 333.

**JOUR 351 Advanced Radio Reporting: KCPR (2)**

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. 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 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 390 Visual Communication for the Mass Media (4)**

Theory and application of visual communication in today's print, broadcast and public relations media. Extensive experience in visual and text manipulation for effective information communication. 3 lectures, 1 laboratory. Prerequisite: JOUR 233 and JOUR 304.

**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: Junior standing, JOUR 218.

**JOUR 407 Feature Writing (4)**

Practice in researching, interviewing, writing and marketing nonfiction articles for print media, and analysis of similar work in current distribution. 4 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 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.

## **JPNS—JAPANESE**

#### **JPNS 101, 102, 103 Elementary Japanese (4) (4) (4)**

Beginning Japanese class practice in pronunciation, sentence structure, reading, writing, basic conversation, and introduction to Japanese culture. Activity drill required. 3 lectures, 1 activity.

## **KINE—KINESIOLOGY**

(See also PE—Physical Education)

### **PROFESSIONAL ACTIVITIES**

Priority for enrollment given to those students pursuing a major in Kinesiology. Kinesiology majors may apply a maximum of 24 units of credit earned in PE 101-199 or KINE 206-239 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.

- KINE 206 Gymnastics (2)
- KINE 208 Golf (1)
- KINE 209 Creative and Non-Traditional Games (1)
- KINE 210 Tennis (1)
- KINE 211 Softball-Baseball (1)
- KINE 212 Handball/Racquetball (1)
- KINE 213 Basketball (1)
- KINE 214 Volleyball (1)
- KINE 215 Field Sports (2)
- KINE 216 Wrestling (1)
- KINE 217 Flag Football/Football (1)
- KINE 218 Aquatics (2)
- KINE 219 Progressive Strength Training (1)
- KINE 221 Combatives/Self Defense (1)
- KINE 222 Archery (1)
- KINE 223 Cross Country and Track Events (1)
- KINE 224 Field Events (1)
- KINE 225 Team Handball (1)
- KINE 227 Aerobic Dance Exercise (2)
- KINE 229 Badminton (1)

### **ACADEMIC COURSES**

Professional courses designed primarily for the student majoring in physical education. KINE 250 may be used in partial satisfaction of the General Education-Breadth requirement in physical education.

#### **KINE 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.

#### **KINE 242 Pre-WSI (1) (CR/NC)**

Designed to offer certification in American Red Cross Instructor Candidate Training (ICT) which is a prerequisite for Water Safety Instructor Certification. Teaching strategies as related to American Red Cross courses will be discussed. Various Water Safety topics will be addressed. Credit/No Credit grading only. 1 lecture. Prerequisite: PE 145 or equivalent.

#### **KINE 243 Lifeguard Training (3) (CR/NC)**

Lifeguarding skills and knowledge needed to prevent and respond to aquatic emergencies. Successful completion of this will result in American Red Cross certifications in Community First Aid and Safety, CPR for the Professional Rescuer and Lifeguard Training. Credit/No Credit grading only. 2 lectures, 1 activity. Prerequisite: Successful completion of Red Cross swimming skills test.

#### **KINE 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. Not open for credit to students who have completed KINE 255. 1 lecture, 1 recitation.

#### **KINE 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.

#### **KINE 255 Personal Health: A Multicultural Approach (4)**

**GEB E.2. USCP**

Introduction to personal health with special emphasis on multicultural practices and contributions. 3 lectures, 1 recitation. Not open for credit for students who have completed KINE 250.

#### **KINE 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.

#### **KINE 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.

#### **KINE 276 Athletic Coaching Theory (3)**

Basic concepts, methods, practices, strategies and philosophies as they apply to competitive athletics. 3 lectures.

**KINE 277 Coaching Practicum (2–6)**

Practical experience through the actual coaching of a competitive sports team. 2–6 activities; minimum of 2 hours per week per unit. Total credit limited to 6 units. Prerequisite: KINE 276 and consent of adviser.

**KINE 280 Responding to Emergencies: First Aid/CPR (3)**

An American Red Cross certification course, more comprehensive than a Standard First Aid course. Skills and knowledge necessary in the treatment of life-threatening emergencies and other injuries and sudden illnesses. Red Cross First Aid/CPR certifications issued upon successful completion of certification requirements. 2 lectures, 1 activity.

**KINE 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.

**KINE 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 240 and ZOO 340.

**KINE 303 Physiology of Exercise (4)**

Application of the knowledge of human physiology to exercise situations. 3 lectures, 1 laboratory. Prerequisite: ZOO 240 and ZOO 241. Recommended: FSN 210.

**KINE 305 Drug Education (2)**

Instruction on the nature and effect of the use of tobacco, alcohol, narcotics and restricted dangerous drugs. 2 lectures. Prerequisite: KINE 250.

**KINE 307 Adapted Physical Activity for Special Populations (4)**

Major categories of handicapping conditions with implications for the development of physical activity programs for specific disabilities. 3 lectures, 1 laboratory. Prerequisite: ZOO 240 and ZOO 241.

**KINE 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.1. (See page 77 for GEB requirements.)

**KINE 317 Computer Applications in Kinesiology (3)**

Experiences focusing on applications of computers, data processing and information technology as they relate to understanding and solving specific problems in the field of kinesiology. 1 lecture, 2 laboratories. Prerequisite: KINE 300-level course and GEB F.1.

**KINE 319 Measurement and Evaluation in Kinesiology (4)**

Principles of test selection and administration, measurement and evaluation of data characteristics, and data analysis related to motor behavior and the performance of physical skills. How the personal computer and various software can

be used to enhance the entire process. 3 lectures, 1 laboratory. Prerequisite: KINE 318.

**KINE 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: KINE 250.

**KINE 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: KINE 206 and KINE 296, or consent of instructor.

**KINE 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. \*\*Kinesiology majors: KINE 218.

**KINE 385 Lifeguard Instructor (3)**

Analyzing lifeguarding, CPR and First Aid skills with emphasis on techniques and methods for teaching rescue skills. Upon successful completion of this course, American Red Cross certifications Lifeguard Instructor, CPR for the Professional Rescuer Instructor, and community First Aid and Safety Instructor will be issued. 2 lectures, 1 activity. Prerequisite: KINE 243 or equivalent certifications.

**KINE 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.

**KINE 401 Managing Physical Education and Health Promotion Programs (3)**

Planning, organizing and controlling programs in school, commercial, private and clinical settings. Emphasis on legal, ethical and budgetary considerations. 3 lectures. Prerequisite: KINE 319.

**KINE 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 KINE 317 or KINE 319, or consent of instructor.

**KINE 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.

**KINE 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: KINE 354.

**KINE 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: KINE 250, senior standing or consent of instructor.

**KINE 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.

**KINE 411 Psycho/Social Aspects of Physical Activity (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.

**KINE 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-KINE/REC majors.

**KINE 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: KINE 296. Recommended: PSY 210/202, KINE 206.

**KINE 420 Administration of Aquatic Programs (3)**

Health and sanitation in swimming facilities; state swimming codes; pool chemistry; filtration systems; safety; liability; instructional programming; facility design; and equipment. 3 lectures. Prerequisite: KINE 384 or consent of instructor.

**KINE 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: KINE 296, KINE 419, and 2 activity classes.

**KINE 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: KINE 296, KINE 419, and KINE 421.

**KINE 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: KINE 206, KINE 296 and KINE 421.

**KINE 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: KINE 296, KINE 419, KINE 422 and KINE 423.

**KINE 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: KINE 241 and KINE 252 for non-KINE majors; KINE 252 and senior standing for KINE majors.

**KINE 434 Exercise Prescription (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: KINE 252, KINE 302, KINE 303.

**KINE 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.

**KINE 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: KINE 307, consent of instructor.

**KINE 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: KINE 423 or consent of instructor.

**KINE 443 Comprehensive School Health Education (4)**

Satisfies the California Commission for Teacher Credentialing requirement for health education. Course content includes the health status of children K-12, and the recommendations of the California Health Framework. 4 lectures. Prerequisite: Candidates must be seeking a California Teaching Credential.

**KINE 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 313, KINE 303, or consent of instructor.

**KINE 450 Worksite Health Promotion Programs (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.

**KINE 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 KINE 303.

**KINE 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, KINE 303, KINE 445 or consent of instructor.

**KINE 461 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. Prerequisite: KINE 302, KINE 303, KINE 319, KINE 402 and junior level writing course.

**KINE 462 Senior Project (1)**

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 30 hours total time. Prerequisite: KINE 461 and consent of adviser.

**KINE 463 Commercial/Corporate Health Promotion (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 KINE 439.

**KINE 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.

**KINE 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.

**KINE 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.

**KINE 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.

**KINE 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: KINE 517 and consent of department head, graduate adviser, and supervising faculty member.

**KINE 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.

**KINE 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.

**KINE 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 241, KINE 303.

**KINE 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.

**KINE 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: KINE 250 and KINE 401 or consent of instructor.

**KINE 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: KINE 250, KINE 401 or consent of instructor.

**KINE 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: KINE 401 and KINE 450.

**KINE 517 Research Methods in Kinesiology (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: KINE 319 or consent of instructor.

**KINE 519 Evaluation of Current Studies (3)**

Analysis and evaluation of published studies in physical education, health education and recreation. 3 seminars. Prerequisite: KINE 517.

**KINE 522 Biomechanics (3)**

Advanced biomechanical concepts applied to human movement, examination of research, and biomechanical analyses of movement activities. 2 seminars, 1 laboratory. Prerequisite: KINE 302 or equivalent.

**KINE 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.

**KINE 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.

**KINE 530 Advanced Physiology of Exercise (4)**

Physiological determinants of physical work capacity and sports performance. 3 seminars, 1 laboratory. Prerequisite: KINE 303.

**KINE 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: KINE 445 or equivalent.

**KINE 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 \*\*Kinesiology Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor. Student must be advanced to candidacy.

**KINE 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.

**KINE 581 Graduate Seminar in Kinesiology (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.

**KINE 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.

**KINE 599 Thesis or Project (3) (3)**

Completion of a thesis or project pertinent to the field of kinesiology. Independent research under the guidance of the faculty. Prerequisite: KINE 519, consent of graduate committee and supervising faculty member.

**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, BRAE 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 (4) GEB F.2.**

Historical investigation of human activity and how it shaped environments. Consequences are examined for entire continents or as isolated statements in individual gardens. The metaphor of "garden" provides understanding for agrarian regions, urban spaces, and vernacular landscapes of the world. 4 lectures. Prerequisite: Third-year standing.

**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 (3) (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*. 1 lecture, 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. Prerequisite: Third-year standing.

**LA 323 History of Twentieth Century Landscape Architecture (4)**

Philosophies and ethics of important personalities in the environmental design disciplines of the twentieth century. Design theories supporting these individuals' projects and the nature of their practice, combined with the great influential events in industry, the arts and sciences, politics, and society of this century. 4 lectures. Prerequisite: At least one course in either architecture, landscape architecture or planning history.

**LA 351, 352 Design for Landscape Architects (5) (2)**

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 401 Research Project (1) (CR/NC)**

Research methods in landscape architecture and proposal writing techniques. Students prepare proposal and strategy for fifth year study in area of concentration. Credit/No Credit grading only. 1 seminar. Prerequisite: LA 451 and LA 452.

**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*. Total credit limited to 36 units. 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 (1-4)**

Sources of information and search strategies in major subject fields. Reference materials, bibliographic aids, indexing and abstracting tools, and Internet sources. Evaluation of sources. *Class Schedule* will list major subject area covered. Total credit limited to 4 units. 1-4 lectures. Prerequisite: Junior standing or consent of instructor.

**LIB 303 Library and Internet Computer Searching (1)**

Instruction and practice in use of computerized information retrieval systems including CD-ROM, local and Internet sources, and vendor services. Emphasis on efficient searching skills utilizing controlled and/or keyword searching, limiters, Boolean logic, truncation, proximity operators, field searching, etc. 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 211 The American Enterprise: The Birth of a Nation to the 1876 Centennial (5) GEB C.1. (2) and GEB D.1. (3)**

The first Americans. The Americas "discovered." The American Revolution—birth of a nation. A nation expands. A family struggles—the Civil War. Reconstruction. Storytellers of the time—Native American oral tradition, Puritan literature, Emerson, deCrevecoeur, Dickinson, Melville, Douglass, and Whitman. 4 lectures, 1 laboratory. Prerequisite: ENGL 114.

**LS 212 The American Enterprise: The 1876 Centennial to the 21<sup>st</sup> Century (5) GEB C.1. (2) and GEB D.1. (3)**

Manifest Destiny. Evolution of our government institutions—parallels between the past and present. The new immigrants. The Nation steps into a larger world—World Wars. Civil Rights—equity for all. Storytellers of the time—Twain, Fitzgerald, Hemingway, Plath, Baldwin, Updike. 4 lectures, 1 laboratory. Prerequisite: ENGL 114, LS 211 or consent of instructor.

**LS 230 Community-Based Field Experience (1-3)**

Community service such as tutoring and aiding in a school setting or volunteering to work for a public service or non-profit group. Explore careers while putting academic experience to work. Offered in conjunction with Cal Poly Community Service Center. Total credit limited to 5 units.

**LS 310 Storytelling: The Oral Tradition (4) (Also listed as SPC 310)**

Techniques for performing traditional folktales and myths in primary and secondary teaching situations. Selection, preparation and presentation of folklore for an audience; lectures on function of folk literature and mythology in modern society. 4 lectures. Prerequisite: SPC 201 or SPC 202.

**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 110 Introduction to Materials Engineering (1)**

A lecture series involving materials engineers from industry as well as Cal Poly faculty. 1 lecture.

**MATE 120 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 140 The Way Things Work (4)**

Designed for students of all disciplines to learn the science behind technology. Learn how and why basic technology functions. Examples include: silicon's chemical structure used to make computers; the theory behind radio; thermodynamics and the four-stroke engine; how electricity is generated and delivered. 4 lectures.

**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 210 Materials Engineering (3)**

Structure of matter. Physical and mechanical properties of materials including metals, polymers, ceramics, composites, and electronic materials. Equilibrium diagrams. Heat treatments, material selection and corrosion phenomena. 3 lectures. Prerequisite: CHEM 111, CHEM 124 or CHEM 127.

**MATE 215 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 210.

**MATE 220 Structure of Materials (3)**

Foundations of materials structure: solid state bonding, grains, crystals structures, stacking faults, dislocations, crystal symmetry, stereographic projections and their application, polymeric crystal structure. 3 lectures. Prerequisite: MATE 210.

**MATE 225 Structure of Materials Laboratory (1)**

Basic techniques of structure analysis: metallography, scanning electron microscopy, energy dispersive x-ray analysis, Fourier transform infrared spectroscopy, x-ray diffraction. 1 laboratory. Prerequisite: MATE 210. Concurrent: MATE 220.

**MATE 230 Metals (4)**

Physical metallurgy of major ferrous and nonferrous alloy systems. Mineral resources and economics of metal production. Introduction to equilibrium diagrams, phase transformations and heat treatment. Casting, working and joining of metals. 4 lectures. Prerequisite: MATE 210; MATE 235 should be taken concurrently.

**MATE 235 Metals Laboratory (1)**

Interpretation of microstructures in metals and alloys and laboratory methods for revealing and documenting such microstructures. Miscellaneous course fee required—see *Class Schedule*. 1 laboratory. Prerequisite: MATE 225; MATE 230 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 310 Polymers (4)**

Molecular structures of polymers and polymer systems. Synthesis, processing techniques, properties and fabrication methods of polymeric materials. 4 lectures. Prerequisite: MATE 210.

**MATE 320 Ceramics (4)**

Development, utilization, and control of properties in ceramic materials (inorganic-nonmetallic solids). Structure of crystalline ceramics and of glasses. Mechanical, thermal, optical, magnetic, and electrical properties. Physical chemistry of ceramics. 4 lectures. Prerequisite: MATE 210, CHEM 305.

**MATE 330 Composites (4)**

Fundamentals of polymer-matrix, ceramic-fiber composites from materials engineering and applied mechanics viewpoints. Materials (matrices, fibers) and manufacturing methods treated in detail. Beginning applied mechanics of continuous and discontinuous fiber-reinforced composites covered including properties of an orthotropic lamina; behavior of laminated plates. 4 lectures. Prerequisite: MATE 210, MATE 350, CE 204 or consent of instructor.

**MATE 340 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 210, PHYS 133.

**MATE 345 Electronic Properties of Materials Laboratory (1)**

Exploration of electrical, optical and magnetic properties of materials. Optical absorption, electrical conductivity, ferromagnetism, superconductivity. 1 laboratory. Concurrent or prerequisite: MATE 340.

**MATE 350 Mechanical Behavior of Materials (3)**

Fundamental behavior, emphasis on the relationship between atomic structure and mechanical properties. Continuum mechanics—stress, strain, elasticity, anelasticity, plasticity. Detailed treatment of the mechanical behavior of (1) crystalline materials (metals, ceramics)—dislocation dynamics, slip, strengthening mechanisms; (2) non-crystalline materials (polymers). 3 lectures. Prerequisites: MATE 210, CE 204; MATE 355 should be taken concurrently.

**MATE 355 Mechanical Behavior of Materials Laboratory (2)**

Additional meaning to major concepts in MATE 350. Mechanical properties of materials. Major concepts in stress, strain, elasticity, and plasticity in a range of engineering materials. Multiple session laboratories. Prerequisite: MATE 210, CE 204. Concurrent: MATE 350.

**MATE 360 Thermodynamics of Materials (4)**

Material and energy balances, phase equilibria of condensed systems, statistical thermodynamics, transport phenomena (mass and heat transfer), defects in solids, reaction kinetics, phase transformations. 4 lectures. Prerequisite: MATE 210, CHEM 305.

**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 405 Kinetics of Materials (5)**

Mass transport in solid systems (steady-state and non-steady state diffusion), phase transformations, reaction kinetics and their interplay with thermodynamic tendencies. 4 lectures, 1 laboratory. Prerequisite: MATE 360.

**MATE 410 Materials Inspection (2)**

Special physical and mechanical techniques for non-destructive and destructive examination of materials, to determine their fitness for service. Topics include: statistical methods and control charts, hardness testing, quantitative metallography, grain size measurement and analysis, ultrasonics, liquid penetrant, magnetic particle, radiography, and eddy current. 2 lectures. Prerequisite: MATE 210; MATE 415 should be taken concurrently. *Materials analysis and characterization course*.

**MATE 415 Materials Inspection Laboratory (2)**

Special physical and mechanical techniques for non-destructive and destructive examination of materials, to determine their fitness for service. Laboratory topics include: hardness testing, quantitative metallography, grain size determination, and various NDT methods. Miscellaneous course fee may be required—see *Class Schedule*. 2 laboratories. Prerequisite: MATE 235, MATE 410 as corequisite. *Materials analysis and characterization course*.

**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 210. *Materials analysis and characterization course or Special topics course.*

**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 210. Prerequisite or concurrent: MATE 360 or permission of instructor. *Materials processing course.*

**MATE 435 Microelectronics Processing Laboratory (2)**

Basic processes involved in making I.C.'s; material preparation and handling, oxidation, diffraction and photolithographic and chemical etching processes, sputtering and thin film evaporation, device testing and evaluation. Cleanroom protocol including safety procedures. Each student will be part of a 4-6 person interdisciplinary team that will make and test transistors and simple integrated circuits. Miscellaneous course fee may be required—see *Class Schedule*. 2 laboratories. Prerequisite or concurrent: MATE 430. *Materials processing course.*

**MATE 440 Welding Metallurgy and Joining of Advanced Materials (3)**

Principles, primary variables, and microstructural changes associated with the joining process. Physics of energy transfer. Heat and mass balances in joining, thermodynamic and kinetic justification of solidification and near interface microstructures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. 3 lectures. Prerequisite: MATE 210. *Materials processing course.*

**MATE 445 Joining of Advanced Materials Laboratory (2)**

Laboratory to accompany MATE 440. Illustration of principles, primary variables, and microstructural changes associated with the joining process. Physics of energy transfer. Heat and mass balances in joining, thermodynamic and kinetic justification of solidification and near interface microstructures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. Miscellaneous course fee may be required—see *Class Schedule*. 2 laboratories. Prerequisite: MATE 210. *Materials processing course.*

**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 or consent of instructor. *Special topics course.*

**MATE 450 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 220, MATE 230, MATE 350, MATE 410, MATE 450 and MATE 455 should be taken concurrently. *Materials analysis and characterization course.*

**MATE 460 Materials Aspect of Mechanical Design (4)**

Materials-based approach to mechanical design. Using mechanical, physical properties of materials (performance indices) to select them for design needs (Materials Selection Charts). Detailed background of these properties – information from materials and mechanics. Numerous case studies highlight the concepts covered. 4 lectures. Prerequisite: MATE 210, CE 204, or consent of instructor. *Special topics course.*

**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 510 Scanning Force Microscopy (3)**

Theory and application of scanning force microscopy, including scanning tunneling microscopy, atomic force microscopy, lateral force microscopy. Interpretation of scanning force images. 3 lectures. Prerequisite: MATE 340 or PHYS 412 or consent of instructor. *Materials analysis and characterization or Special topics course.*

**MATE 515 Scanning Force Microscopy Laboratory (2)**

Application of scanning force microscopy, including scanning tunneling microscopy, atomic force microscopy, lateral force

microscopy. Interpretation of scanning force images. Considerations in sample preparation, artifacts in scanning force images. 2 laboratories. Prerequisite: MATE 510 or consent of instructor. *Materials analysis and characterization or Special topics course.*

**MATE 518 Special Topics in Superconductivity (2)**

Basic concepts in the theory of superconductivity and current and potential applications of high-temperature superconducting materials. 2 lectures. Prerequisite: MATE 340 or PHYS 412, graduate standing in engineering or science or instructor's permission. *Special topics course.*

**MATE 520 X-Ray Diffraction (2)**

Theory and application of x-ray diffraction as applied to advanced materials problems such as crystal quality and identification, thin film applications and structural transformations at high and low temperatures. Course will cover techniques in sample preparation, operation of equipment and interpretation of diffraction data. 1 lecture, 1 laboratory. Prerequisite: Graduate status or instructor's permission. *Materials analysis and characterization or Special topics course.*

**MATE 522 Advanced Ceramics (5)**

Development, utilization, and control of properties in ceramic materials (inorganic-nonmetallic solids). Emphasis on application on processing to achieve structure and properties. Structure of crystalline ceramics and of glasses. Mechanical, thermal, optical, magnetic, and electrical properties. Application of ceramics in technology. Physical chemistry of ceramics. 4 lectures, 1 seminar. Prerequisite: Graduate standing or permission of instructor.

**MATE 525 X-Ray Diffraction Laboratory (2)**

X-ray diffraction laboratory experiments of advanced materials problems such as crystal quality and identification, thin film applications and structural transformations at high and low temperatures. Radiation safety training, techniques in sample preparation, operation of equipment and interpretation of diffraction data. 2 laboratories. Prerequisite: Graduate standing in engineering or science or instructor's permission. Concurrent: MATE 520. *Materials analysis and characterization or Special topics course.*

**MATE 530 Biomaterials (4)**

Structures of biological materials - plant/animal. Biomimetics. Structure-function relationships for materials in contact with biological systems. Interactions of materials implanted in the body. Histological and hematological considerations including foreign body responses, inflammation, carcinogenicity, thrombosis, hemolysis, immunogenic and toxic properties. Microbial interaction with material surfaces, degradation. 4 lectures. Prerequisite: BIO 220, MATE 210 and graduate standing or permission of instructor. *Special topics course.*

**MATE 560 Thin-Film Processing (3)**

Thin film science and technology: deposition techniques, surface crystal notation, energy and kinetic processes, epitaxy. Schottky barriers and surface states, stress analysis, characterization techniques, electronics devices incorporating thin films. *Class Schedule* will list topics for selection. Total credit limited to 6 units. 3 lectures. Prerequisite: Graduate

standing or permission of instructor. *Materials processing course.*

**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. *Special topics course.*

**MATE 565 Thin-Film Processing Laboratory (2)**

Thin film processing and analytical techniques: direct current and radio frequency magnetron sputtering, reactive sputtering, co-evaporation, epitaxy, grazing incidence x-ray diffraction, magnetic force imaging. *Class Schedule* will list topics for selection. Total credit limited to 6 units. 2 laboratories. Prerequisite: MATE 465. Concurrent: MATE 520, MATE 560 or consent of instructor. *Materials processing course.*

**MATE 570 Advanced Engineering Materials (4)**

An advanced treatment of the structure of matter. Physical and mechanical properties of materials including metals, alloys, ceramics, insulating materials, semiconductors, super semiconductors, polymers and composites based on detailed theoretical understanding of material microstructures. Discussions of Equilibrium diagrams, processing approaches, material selection based on thermodynamic and kinetic arguments. Degradation and failure, fitness for purpose. 4 lectures. Prerequisite: Graduate standing or permission of instructor. *Special topics course.*

**MATE 580 Fracture and Fracture Mechanics of Materials (4)**

Fracture modes and mechanisms in engineering materials, fracture mechanics fundamentals (stress analysis of cracks, energy analysis of fracture process). Use of fracture mechanics in design. Laboratory gives concentrated exposure to fracture development in materials, fracture surface evaluation, fracture toughness testing. 2 lectures, 2 laboratories. Prerequisite: MATE 350, MATE 355, or graduate standing. *Special topics course.*

**MATE 590 Solidification and Densification (4)**

Thermodynamics, kinetics and morphologies of solid-liquid interfaces. Heat flow in castings, crystal growth. Solidification mechanics, solute redistribution. Production, characterization and testing of metal powders. Compacting of powder. Sintering with/without liquid phase. Hot pressing, properties of sinterings as a function of processing conditions. Application of theory to the production of useful materials. 4 lectures. Prerequisite: Graduate standing or permission of instructor. *Materials processing or Special topics course.*

**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. Miscellaneous course fee may be required—see *Class Schedule*. 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. Miscellaneous course fee may be required—see *Class Schedule*. 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.

### **<sup>1</sup> 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 appropriate 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 appropriate 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 appropriate 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.

### **<sup>1</sup> 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.

### **<sup>1</sup> 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.

<sup>1</sup> Each course in a combined listing of sequentially numbered courses is a prerequisite to its successor in the same listing.



**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 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, 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 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 101 or CSC 110 or CSC 113, 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.

**<sup>1</sup> 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 I (4)**

Topics in interpolation and approximation methods, initial value problems, and boundary value problems of ordinary differential equations. 4 lectures. Prerequisite: MATH 242 or equivalent.

**MATH 335 Graph Theory (4)**

Introduction to graph theory and its applications: isomorphism, paths and searching, connectedness, trees, tournaments, planarity, graph colorings, matching theory, network flow, adjacency and incidence matrices. Further topics to be selected from the theory of finite state machines,

<sup>1</sup> Each course in a combined listing of sequentially numbered courses is a prerequisite to its successor in the same listing.

Ramsey theory, extremal theory, and graphical enumeration. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**MATH 336 Combinatorial Mathematics (4)**

Methods of enumerative combinatorics: sum, product, and division rules, bijective and recursive techniques, inclusion and exclusion, generating functions, and the finite difference calculus. Advanced topics to be selected from the theory of partitions, Polya theory, designs, and codes. 4 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. Miscellaneous course fee may be required—see *Class Schedule*. 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.

**<sup>1</sup> 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 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.

**<sup>1</sup> MATH 431, 432 Mathematical Optimization I, II (4) (4)**

Classical optimization. Maximum/minimum of functions, linear and nonlinear optimization problems, duality, constrained optimization. Model building and applications to

<sup>1</sup> Each course in a combined listing of sequentially numbered courses is a prerequisite to its successor in the same listing.

various fields. 4 lectures. Prerequisite: MATH 206 and MATH 241 or consent of instructor.

**MATH 433 Numerical Analysis II (4)**

Numerical techniques for solving partial differential equations of the parabolic, hyperbolic and elliptic type. 4 lectures. Prerequisite: MATH 333 or equivalent.

**MATH 437 Game Theory (4)**

Development of the mathematical concepts, techniques, and models used to investigate optimal strategies in competitive situations; games in extensive, normal, and characteristic form, Nash equilibrium points and Nash Bargaining Model. 4 lectures. Prerequisite: MATH 206 or consent of instructor. MATH 335 and MATH 431 are recommended.

**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 (4)**

Written and oral analysis and presentations by students on topics from mathematical modeling. 4 seminars. Prerequisite: MATH 206 and MATH 242.

**<sup>1</sup> MATH 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: MATH 459.

**MATH 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: Junior standing and consent of instructor.

**<sup>1</sup> 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. MATH 501: Miscellaneous course fee may be required—see *Class Schedule*. 4 lectures. Prerequisite: MATH 318 or equivalent, and 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

<sup>1</sup> Each course in a combined listing of sequentially numbered courses is a prerequisite to its successor in the same listing.

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 151 Engineering Design Communication I (2)**

Communication of designs to manufacturing using basic definitions of points, lines and planes in space. Creative projects involving mechanical devices described in a manner required by appropriate manufacturing processes. Techniques from geometry, vectors, analysis, and spatial definitions integrated to provide information to both the design and manufacturing processes. 1 lecture, 1 laboratory.

**ME 152 Engineering Design Communication II (2)**

Use of advanced communication principles to communicate project designs to manufacturing processes. Projects evaluated in terms of meeting design criteria. Techniques of advanced communication methods explored to enhance reliability and quality assurance of products and subsystems. Use of computers to enhance these processes. 1 lecture, 1 laboratory. Prerequisite: ME 151.

**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 231.

**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 231.

**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 205, ME 152, MATE 210, CSC 231, 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 231 or equivalent.

**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 346 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 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 406 Mechatronics Design (4)**

Application of micro-controllers and programmable logic controllers in the design of mechatronic products and automation systems. Digital feedback motion and process control. Modern industrial mechatronics applications. 3 lectures, 1 laboratory. Prerequisite: ME 329 and ME 405 or consent of instructor.

**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 moire fringe methods including birefringent coatings, shadow, and projection moire. 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 231, MATE 210.

**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 Ventilation Principles and Design (4)**

Individual and team project work (including computer simulation) in designing systems, selecting equipment, estimating energy consumption and operating costs for applications in industrial ventilation, exhaust and pollution control. 3 lectures, 1 laboratory. Prerequisite: ME 341, ME 344 or ENVE 304, EE 201.

**ME 457 Refrigeration Principles and Design (4)**

Basic engineering principles of refrigeration processes including: vapor compression cycles, multipressure systems, absorption systems, steam jet cooling, air cycles, and low temperature refrigeration. 3 lectures, 1 laboratory. Prerequisite: ME 313, ME 341.

**ME 458 Air Conditioning Principles and Design (4)**

Individual and team projects in designing systems, using psychometrics and load calculations for selecting equipment, estimating energy consumption and operating costs for air conditioning systems. 3 lectures, 1 laboratory. Prerequisite: ME 313, ME 341 and ME 344.

**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 231, 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 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.

**ME 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.

**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, 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 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.

**ME 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.

**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.

**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 freshmen and sophomores. 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 freshmen and sophomores. 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 freshmen and sophomores. 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 freshmen and sophomores. 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 activities. 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. 2 activities. Prerequisite: MSC 111 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. 2 activities.

**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 Army 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 (4)**

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. 3 lectures, 1 activity.

**MU 101 Introduction to Music Theory (4) GEB C.2.**

Introduction to the elements of music and their use by composers and performers. Notation of pitch and rhythm, scales, key signatures, intervals and chords. 3 lectures, 1 activity.

**MU 103 Music Theory I (4)**

Structure of tonality, four-part writing of root position and inverted triads, cadences and melodic structure, harmonic progressions, harmonization of a melody and nonharmonic tones. Composition project. 4 lectures. Prerequisite: MU 101 or permission of instructor.

**MU 104 Musicianship I (2)**

Introductory sight-singing; rhythmic performance and dictation in simple meters; identification and performance of melodic and harmonic intervals and triads; dictation of major diatonic melodies. 2 activities. Prerequisite: Previous or current enrollment in MU 101; Music major or minor status.

**MU 106 Musicianship II (2)**

Sight-singing in all forms of the minor mode; rhythmic performance and dictation in compound meters and

syncopation; identification of triad inversions and cadence formulas; dictation of minor diatonic melodies; interval identification in multiple timbres. 2 activities. Prerequisite: MU 104 or consent of instructor.

**MU 114 Introduction to Composing (4)**

Fundamental concepts in music composition. Creative projects. Compositional techniques, development, and structure. Analysis of examples from the literature. 3 lectures, 1 activity. Prerequisite: MU 101 or consent of instructor.

**MU 120 Music Appreciation (4)****GEB C.2.**

Explores the world of music with emphasis on Western tradition. Language of music, the role of music in society. Historical context and major composers from the Middle Ages to the present. 3 lectures, 1 activity.

**MU 121 Introduction to Non-Western Musics (4)**

Survey of selected non-Western music cultures. Emphasis on listening and understanding the ensemble type, aesthetic principle, musical style, and performance practice of each. 3 lectures, 1 activity. Prerequisite: Music major, minor, 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, sight-reading and facility. 1 lecture, 1 activity.

**MU 152 Elementary Class Piano (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 Intermediate Class Piano (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 (2)**

Beginning study of vocal and performance technique for the untrained singer. Includes the beginning study of the vocal mechanism and the fundamentals of notation. 1 lecture, 1 activity.

**MU 155 Guitar I (1)**

Fundamentals of guitar technique and performance. Elements of classical, pop, and folk styles. Basics of staff and chord notations. No previous experience necessary. 1 activity.

**MU 161 Piano Skills I (1)**

Preparation for Piano Proficiency Examination. Study of piano repertoire, sight-reading, 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)**

Study and public performance of music written for big band jazz. Limited to those who have had considerable experience playing musical 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 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 Wind Orchestra (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 175 Contemporary Music Ensemble (1)**

Open to all instrumentalists who are interested in performing 20<sup>th</sup>-century classical literature. Limited to students who are proficient on their instrument. Total credit limited to 6 units. 1 activity. Prerequisite: By audition or 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 PolyPhonics (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 specialized 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 200 Special Problems for Undergraduates (1)**

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.

**MU 207 Music Theory II (4)**

Construction and resolution of seventh chords, secondary dominants, nondominant seventh chord, basic modulation, change of mode. Augmented sixth chord and Neapolitan sixth chord. Binary and ternary form. Composition project. 4 lectures. Prerequisite: MU 103.

**MU 208 Musicianship III (2)**

Sightsinging in all modes in two or more parts; rhythmic dictation in 2 parts; identification of triadic chord progressions and root position seventh chords; dictation of two-part melodies in all modes. 2 activities. 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 (4)**

Survey of Jazz as a significant American art form from 1900 to the present; its historical background and development in the United States; key elements, leading performers, and significant compositions in each style. Emphasis on listening skills. 3 lectures, 1 activity.

**GEB C.2.**

**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. *Class Schedule* will list topic elected. Total credit limited to 3 units. 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 Advanced Class Piano (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)**

Develops intermediate guitar techniques and performance. Elements of classical, pop, and folk styles. Intermediate skills, reading notes and chord charts. 1 activity. Prerequisite: MU 155 or permission of instructor.

**MU 259 Beginning 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 (4)**

Counterpoint as a compositional technique. Modal, tonal, and post-tonal practices. Creative project. 4 lectures. Prerequisite: MU 309.

**MU 308 Sound Design: Technologies (4)**

Fundamental tools of electroacoustic sound design. Concepts and application of music studio procedure, recording, synthesis, and MIDI. Studio projects. 3 lectures, 1 activity. Prerequisite: MU 101, MU 120 or consent of instructor.

**MU 309 Music Theory III (4)**

Compositional procedures employed by composers of the Classical and Romantic periods. Chromatic third-related harmony, ninth, eleventh and thirteenth chords. Chromatic and enharmonic modulation. Sonata and rondo form. Composition project. 4 lectures. Prerequisite: MU 207.

**MU 310 Sound Design: Recording (4)**

Exploring creative use of recording technology. Analog and digital equipment for recording music. Analysis and creative projects. 3 lectures, 1 activity. Prerequisite: MU 308 or permission of instructor.

**MU 320 Music Research and Writing (4)**

Methodology for researching, analyzing, and writing about music. Exploration of investigative tools including library resources, periodicals, bibliographic tools, computerized search methods. Computerized software for text, music notation, facsimile enhancement, and music printing. Formatting music for publication. Performance practice. 4 lectures. Prerequisite: ENGL 114, MU 120 recommended; or permission of instructor.

**MU 321 Music History I (4)**

Musical literature, styles, composers, theory, genres and notation of the Middle Ages and Renaissance. Relationship to historical trends. 4 lectures. Prerequisite: MU 320; MU 120 recommended; or permission of instructor.

**MU 322 Music History II (4)**

Musical literature, styles, composers, theory, genres and notation of High Baroque, Classic and early Romantic periods. 4 lectures. Prerequisite: MU 320; MU 120 recommended; or permission of instructor.

**MU 323 Music History III (4)**

Musical literature, styles, composers, theory, genres and notation of the Romantic and 20<sup>th</sup> Century periods. 4 lectures. Prerequisite: MU 320; MU 120 recommended; or permission of instructor.

**MU 324 Music and Society (4)**

Exploration into the role of music historically and culturally. Emphasis on deeper understanding and appreciation of the context of music through topics of special interest. *Class Schedule* will list topics selected. Total credit limited to 12 units. 3 lectures, 1 activity. Prerequisite: Junior standing. MU 120 recommended.

**GEB C.3.****MU 325 America's Music (4)**

Explorations of the many styles of America's music through lectures, readings, sound recordings, musical scores, and performance. Includes "Native American," "folk," "popular," and "fine art" traditions. How American music reflects the different cultural heritages, social contexts, and philosophies of its creators. 4 lectures. Prerequisite: MU 207; MU 120 recommended.

**USCP**

**MU 326 Cultural Concepts and Structures in Music (4)**

Exploring the definition, concepts, and structures of music in terms of theory, performance practice, and compositional procedures of selected non-Western cultures. 3 lectures, 1 activity. Prerequisite: Junior standing or consent of instructor.

**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 328 Women in Music (4) GEB C.3.**

Survey of women's contributions as composers and performers of western art and popular music; historical overview of the experiences and perception of women as musicians. 4 lectures. Prerequisite: Junior standing.

**MU 329 Music of the 60s: War and Peace (4) GEB C.3. USCP**

Explores wide spectrum of rock, folk and pop styles of the 60s. Relates music to social turmoil and historical trends, including Vietnam War, Civil Rights Movement, American Indian Movement, Chicano Movement, Free Speech Movement. 4 lectures. Prerequisite: MU 120 or MU 320 or permission of instructor.

**MU 335 Survey of Keyboard Literature (4)**

Intensive survey of solo piano literature from early keyboard music through contemporary composers; emphasis upon composers' influences, stylistic characteristics, performance practices, and the development of the pianoforte. 4 lectures. Prerequisite: MU 207 or consent of instructor.

**MU 336 Jazz History and Theory (4)**

Survey of Jazz theoretical techniques. Emphasis upon historical context and development of Jazz through study and analysis of scores and historical performances. 4 lectures. Prerequisite: MU 207.

**MU 337 Survey of Vocal Literature (4)**

Comprehensive survey of vocal literature from early to contemporary composers. Emphasis upon composers' influences, style characteristics, and performance practices. 4 lectures. Prerequisite: MU 207 or consent of instructor.

**MU 340 Conducting: Fundamentals (2)**

Principles and techniques of conducting with experience in score reading. 2 activities. Prerequisite: MU 207 or consent of instructor.

**MU 341 Conducting: Choral (2)**

Continuation of MU 340. Emphasis on choral literature. Score reading, rehearsal techniques, and musical details associated with vocal music. 2 activities. Prerequisite: MU 340.

**MU 342 Conducting: Instrumental (2)**

Continuation of MU 340. Emphasis on band and orchestra literature. Score reading, rehearsal techniques, and musical details associated with instrumental music. 2 activities. 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 351 Jazz and Popular Music Arranging (2)**

Arranging for small and large jazz ensembles. Score and part preparation. 2 activities. Prerequisite: MU 207.

**MU 352 Orchestration (4)**

Ranges, transposition, technical capabilities, and scoring of vocal ensembles, band, and orchestra instruments. Creative project. 3 lectures, 1 activity. Prerequisite: MU 207.

**MU 360 Music for Classroom Teachers (4)**

Development of skills for 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, 1 activity. Prerequisite: MU 100.

**MU 361 Instruments (1)**

Fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. Separate sections in specific areas of study are 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 (4)**

Study and application of Orff, Dalcroze, Kodaly, Manhattanville, and Suzuki. Philosophy, objectives and methodologies for implementing an effective school music program. Includes fieldwork. 3 lectures, 1 activity. Prerequisite: MU 207; junior standing.

**MU 366 Piano Pedagogy (2)**

Survey of elementary, intermediate and advanced teaching methods and literature; private and group instruction; studio policies. 2 activities. Prerequisite: MU 207 or consent of instructor.

**MU 367 Vocal Pedagogy (2)**

Survey of elementary, intermediate and advanced teaching methods including a comprehensive study of the vocal mechanism. 2 activities. Prerequisite: MU 207 or consent of instructor.

**MU 370 University Jazz Band (1)**

Study and public performance of music written for big band jazz. Limited to those who have had considerable experience playing musical 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 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 Wind Orchestra (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 375 Contemporary Music Ensemble (1)**

Open to all instrumentalists who are interested in performing 20<sup>th</sup>-century classical literature. Total credit limited to 6 units. 1 activity. Prerequisite: Junior standing; by audition or 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 PolyPhonics (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 specialized 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 (4)**

Examination of modern compositional practices including impressionism, polytonality, serialism, timbre and form, minimalism, and the new eclecticism. Analysis and creative projects. 4 lectures. Prerequisite: MU 309 or permission of instructor.

#### **MU 404 Composition (2)**

Independent creative projects. Exercises in compositional methods designed to increase technical facility. Total credit limited to 6 units. 2 activities. Prerequisite: MU 309 or permission of instructor.

#### **MU 411 Sound Design: Synthesis (4)**

Compositional application of sound synthesis techniques. Realization of computer music. Creative projects. 3 lectures, 1 activity. Prerequisite: MU 310.

#### **MU 412 Sound Design: Composition and Performance (4)**

Performance of electroacoustic music. Program preparation, composition, technical planning. Concert performance. 3 lectures, 1 activity. Prerequisite: MU 411.

#### **MU 420 Music History: Selected Topics (4)**

Intensive study of selected topics in music history through the use of readings, recordings, scores, and class presentations. *Class Schedule* will list topics selected. Total credit limited to 8 units. 3 lectures, 1 activity. Prerequisite: MU 321, MU 322, and MU 323, or consent of instructor.

#### **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 (4)**

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. 3 lectures, 1 activity. Prerequisite: MU 341, or consent of instructor.

#### **MU 466 Instrumental Literature and Rehearsal Techniques (4)**

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. 3 lectures, 1 activity. Prerequisite: MU 342, or consent of instructor.

## **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. Plant processes, climate and the effect of the environment on plants. Controlling the plant's environment, soil and media, mineral

nutrition. Introduction to disease and pest control. 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 (4)**

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. Speakers from industry. 3 lectures, 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. 2 laboratories.

**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. Report required. 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 111.

**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 121, OH 122, OH 123, OH 124, BOT 121, CHEM 111, SS 121.

**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 Environmental Horticulture (4) GEB F.2.**

Technical information and recommendations for the residential horticulturist. Propagation, pruning, planting, media, fertilizers, pest and weed control, landscaping, maintenance, identification and care of ornamental plants. Being a wise horticultural consumer. For non-horticulture majors. 3 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, SS 121.

**OH 301 Principles of Landscape Design (4)**

Introduction to basic principles and elements of single-family residential landscape design, design theory, plant composition; creative problem solving, functional and aesthetic uses of landscape materials, client and maintenance criteria, xeriscape concepts, and perspective drawing. Expansion of OH 122 drafting and CADD skills. 2 lectures, 2 laboratories. Prerequisite: OH 122, OH 123, OH 126, OH 231 and one computer course (computer literacy).

**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 (4)**

Researching information about horticultural plants and presenting it verbally, in writing, and photographically. Systematic learning and identification of a selected group of horticultural plants. Field trip required. Miscellaneous course fee required—see *Class Schedule*. 4 lectures. Prerequisite: 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, BRAE 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: OH 121, OH 124 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 activity, 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 339 Internship in Ornamental Horticulture (1–12) (CR/NC)**

Selected Ornamental Horticulture 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. Degree credit

limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship 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 or 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 (4)**

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 trips required. 3 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 degree credit limited to 4 units, with a maximum of 4 units per quarter. Report required. 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: BUS 271.

#### **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. 2 activities. Prerequisite: OH 421 or 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, insect/mite pests and weeds 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, pest and weed control procedures. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: OH 121, CRSC 311, BOT 324 and senior standing.

#### **OH 434 Landscape Management (4)**

Maintenance procedures and operations. Operating a landscape management business. Estimating, scheduling, recordkeeping and implementation of landscape maintenance projects. Interior landscape maintenance. Miscellaneous course fee required—see *Class Schedule*. 3 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**

(See also KINE—Kinesiology)

### **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 \*\*kinesiology 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 107 Billiards
- PE 108 Basketball
- PE 109 Bowling
- PE 110 Cycling
- PE 111 Fencing
- PE 112 Bowling, Int.
- 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 189 Soccer
- PEW 190 Softball
- PEW 191 Swimming
- PEW 192 Tennis
- PEW 193 Track and Field
- PEW 194 Volleyball

**PROFESSIONAL ACTIVITIES – See KINE–Kinesiology**

**ACADEMIC COURSES – See KINE–Kinesiology**

## 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 225 Symbolic Logic (4)**

The nature of deductive logical systems. Methods of notation, translation and proof in the sentential, predicate and relational calculi including indirect and conditional methods of proof. 4 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. 3 lectures. 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 320 Asian Philosophy (3)** **GEB C.3.**  
Philosophies developed in India, South Asia, China, and Japan, including the logical and epistemological presuppositions of the Six Schools of Hindu metaphysics; the Six Schools of Chinese philosophy; Confucian moral philosophy and Taoist social ecology. 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 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. USCP**  
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 336 Ethics, Gender and Society (3)** **GEB C.3. USCP**  
Critical examination of the relation of gender to moral reasoning and to ethical problems in contemporary American society. Joint focus on theory and application. Consideration given to the connection of gender to race and power, including African-American women's perspectives. 3 lectures. Prerequisite: PHIL 231.
- PHIL 337 Business Ethics (3)** **GEB C.3.**  
Critical examination of ethical problems arising in business. 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 (4)**

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, research project. Prerequisite: PHIL 230.

**PHIL 412 Epistemology (4)**

Analysis of the concept of knowledge. Development of competing theories of epistemic justification and truth. Inquiry into relationship between knowledge, belief, justification and truth. Examination of skepticism. 3 lectures, research paper. Prerequisite: PHIL 230.

**PHIL 422 Philosophy of Mind (4)**

Classic and current work in the problems and issues of the nature and unity of the self, consciousness, mental representations, and action, and of the relation of philosophy of mind to psychology, linguistics and computer science. 4 lectures. Prerequisite: PHIL 230 or PHIL 231.

**PHIL 429 Special Topics in the History of Philosophy (4)**

Advanced discussion of selected topics in the history of philosophy. Examination and analysis of important philosophical movements (e.g., positivism, postmodernism) or alternatively, of particular philosophers or philosophical works of exceptional importance (e.g., David Hume; Kant's *Critique of Pure Reason*). *Class Schedule* will list topic selected. Total credit limited to 12 units. 3 lectures, research paper. Prerequisite: PHIL 230.

**PHIL 439 Selected Problems in Ethics and Political Philosophy (4)**

Advanced discussion of selected topics in ethics and political philosophy. Examination and analysis of significant ethical or political theories (e.g., utilitarianism, contractarianism) or alternatively, of particular philosophers or philosophical works of exceptional importance (e.g., John Stuart Mill; John Rawls' *A Theory of Justice*). *Class Schedule* will list topic selected. Total credit limited to 8 units. 3 lectures, research paper. Prerequisite: PHIL 231 and PHIL 331 or PHIL 333.

**PHIL 460, 461 Senior Project (2) (2)**

Selection, development and completion of a project under faculty supervision. Results presented in a formal thesis. Minimum of 60 hours per quarter. Requirements for PHIL 460 must be completed before student can enroll in PHIL 461. Prerequisite: Senior standing, 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.**

Selected topics in physics with applications to contemporary issues in science and technology. Intended to provide non-science students with an understanding of basic physical concepts. Not open to students who have credit in a college physics course. 4 lectures. Prerequisite: 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 118 and high school trigonometry, 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 141 with grade C- or better, and MATH 142 (or concurrent enrollment). 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 College 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 on the Computer (4)**

Introduction to computer algebra system for solving problems in physics: differential equations, matrix manipulations, simulations and numerical techniques, nonlinear dynamics. 4 lectures. Prerequisite: PHYS 133, MATH 242 (or concurrent enrollment) and GEB F.1. elective.

**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 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 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 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 (5) GEB B.1.a.**

Geometric optics, lens systems, aberration, physical optics and polarization. 4 lectures, 1 laboratory. Prerequisite: PHYS 133, MATH 241.

**PHYS 340, 341, 342 Quantum Physics Laboratory I, II, III (1) (1) (2) GEB B.1.a.**

Experimental studies of quantum properties of particles and radiation, and their interaction with atoms and nuclei. Atomic and nuclear spectra, nuclear radiation detection, Monte Carlo simulations, transport properties of resistors, diodes and transistors. Measurement of fundamental physical constants. Courses must be taken in numerical order. PHYS 340, 341: 1 laboratory; PHYS 342: 2 laboratories. Prerequisite: PHYS 212, and PHYS 256.

**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 (4)**

Wave nature of matter and the basic postulates of quantum mechanics. The wave function, operators, and their interpretation. Schrodinger's Equation and its solutions in one and more dimensions. The hydrogen atom and the periodic table. 4 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 or MATE 340, 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 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 145 Introduction to Poultry Management (4)

Introduction to modern techniques in poultry production, processing, marketing and price discovery. Consumption trends, breeds and consumer grades. Laboratory application of management skills, health care, keeping of production and accounting records and processing techniques. 3 lectures, 1 laboratory.

### 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 instructor.

### 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 145.

### 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 145.

### 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 145.

### 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 220 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 145, 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 instructor.

### 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 110 American and California Government (3)

(formerly POLS 210)

GEB D1

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 180 Political Inquiry (4)

(formerly POLS 100)

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, the dynamics of political change and philosophy of science. 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 225 Introduction to International Relations (4)**  
(formerly POLS 105)

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 230 Basic Concepts of Political Thought (4)**  
(formerly POLS 204)

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 110.

**POLS 285 Model United Nations (2) (CR/NC)**  
(formerly 250)

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 308 Revolutions and Collective Violence (4)**

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 states. 4 lectures. Prerequisite: POLS 110.

**POLS 310 Politics of Ethnicity and Gender (4) USCP**  
(formerly POLS 303)

Analysis of factors that affect the changing role of women and major ethnic groups in American politics. Involvement, organization and role of minority groups in the political process. 4 lectures. Prerequisite: POLS 110.

**POLS 315 The American Presidency (4)**  
(formerly POLS 342)

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. 4 lectures. Prerequisite: POLS 110.

**POLS 316 Political Parties and Interest Groups (4)**  
(formerly POLS 331)

Make-up 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. 4 lectures. Prerequisite: POLS 110.

**POLS 317 Public Opinion and Political Participation (4)**  
(formerly POLS 332)

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. 4 lectures. Prerequisite: POLS 110.

**POLS 318 Political Behavior (4)**  
(formerly POLS 380)

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 110.

**POLS 319 Legislative Process (4)**  
(formerly POLS 335)

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 110.

**POLS 320 Politics of Global Survival (4)**  
(formerly POLS 304)

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 225 or junior standing.

**POLS 324 International Politics (4)**  
(formerly POLS 312)

International political processes and problems. Foreign policies and politics in relations between states. Conflicts and adjustments. Analyses of selected problems. 4 lectures. Prerequisite: POLS 225.

**POLS 325 Contemporary Global Political Issues (3) GEB D.4.b.**  
(formerly POLS 370)

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 110.

**POLS 326 World Food Politics (3) GEB D.4.b.**  
(formerly POLS 371)

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 225 or junior standing.

**POLS 327 Inter-American Relations (4)**  
(formerly POLS 311)

Inter-American affairs. Political, economic, and social problems; forces motivating cultural behavior, economic development, trade, distribution of resources, institutional organization. Finding and evaluating authoritative source materials on Latin America. 4 lectures. Prerequisite: POLS 225.

**POLS 328 Politics of Developing Areas (4)**  
(formerly POLS 384)

Process of political development in the Third World with appropriate examples taken from particular areas and countries. 4 lectures. Prerequisite: POLS 225.

**POLS 329 Comparative Politics (4)**  
(formerly POLS 382)

Comparative study of the governments of selected Western and non-Western countries. Case studies. 4 lectures.  
Prerequisite: POLS 225 or POLS 110.

**POLS 330 Modern Political Thought (4)**  
(formerly POLS 306)

Theories of political participation and the relationship between the individual and the state as developed in the works of influential thinkers such as Locke, Rousseau, Mill and Marx. 4 lectures. Prerequisite: POLS 230.

**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 337 American Political Thought (4)**  
(formerly POLS 307)

The central political ideas of America's leading thinkers from the Puritans to the present. 4 lectures. Prerequisite: POLS 110, POLS 230.

**POLS 341 American Constitutional Law (4)**  
(formerly POLS 321)

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 110.

**POLS 343 Civil Rights in America (4)** **USCP**  
(formerly POLS 323)

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 110.

**POLS 344 Civil Liberties (4)**  
(formerly POLS 324)

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 110.

**POLS 345 Judicial Process (4)**  
(formerly POLS 336)

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 110.

**POLS 351 Public Administration (4)**  
(formerly POLS 314)

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 110.

**POLS 360 Political Analysis (4)**  
(formerly POLS 305)

Introduction to methodology research design and quantitative methods used in survey research and political analysis. Bivariate inferential statistics and SPSS statistical computer programs will be used to analyze political phenomena. 3 lectures, 1 activity. Prerequisite: POLS 180 and STAT 221 or equivalent.

**POLS 375 California State and Local Politics (4)**  
(formerly POLS 301)

Political culture, processes, behavior, institutions, public policy and distribution of power in California state and substate governments. 4 lectures. Prerequisite: POLS 110.

**POLS 385 Advanced Model United Nations (2)**  
(formerly POLS 350)

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 6 units. 2 lectures. Prerequisite: POLS 285 or consent of instructor.

**POLS 386 Government Internship (2–12) (CR/NC)**  
(formerly POLS 340)

Supervised work experience in a government or related public agency as approved by the college 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 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 420 Contemporary U.S. Foreign Policy (4)**  
(formerly POLS 411)

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. 4 lectures. Prerequisite: POLS 225.

**POLS 421 Asian Politics (4)**  
(formerly POLS 417)

Analysis of political, economic, and social institutions and conditions in selected Asian nations. 4 lectures. Prerequisite: POLS 225.

**POLS 422 European Politics (4)**

Comparative study of European political systems before and after the demise of communist governments in Eastern Europe and the USSR. Regional organizations including the European Union and NATO. Discussion of alternative futures for Europe. 4 lectures. Prerequisite: POLS 225 or POLS 327.

**POLS 423 Middle Eastern Politics (4)**  
(formerly POLS 465)

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 225 or junior standing.

**POLS 424 African Politics (4)**  
(formerly POLS 468)

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 225 or junior standing.

**POLS 451 Science, Technology and Public Policy (4)**  
(formerly POLS 404)

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 110.

**POLS 452 Politics of Finance and Planning (4)**  
(formerly POLS 405)

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. 4 lectures. Prerequisite: POLS 110.

**POLS 453 Administrative Theory and Behavior (4)**  
(formerly POLS 441)

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 110 and POLS 351.

**POLS 454 Public Personnel Administration (4)**  
(formerly POLS 442)

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 110 and POLS 351.

**POLS 455 Public Policy Analysis (4)**  
(formerly POLS 425)

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 110.

**POLS 460 Intermediate Political Analysis (4)**

Intermediate social science methodology focusing on stochastic model specification and estimation. Enhancements and generalizations of the basic approaches with applications to multivariate, nonlinear and large sample settings. Increased use of computer packages and data analysis. 3 lectures, 1 activity. Prerequisite: POLS 360.

**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 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 110, junior standing.

**POLS 471 Municipal Government (4)**  
(formerly POLS 403)

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 110.

**POLS 472 State and Local Government (4)**  
(formerly POLS 401)

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 110.

**POLS 481 Undergraduate Seminar (4)**  
(formerly POLS 463)

Preparation and presentation of current developments in the field of political science, with primary attention to American politics, or international relations, or public administration. 4 seminars. Prerequisite: Junior or senior in Political Science.

**POLS 484 Community Research Seminar (2)**  
(formerly POLS 450)

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: Junior or senior standing.

**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 550 Administration in Developing Nations (4)**  
(formerly POLS 510)

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 560 Advanced Political Analysis (4)**

Advanced social science methodology focusing on stochastic model specification and estimation. Topics include maximum likelihood estimation, event count models, time series data, nonparametric analysis, Resampling techniques, and

Bayesian Methods. Advanced computer packages will be used to analyze challenging data sets. 3 lectures, 1 activity. Prerequisite: POLS 360 or STAT 322.

## 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 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 305 Patterns of Change (4)

Patterns of change in the formation and evolution of the Universe, the Earth, and life. Topics include the Big Bang, radiometric dating, plate tectonics, the fossil record, biogeography, and the biochemical evidence that supports

evolution. 3 lectures, 1 activity. Prerequisite: PSC 101 or PSC 103 or consent of instructor.

### 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 103 Pairing and Marriage (4)

Functional approach to contemporary dating and pairing patterns with emphasis on developing communication during the early developmental stage of the paired relationships. 4 lectures.

### PSY 104 Effective Study Techniques (3) (CR/NC)

Provides adequate instruction and practice in specific study skills such as note-taking, time-planning, memory, concentration, reading, test taking, self monitoring, and use of personal resources. Credit/No Credit grading only. 2 lectures, 1 activity.

### PSY 200 Special Problems for Undergraduates (1–4)

Individual investigation, research, study or survey of selected problems in consultation and with prior approval of instructor. Written report required. Total credit limited to 4 units. 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 204 Tutor Training and Certification (2) (CR/NC)

Group study/tutorial certification program. Prepares students for certification with the College Reading and Learning Association (CRLA) tutor program. Emphasis on effective group study/tutorial strategies and techniques, communication skills, multicultural issues and disability awareness. Credit/No Credit grading only. 1 lecture, 1 activity.

**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 infancy to old age. Basic research and concepts in understanding social, emotional, cognitive and contextual influences on development. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 300 Human Development: An Ecological Perspective (4)**

Introduction to lifespan human development as an area of study closely related to developmental psychology. The developing self of the college student within an ecological context. Illustrative examples of research and scholarship focusing on the individual, family and community as interdependent developmental determinants. 4 lectures. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 301 Psychology of Personal Development (4)**

Application of developmental psychology to self awareness. Includes communication skills, self modification skills and examination of life goals and values. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 302 Behavior in Organizations (4)**

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. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 303 Family Interaction (4)**

Examination of the family ecosystem and how it creates reality. Emphasis on how the practitioner can recognize the cues present in patterned behavior in family interaction that produce a family's distinctive style or family type. Normal processes are studied in order to understand how dysfunctional patterns are introduced and reinforced. Focus on the internal dimension rather than the effect of external influences. 4 lectures. Prerequisite: PSY 201 or PSY 202, CD 203 or PSY 254.

**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 (4)**

Personality theories and research. Assessment, dynamics, and development of personality. Trait, behavioral, social learning, cognitive, humanistic, psychoanalytic and biological approaches. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 306 Adolescence (4) (Also listed as CD 306)**

Psychological analysis of the years from prepubescence to young adulthood. Current research on behavior and development during adolescence with emphasis on physical, affective, cognitive, sociocultural, historical, family, peer and school aspects of life during the post-child, pre-adult years. 4 lectures. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 307 Memory and Cognition (4)**

Principles and theories of memory and cognition including processes; models of perception, attention and memory; concept formation; language; intelligence; problem-solving and decision making; creativity; applications to areas such as law, artificial intelligence, and education. 4 lectures. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 309 Psychology of Consciousness (4)**

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. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 310 Psychology of Death (4)**

Psychological aspects of death, loss and grief, including scientific findings, person-culture transactions and expressions in the arts and humanities. Personal exploration and interdisciplinary application of psychology to issues such as death anxiety, dying processes, funerals, immortality beliefs, suicide, and grieving. 4 lectures. Prerequisite: PSY 201 or PSY 202, or consent of instructor.

**PSY 311 Environmental Psychology (4)**

Interrelationship between behavior and the built and natural environments. Evaluating and understanding environments,

environmental stress, and the human aspects of environmental problems. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 314 Psychology of Women (4)**

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. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 315 Psychology of Men (4)**

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. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 317 Psychology of Stress (4)**

Examines the relationship between stress and psychological and physical well-being. Research on the psychological factors influencing stress as well as a description and critical evaluation of methods of stress reduction. Miscellaneous course fee required—see *Class Schedule*. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 318 Psychology of Aging (4)**

Psychological and physiological aging in the context of the culture. Theories and research relating to the issues of stability and both positive and negative changes in perception, learning, memory, intelligence, personality, identity, motivation, sexuality, family relationships, career. Disorders, institutionalization, death and bereavement. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 319 Motivation and Emotion (4)**

Examination of the mechanistic and cognitive-based theories of motivation and emotion. Practical applications of each theory covered in an attempt to understand certain personal and societal behaviors. Research evaluating each theory and diversity consideration. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**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. 2 lectures, 2 activities. Prerequisite: Junior standing, cultural pluralism course, Psychology & Human Development majors only, or consent of instructor.

**PSY 329 Research Methods in Psychology (3)**

Introduction to research methods used in psychology and other behavioral sciences. Topics include the logic and ethics of research; experimental, correlational, and survey methodology; library search strategies; basic statistical

procedures; and the format of the research report. 2 lectures, 1 activity. Prerequisite: PSY 201 or PSY 202, STAT 217 or STAT 211, or consent of instructor.

**PSY 330 Behavioral Effects of Psychoactive Drugs (4)**

Pharmacokinetic, pharmacodynamic and behavioral effects of psychoactive drugs. Social and psychological issues related to drug use and misuse. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 333 Quantitative Research Methods for the Behavioral Sciences (3) (Also listed as SPC 333)**

Thorough introduction to the quantitative aspects of empirical research. Using SPSS statistical software, students will learn how to choose, conduct, and interpret analyses of research data from different behavioral science disciplines. 2 lectures, 1 activity. Prerequisite: PSY 329 or SOC 333 or SPC 312, and STAT 211 or STAT 217, or consent of instructor.

**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 or 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 360 Applied Social Psychology (4)**

Applications of social psychology to education, business and industry, environmental problems, interpersonal and intergroup relations, health and welfare, mass communication, judicial systems, and politics. Analysis of social and organizational problems, methods of intervention, and program evaluation. 4 seminars. Prerequisite: PSY 252.

**PSY 370 Introduction to Clinical and Counseling Psychology (4)**

Introduction to the fields of clinical and counseling psychology. History, education and training, theories, assessment, diagnosis, and treatment. Introduction to diverse settings, ethical principles, legal guidelines, credentialing and employment opportunities. 4 lectures. Prerequisite: Any two Psychology courses.

**PSY 390 Career Planning (2) (CR/NC) (Also listed as CD 390)**

Individual career and graduate school planning. Current employment issues for college graduates such as career profiles, trends and work environments. Credit/No Credit grading only. 2 seminars. Prerequisite: Junior or senior standing or consent of instructor.

**PSY 400 Special Problems for Advanced Undergraduates (1–4)**

Individual investigation, research, study or survey of selected problems in consultation and with prior approval of instructor. Written report required. Total credit limited to 4

units. Prerequisite: PSY 201 or PSY 202 and consent of department head.

**PSY 405 Abnormal Psychology (4)**

Normal and abnormal behavior in everyday life. Anxiety, somatoform, dissociative, mood, childhood, personality, psychotic, cognitive, eating, and substance use disorders and their treatment. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 410 History and Systems of Psychology (4)**

Survey of the philosophical and scientific roots of modern psychology, pioneer laboratories, systems, and schools of psychology, the refining of experimental methods, and applications of psychology in testing and psychological services. Examination of contributions by women and minorities in psychology. 4 seminars. Prerequisite: PSY 201 or PSY 202, PSY 305, PSY 458 or consent of instructor.

**PSY 413 Parent-Child Relationships (4)**

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. 4 lectures. Prerequisite: PSY 256 or CD 209, junior standing.

**PSY 419 Self and Identity (4)**

Concepts, theories, and research related to the development of the self across the lifespan. Examination of the influence of temperament, culture, individuation, self-esteem, self-awareness, roles and identity on maturity. 4 seminars. Prerequisite: PSY 201 or PSY 202 and PSY 256 or consent of instructor.

**PSY 420 Social and Emotional Development (4)**

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. 4 seminars. Prerequisite: PSY 256 or consent of instructor.

**PSY 421 Cognitive Development (4)**

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. 4 seminars. Prerequisite: PSY 201 or PSY 202, PSY 307.

**PSY 422 Lifespan Sexuality (4)**

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. 4 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 430 Sensation and Perception (4)**

Principles of sensory systems, psychophysics, attention and the perception of color, shape, movement, space, and time. Survey of the development of perception through the lifespan. 4 lectures. Prerequisite: PSY 201 or PSY 202, and PSY 307.

**PSY 432 Psychological Testing (4)**

Theory and practice of psychological measurement and testing. Principles of test construction, administration, and interpretation. Survey of common testing domains such as intelligence, scholastic aptitude and achievement, and personality. 4 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 CD 209, and EDUC 440 or consent of instructor.

**PSY 450 Family 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, or graduate standing.

**PSY 453, 454 Supervised Fieldwork (5) (5) (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 5 units per quarter. Credit/No Credit grading only. Prerequisite: PSY 323, Psychology majors, junior standing, and consent of instructor.

**PSY 456 Behavioral Disorders in Children (4)**

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. 4 seminars. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 458 Learning (4)**

Theoretical and philosophical foundations of the experimental analysis of behavior. Principles of classical and operant conditioning including aversive control of behavior through punishment and avoidance learning and the theoretical basis for behavior therapy techniques and applications of learning principles in education and health settings. 4 seminars. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 459 Lifespan Theories (4)**

Comparative study of theories that have been offered as explanations for lifespan development. Controversial issues, evaluations and applications of theories. Emphasis on biological, psychological, and social aspects of lifespan development. 4 seminars. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 460 Child Abuse and Neglect (4)**

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. 4 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. Psychology majors only. 1 seminar. Prerequisite: PSY 329, PSY 453, Graduation Writing Requirement.

**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. Psychology majors only. Prerequisite: PSY 461.

**PSY 465 Cross-Cultural Issues in Psychology (4)**

Psychological, cultural, ecological and behavioral influences on human development in different cultural settings. Focuses on from one to three different cultures outside the U.S. in any given quarter. 4 seminars. Prerequisite: PSY 201 or PSY 202 and junior standing.

**PSY 470 Selected Advanced Topics (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. 4 seminars. Prerequisite: Consent of instructor.

**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 (4)**

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. 4 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 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 Neuropsychology and Psychopharmacology (4)**

Advanced course in brain-behavior relationships. Neuropathology of brain disorders including the neurochemical etiology and treatment of mental illness and chemical dependency. 4 seminars. Prerequisite: PSY 304.

**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 558 Career Counseling (4)**

Sources, methods and techniques for gathering, evaluating and disseminating occupational, technological and educational information through career counseling. 4 seminars. Prerequisite: Graduate standing.

**PSY 560 Individual Therapy: Theory and Application (4)**

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 (4)**

Ethical, legal and case management issues related to individual, child, family and group therapy. Client rights and professional orientation to ethical standards and state regulation of clinical practice. 4 seminars. Prerequisite: EDUC/PSY 560, PSY 566, 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, or consent of instructor.

**PSY 566 Group Therapy: Theory and Application (4)**

Group therapy theory, leadership and research applied to client assessment, screening, treatment selection, evaluation and termination. Ethics, law included. 2 seminars, 2 activity. Prerequisite: EDUC/PSY 560, 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 IV, physiological, crisis and ethnic concerns with a required

practicum. 2 seminars, 1 activity. Prerequisite: EDUC/PSY 555, PSY 459, equivalent or consent of instructor.

**PSY 568 Advanced Psychotherapies (4)**

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 12 units. 4 seminars. Prerequisite: EDUC/PSY 560, PSY 565 or consent of instructor.

**PSY 569 Counseling Clinic Practicum (3) (CR/NC)**

Applied experience and instruction in assessment, diagnosis, treatment planning and treatment of individuals, couples, families and children under direct supervision of faculty in program clinic. Weekly meetings. Total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: EDUC/PSY 560, PSY 405, PSY 450, or consent of instructor.

**PSY 570 Selected Topics in Psychology and Human Development (4)**

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 8 units. 3 seminars, 1 activity. Prerequisite: Graduate standing or consent of instructor.

**PSY 571 Family Therapy: Theory and Application (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: Theory and Application (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, PSY 566, 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 12 units. Prerequisite: PSY 569 and consent of M.S. program committee.

**PSY 574 Applied Psychological Testing (4)**

Administration, scoring and interpretation of psychological tests. Reliability and validity of psychological measures. Ethical and cultural issues in testing. 4 seminars. Prerequisite: Graduate standing.

**PSY 575 Gender, Couple and Sexual Dysfunction Therapy (4)**

Antecedents to sex-role identity, gender aware therapy, couple therapy, treatment of spousal abuse, assessment, diagnosis, treatment of sexual dysfunction. 4 seminars. Prerequisite: PSY 450 and PSY 560.

**PSY 576 Field Experience: Marital and Family Counseling (4)**

Supervised experience in applied psychotherapeutic techniques, assessment, diagnosis and treatment of individual, marital, family and child relationship problems. Total credit limited to 16 units. Weekly seminar with on-site and university supervisors. Prerequisite: PSY 569 and consent of 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: Graduate standing 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. Qualitative research design and analysis, needs assessment and program evaluation. Emphasis on the design of data collection instruments, data collection and 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 (4)**

Completion of a thesis 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, Parks and Tourism (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 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: Recreation administration majors only.

**REC 127 Cross-Cultural Dimensions of Leisure (4)**

Sociological, psychological, and cultural aspects of leisure behavior. Needs, motivations, constraints, values and benefits explored. Cultural diversity as it relates to recreation and tourism and the natural resources. 4 lectures.

**REC 203 Resource Law Enforcement (3) (Also listed as FNR 203)**

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.

**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 127 or consent of instructor.

**REC 252 Recreation and Special Populations (4)**

Introduction to special populations and therapeutic recreation. Specialized leadership and communication techniques. Modification requirements for programs, areas, facilities, equipment, and supplies. Exploration of disability rights issues, including legislation which impacts the delivery of recreation and leisure services. 3 lectures, 1 activity. Prerequisite: REC 127 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 300 Computer Applications in Resource Management (2) (Also listed as FNR 300)**

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. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: AG 250 or CSC 113, junior standing or consent of instructor.

**REC 302 Environmental and Wilderness Education (4)**

Education and teaching techniques that apply to learning experiences in an outdoor environment. Impact of natural resource usage that affects sociological, biological and physical resources. Educational strategies for presenting

environmental learning to grades K-12 and selected environments. 3 lectures, 1 activity. Prerequisite: REC 210.

**REC 305 Recreation Areas and Facilities Management (4)**

Management of recreation areas and facilities: clientele considerations, facility and outdoor area site planning; day-to-day operations of common recreation areas and facilities. Agency visitation required. 3 lectures, 1 laboratory. Prerequisite: REC 210.

**REC 311 Environmental Interpretation (4) (Also listed as FNR 311)**

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.

**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, and contract services. Field visits required. 3 lectures.

**REC 313 Issues in Natural Resources Tourism (4)**

Investigation of tourism industry from perspective of natural resources based tourism. Examination of ecotourism, agritourism, rural tourism, sustainable tourism development, and adventure travel. Emphasis on tourism that sustains social, cultural, heritage, and natural environments while generating economic development. 3 lectures, 1 laboratory. Prerequisite: REC 210 or consent of instructor.

**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 or consent of instructor.

**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 or consent of instructor.

**REC 324 Legal and Legislative Patterns in Recreation Administration (4)**

Legislative and legal aspects of public, private, commercial, and non-profit recreation and tourism agencies. Emphasis on risk management, liability, insurance, and negligence. Understanding of legal foundations and the legislative process. 3 lectures, 1 laboratory. Prerequisite: REC 210.

**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 360 Assessment and Evaluation of Recreation, Parks and Tourism (4)**

Evaluation of a full service program delivery system in a variety of settings. Needs assessment, program evaluation, and decision making. Program selection and long range planning based on data analysis. 3 lectures, 1 laboratory. Prerequisite: REC 210, CSC 113/AGB 250, STAT 217.

**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 405 Management and Leadership for Recreation Administration (4)**

The study, analysis, and practice of management and leadership processes as they are applied to recreation organizations: planning, organizing, motivating, and controlling. Emphasis upon application of theories and practices in specific recreation settings. 4 lectures. Prerequisite: REC 324.

**REC 410 Resource Recreation Management (4) (Also listed as FNR 410)**

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.

**REC 414 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: BUS 212, BUS 346 and senior standing.

**REC 417 Resource Recreation Planning (3) (Also listed as FNR 417)**

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. Miscellaneous course fee may be required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: FNR 112 or consent of instructor.

**REC 424 Financing Recreation 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. 4 lectures. Prerequisite: BUS 212, CSC elective.

**REC 450 Grant Development and Writing (4)**

Principles of all aspects of grantmanship; researching grant funding resources from both the private and public sector, preparing the grant proposal, and grant administration. Field visits required. 4 lectures. Prerequisite: ENGL 215 or ENGL 218 or consent of instructor, junior standing.

**REC 460 Research in Recreation, Parks and Tourism (4)**

Research design, questionnaire and interview schedule construction, sampling methods, data array and analysis, and computer applications. Selection of senior project topic and proposal development. 4 seminars. Prerequisite: CSC 113 or AG 250, STAT 217, REC 360.

**REC 461 Senior Project (3)**

Completion, under faculty supervision, of an investigative project typical of problems which graduates must solve in their fields of employment. Required minimum of 90 hours. Analytical, formal report is required. Prerequisite: Senior standing and completion of REC 460.

**REC 463 Pre-Internship Seminar (1) (CR/NC)**

Exploration of internship opportunities and practices. Internship selection process and procedures introduced. Recommended enrollment two quarters prior to REC 465. Credit/No Credit grading only. 1 seminar. Prerequisite: 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 472 Leadership Practice (1) (Also listed as FNR 472)**

Leadership styles used in the natural resources management and recreation administration professions. Study and practice in setting goals and objectives; developing, evaluating and implementing an entrepreneurial project plan; decision making and problem-solving. 1 laboratory. Prerequisite: Junior standing or 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.

**SCM 451 Ethics in the Sciences (3)**

The practice, performance and application of science from the standpoint of ethics. Includes issues involving plagiarism, data handling, fraud, safety and selected applications in specific science careers. Models for the analysis and resolution of ethical dilemmas are presented. 3 seminars. Prerequisite: Junior standing.

## 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 (4)**

Order versus conflict theories of social problems; the role of values in the study of these problems; methods of study; proposed solutions including political approaches. Three types of problems investigated: social conflict, structural problems, and deviant behavior. 4 lectures.

**SOC 301 Social Work and Social Welfare Institutions (4)**

Introduction to the field of social welfare. Development of social work and social welfare services; major issues in social service policy. Scope and diversity of specific programs in the social services. Analysis of current programs and the recipients of welfare services. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 305 Sociology of Social Movements (4)**

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. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 306 Sociology of the Family (4)**

Description and analysis of family relationships; role of family in society, effects of society on family economy, structure and change. Other topics include courtship,

marriage, parenting, divorce and alternative family forms. 4 lectures. Prerequisite: Junior standing 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. Prerequisite: Junior standing.

**SOC 310 Self, Organizations and Society (4)**

Analysis of the interactions relating to the development of self. Examination of the reciprocal interactions between biology, personal environment, and society. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 311 Sociology of Gender (4)**

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, family and abusive relationships. Focus on media presentation of gender and effects of ethnicity and class. 4 lectures. Prerequisite: Junior standing.

**SOC 313 Urban Sociology (4)**

Description of the context of urban development; analysis of various forces generating urbanization. Investigation of urban models and spatial relationships; urban processes; and problems. 4 lectures. Prerequisite: Junior standing 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 (4)** **USCP**

Exploration of the issues and problems facing 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. 4 lectures. Prerequisite: Junior standing.

**SOC 323 Social Stratification (4)**

Social class and the distribution of income, wealth, status and power in society, with emphasis on contemporary United States; social mobility; race, gender, and ethnic inequalities; political power and the nature of welfare; the nature, causes and solutions to poverty. A comparative perspective also taken with a focus on Japan and Europe. 4 lectures. Prerequisite: Junior standing 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 (4)**

Interpretation of major social trends, movements and changes in the U.S. of the 20<sup>th</sup> Century; the causation, patterns and direction of these changes in continuum with the present; theories of change; and the special impact of technology upon social events. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 350 Social Organization of Modern Japan (4)**

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. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 351 Women in East Asia (4)**

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. 4 seminars. Prerequisite: Junior standing.

**SOC 355 Social Data Collection and Analysis (4)**

The basics of how to do social research. Includes topics on data collection techniques such as surveys, experiments, participant observation, content analysis and the use of existing data. Also includes topics on univariate, bivariate, and multivariate analysis and the use of SPSS for data analysis. 3 lectures, 1 activity. Prerequisite: STAT 221, CSC 110, and two sociology courses.

**SOC 395 Sociology of Complex Organizations (4)**

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. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 402 Crime and Delinquency (4)**

Criminal behavior and juvenile delinquency of the individual and group; special categories including the drug addict, sociopath, sex offender, organized crime, violent youth gang, and white-collar criminal; theories of causation; institutional and other approaches to rehabilitation of criminals and delinquents. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 412 Criminal Justice (4)**

Approaches to the control and rehabilitation of adult and juvenile offenders; philosophy of treatment strategies; history and analysis of probation, imprisonment, parole and preventive programs. 4 lectures. Prerequisite: SOC 402.

**SOC 413 Methods of Social Work (4)**

Skills, values and knowledge emphasized in social work. The generic perspective. Methods in social case work, group

work, community organization, and social action. Alternative models. Settings of social work practice. Discussion of case material and professional literature. Case work management. Traditional and innovative therapy techniques. 4 seminars. Prerequisite: SOC 301 or consent of instructor.

#### **SOC 421 Social Theory (4)**

Concepts and theories in sociology, anthropology and geography. Development and history of social sciences. Paradigms and sociology of knowledge. Modern and classical perspectives. Importance of theories for understanding of present social arrangements and problems. 4 lectures. Prerequisite: Two sociology courses or consent of instructor.

#### **SOC 431 Population Problems (4)**

Description and analysis of basic population processes of fertility, mortality and migration. Emphasis on understanding significance of today's growth rates for the future, especially in relationship to resources and standards of living. 4 lectures. Prerequisite: SOC 105 or consent of instructor.

#### **SOC 470 Selected Advanced Topics in Sociology (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.

## **SOCS-SOCIAL SCIENCES**

#### **SOCS 200 Special Problems for Undergraduates (1-4)**

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 400 Special Problems for Advanced Undergraduates (1-4)**

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 440 Internship (4-8)**

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 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) USC**

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. To be taken in numerical sequence. 3 lectures, 1 activity.

#### **SPAN 121, 122 Fundamentals of Spanish (4) (4)**

Review of Spanish grammar and practice in writing and oral expression within a cultural context. To be taken in numerical sequence. Students with credit in SPAN 123 cannot take SPAN 122. 3 lectures, 1 activity. Prerequisite: SPAN 103 or consent of instructor.

#### **SPAN 123 Spanish for Bilingual Speakers (4)**

Focus on the grammatical, cultural and linguistic needs of Spanish speakers in the United States who have not had formal study of the language. Emphasis on morphological, lexical and cultural understanding of the Spanish language. Designed to prepare students for upper-division Spanish coursework in language and culture. Students with credit in SPAN 122 cannot take SPAN 123. 3 lectures, 1 activity.

Prerequisite: SPAN 121, placement exam or consent of instructor.

**SPAN 124 Composition in Spanish (4)**

Practice of essay writing in Spanish with particular attention to the process of writing. Analysis of word usage, sentence development and structure, and review of grammar, spelling and accentuation. Practice in writing descriptions, narration, reports, opinions and expositions. 3 lectures, 1 activity. Prerequisite: SPAN 122 or SPAN 123.

**SPAN 204 Intensive Fundamentals of 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 205 Introduction to Spanish Linguistics (4)**

Introduction to the scientific study of language with an overview of the spectrum of both theoretical and applied linguistics including dialectology, morphology, phonetics, phonology, semantics and syntax. 3 lectures, 1 activity. Prerequisite: SPAN 124.

**SPAN 210 Introduction to Research Methods in Spanish (4)**

Methods and techniques of doing research. Critical thinking and library research. Introduction to the most important philosophical and theoretical schools of thought, as seen and applied in the Spanish-speaking world. 3 lectures, 1 activity. Prerequisite: SPAN 124.

**SPAN 233 Introduction to Hispanic Readings (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 122 or SPAN 123.

**SPAN 301 Advanced Composition in Spanish (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 124.

**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 340 Chicano/a Authors (4) GEB C.3. USCP**

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 402 Advanced Linguistics in Spanish (4)**

The more relevant aspects of Spanish linguistics today. Topics may include morphology, semantics, syntax, phonetics, phonology, theoretical linguistics, history of the language, and teaching methodology and applied linguistics in Spanish. Conducted completely in Spanish. *Class Schedule* will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: SPAN 205.

**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 410 Advanced Literature in Spanish (4)**

In-depth study of literature in Spanish. Specific genre, literary period, authorial group, or country. Chicano(a)/Latino(a) literature, Latin American literature, and Spanish literature. Conducted in Spanish. *Class Schedule* will list topic selected. Total credit limited to 8 units. 3 lectures, 1 activity. Prerequisite: SPAN 301 and SPAN 305.

**SPAN 460 Senior Project (4)**

Selection and completion of a project under faculty mentorship. Projects represent individual, well-defined problems and potential solutions that reflect pertinent scholarly activity in the field of Modern Languages and Literatures. Total credit limited to 8 units. Prerequisite: Senior status and 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 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 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 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) (Also listed as LS 310)**

Techniques for performing traditional folktales and myths in primary and secondary teaching situations. Selection, preparation and presentation of folklore for an audience; lectures on function of folk literature and mythology in modern society. 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) USCP**

Examination and clarification of cultural aspects of communication within and among 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: ENGL 215 or ENGL 218.

**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: ENGL 215 or ENGL 218.

**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 333 Quantitative Research Methods for the Behavioral Sciences (3) (Also listed as PSY 333)**

Thorough introduction to the quantitative aspects of empirical research. Using SPSS statistical software, students will learn how to choose, conduct, and interpret analyses of research data from different behavioral science disciplines. 2 lectures, 1 activity. Prerequisite: PSY 329 or SOC 333 or SPC 312, and STAT 211 or STAT 217, or consent of instructor.

**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 375 Health Communication (4)**

Communication in health contexts. Topics include interpersonal communication (e.g., health professional/patient), group and organizational communication (e.g., health-related groups), and mass communication (e.g., persuasive health campaigns). Open to all majors and valuable to laypersons who are consumers of health care, and pre-health professionals. 4 lectures. Prerequisite: SPC 201 or SPC 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 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 217 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 322 or 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 322 or 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: Senior standing; completion of SPC 312 and SPC 330. 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.

**SPC 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 18 units. Credit/No Credit grading only. Prerequisite: SPC 213.

## 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 111 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 301 Soils Practicum (2) (CR/NC)**

Supervised practice in technical, educational, professional, and operational applications related to soil science. Students participate in faculty-supervised group or individual activities that support educational and professional goals. Credit/No Credit grading only. 2 activities. Prerequisite: SS110 or SS 121.

**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 321 Soil Morphology (4)**

Identification of soil morphological and site properties. Correlation of soil physical and chemical properties with soil taxonomy and land use. Techniques of interpretations for agriculture, forest lands, range lands and urban development. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: SS 121 and SS 202.

**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 111 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 345 Soil Interpretations and Management (4)**

Calculate, graph, and interpret physical, chemical, and microbiological data from soils and reports. Apply laboratory results to field conditions. Debate efficacy of soil management and environmental practices considering social, economic and political implications of soil science. 2 lectures, 2 activities. Prerequisite: SS 121, CHEM 129, MATH 119 or MATH 141, PHYS 121 or PHYS 131, or consent of 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 and Biochemistry (4)**

Biochemical activities, ecology and environmental implications of soil organisms. Effects on the formation, characteristics, and productivity of soils. Methods of studying soil organisms. 3 lectures, 1 laboratory. Prerequisite: SS 221 and SS 345, BACT 221, CHEM 313, or consent of instructor.

**SS 423 Soil and Water Chemistry (5)**

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. Preparation of professional quality reports based on laboratory data and library research. 3 lectures, 1 laboratory, 1 activity. Prerequisite: SS 223, SS 345, CHEM 129, CHEM 212, or CHEM 216, MATH 118 or MATH 141.

**SS 431 Soil Resource Inventory (4)**

Development and production of soil surveys for interpretive purposes. Use of soil taxonomy and land classification systems to evaluate land for best management practices. 2 lectures, 2 laboratories. Prerequisite: SS 223; SS 321.

**SS 432 Soil Physics (5)**

Matter and energy in soils, with emphasis on properties and behavior of solids, water, air, and heat. Applications to agriculture, forestry, range management, engineering, and environmental sciences. Preparation of professional reports based on laboratory data and library research. 3 lectures, 1 laboratory, 1 activity. Prerequisite: SS 121, SS 345, PHYS 121 or PHYS 131, CHEM 129, MATH 118 or MATH 141, 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 212, 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 111 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 500 Individual Study in Soil Science (1–6)**

Advanced independent study planned and completed under the direction of a member of the Soil Science faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

**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. Not open to students with credit in STAT

210. 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: One class in introductory statistics other than STAT 217/STAT 218/STAT 221.

**STAT 217 Applied Statistics for the Liberal Arts (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. Not open to students with credit in STAT 218 or STAT 221 or STAT 251. 4 lectures. Prerequisite: Intermediate algebra, appropriate score on ELM.

**STAT 218 Applied Statistics for the Life Sciences (4) GEB B.2.**

Descriptive statistics, confidence intervals, parametric and nonparametric one- and two-sample tests. Applications of statistics to the life sciences. Use of a statistical computer package. Not open to students with credit in STAT 217 or STAT 221 or STAT 251. 4 lectures. Prerequisite: Intermediate algebra, appropriate score on ELM.

**STAT 221 Introduction to Probability and Statistics (5) GEB B.2.**

Data classification, descriptive statistics, elementary probability. Binomial and normal distributions. Random sampling, confidence intervals and hypothesis testing on common parameters. Introduction to regression and correlation, analysis of variance, contingency table analysis. 5 lectures. Prerequisite: Intermediate algebra, appropriate score on ELM. Not open to students with credit in STAT 217 or STAT 218.

**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 119 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 (4) GEB B.2.**

Analysis of variance and regression analysis for students not majoring in statistics or mathematics. Includes one-way classification, randomized blocks, Latin squares, factorial designs, multiple regression, diagnostics, and model comparison. 4 lectures. Prerequisite: STAT 212, STAT 217, STAT 218, or STAT 221.

**STAT 321 Probability and Statistics for Engineers and Scientists (4) GEB B.2.**

Tabular and graphical methods for data summary, numerical summary measures, probability concepts and properties, discrete and continuous probability distributions, expected values, statistics and their sampling distributions, point estimation, confidence intervals for a mean and proportion. Use of MINITAB computer package. 4 lectures. Prerequisite: MATH 142.

**STAT 322 Statistical Analysis for Engineers and Scientists (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 Design and Analysis of Experiments I (4) GEB B.2.**

Principles, construction and analysis of experimental designs. Includes completely randomized, randomized complete block, Latin squares, Graeco Latin squares, factorial, and nested designs. Fixed and random effects, expected mean squares, multiple comparisons, and analysis of covariance. 4 lectures. Prerequisite: STAT 322.

**STAT 324 Applied Regression Analysis (4) GEB B.2.**

Simple linear regression and associated special topics, multiple linear regression, indicator variables, influence diagnostics, assumption analysis, selection of "best subset", nonstandard regression models, logistic regression, nonlinear regression models. 4 lectures. Prerequisite: STAT 252 or STAT 313 or STAT 322.

**STAT 330 Statistical Uses of Computers (4)**

Techniques available to the statistician for efficient use of computers to perform statistical computations and to analyze large amounts of data. Use of SAS throughout the course. Includes data preparation, report writing, and basic statistical methods. 3 lectures, 1 activity. Prerequisite: STAT 212 or STAT 313 or STAT 252 or STAT 322.

**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 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 Design and Analysis of Experiments II (3)**

Continuation of STAT 323.  $2^k$  factorial designs,  $3^k$  factorial designs, balanced and partially balanced incomplete block designs, nested designs, split-plot designs, response surface methodology, confounding, repeated measures, and other design approaches. 3 lectures. Prerequisite: STAT 323.

**STAT 425 Probability Theory (4)**

Basic probability theory, combinatorial methods, stochastic independence, conditional and marginal probability, probability models for random phenomena, random variables, probability distributions, distributions of functions of random variables, mathematical expectation, covariance and correlation, conditional expectation. 4 lectures. Prerequisite: STAT 321, MATH 241.

**STAT 426 Estimation and Sampling Theory (4)**

Properties of statistics obtained from samples. Sample mean properties, convergence in probability, law of large numbers, and central limit theorem. Selected probability distributions. Theory of estimation. Sampling distribution of estimators. Introduction to hypothesis testing. 4 lectures. Prerequisite: STAT 425.

**STAT 427 Mathematical Statistics (4)**

The theory of hypothesis testing and its applications. Nonparametric methods. Linear statistical models including linear regression, and analysis of variance. The general linear model, full-rank models, constrained models, and tests of linear hypotheses. 4 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. Prerequisite: Junior standing.

**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: Graduate standing and intermediate algebra or equivalent.

**STAT 513 Applied Experimental Design and Regression Models (4)**

Applications of statistics for graduate students not majoring in 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. 4 lectures. Not open to students with credit in STAT 313. Prerequisite: STAT 512 or STAT 212 or STAT 218 or equivalent.

**STAT 542 Statistical Methods for Engineers (3)**

Survey of statistical methods for graduate students in engineering. Descriptive statistics. Graphical methods. Discrete and continuous random variable. 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, graduate standing.

## 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 310 Women's Theatre (3) GEB C.3.

Examination of a variety of female theatre artists from the Greeks to the present and the socio-political contexts from which they emerged. Emphasis on 20th century playwriting and evolving visions of women. Glaspell, Hansberry, Hellman, Henley, McCullers, and Shange covered. 3 lectures. Prerequisite: TH 210.

### TH 320 Black Theatre (3) GEB C.3. USCP

Examination of African-American theatre artists from the 17th–20th century, and the socio-political contexts from which they emerged. Particular emphasis on 20th century African-American plays and playwrights: Hansberry, Baldwin, Shange, Baraka, Gordone and Wilson. 3 lectures Prerequisite: TH 210.

### 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)

Techniques for teaching performance skills to children; group activities culminate in performance for elementary students. 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 440 Advanced Acting (3)

Introduction to the technical aspects of nonrealistic acting through analysis and studio performance of scenes from a Shakespearian tragedy and a 17th century French farce. 3 lectures. Prerequisite: TH 340.

### TH 460 Senior Project (4)

Selection and completion of a project under faculty supervision. Examples include: A formal report, an original play, producing a creative work, conceiving and completing a theatrical design, or a combination of these or similar assignments. Prerequisite: Consent of department head.

### 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 (2–4) (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. 1 lecture, variable practicum. 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 Management (2–4) (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. 1 lecture, variable practicum. 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 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 instructor.

### 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: BIO 101, BIO 105 or BIO 151.

### VS 223 Anatomy and Physiology of Farm Animals (4)

Comprehensive overview of the principal systems of farm animals using an integrative, systemic approach to learning the homeostasis of mammalian organisms so the information can be applied to their daily care and management. 3 lectures, 1 laboratory. Prerequisite: BIO 101, BIO 105 or BIO 151.

### 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, ASCI 144, and VS 223.

### VS 320 Zoonoses and Veterinary Public Health Concerns (4)

Public health concerns including: animal and bird diseases which may be transmitted to people; pre-harvest food safety and handling concerns; and environmental public health

hazards. 3 lectures, 1 activity. Prerequisite: BIO 101, BIO 105 or BIO 151.

**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 instructor.

**VS 438 Systemic Animal Physiology (4)**

Homeostatic relationships of organ systems. Cardiovascular, respiratory, urogenital and neuro-endocrinological functions. 3 lectures, 1 laboratory. Prerequisite: VS 223, CHEM 313 or CHEM 371.

## WS–WOMEN'S STUDIES

**WS 301 Introduction to Women's Studies (4) USCP**

Introduction to theories and research on sex differentiation, stratification, and gender role development. How historical, political, and cultural factors (e.g., race, class) have affected women's lives as well as how women have shaped their social and cultural environments. 4 lectures. Prerequisite: ENGL 114, ENGL 125 or PHIL 125 or SPC 125, and upper division standing.

**WS 316 Women as Subject and Object in Art History (4) (Also listed as ART 316)**

Exploration of the role of women in the visual arts. Women as artists, women as portrayed in art, and feminist theory as it applies to the study of the visual arts and art history. 4 lectures. Prerequisite: ART 111, ART 112 or consent of instructor.

**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 (4)**

Intensive study of a selected topic in Women's Studies (such as women and work, women and the law, women in the arts). The topic will be listed in the *Class Schedule*. Field experience may be required as appropriate. May be repeated for up to 8 units. 3 seminars and a research project. Prerequisite: WS 301 or consent of instructor and upper division standing.

**WS 411 Women in Cross-Cultural Perspective (3) GEB D.4.b.**

Similarities and differences in women's lives internationally. Cultural influences such as ethnicity, lineage, caste, class, nationality, race, and religion and how they interact in shaping women's status. 3 lectures. Prerequisite: WS 301 or consent of instructor and upper division standing.

**WS 434 American Women's History to 1870 (4) (Also listed as HIST 434)**

Female ideology and experience from the colonial period through the American Civil War. Use of a variety of sources, including women's own writing, in order to understand the

history of women as it both reflects and shapes American culture and society. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

**WS 435 American Women's History from 1870 (4) (Also listed as HIST 435) USCP**

The female past in the 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 lectures and research project. Prerequisite: Junior standing or consent of instructor.

## 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 240 Human Anatomy and Physiology (5) GEB B.1.b.**

Structural and functional organization of the skeletal, muscular, and nervous systems. Includes discussion of molecular, cellular, and organ system levels of organization. Activities emphasize histology, cadaver anatomy, physiology of muscle contraction, nerve impulse initiation and conduction, sensory and motor functions. 3 lectures, 2 activities. Prerequisite: ZOO 131 or BIO 101 or BIO 153, CHEM 111 or CHEM 127, sophomore standing.

**ZOO 241 Human Anatomy and Physiology (5) GEB B.1.b.**

Structural and functional organization of the circulatory, respiratory, digestive, excretory, and reproductive systems. Emphasizes cellular, tissue, and organ system integration of anatomical and physiological mechanisms. Laboratory includes histology, cadaver anatomy, and experiments emphasizing physiological regulation involved in the above systems. 3 lectures, 2 activities. Prerequisite: ZOO 131 or BIO 101 or BIO 151, CHEM 111 or CHEM 127, sophomore standing.

**ZOO 320 Fishery Resource Management (4)**

Methods of sampling, capturing and examination of fish populations with emphasis upon game fish. Aspects of management for maximum yield of fish for recreation purposes. Biopolitics of management. 4 lectures. Prerequisite: Course in ecology or consent of instructor.

**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 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 (1)**

Functional organization of the human muscular system, utilizing cadavers and human preparations. All major muscle groups. 1 laboratory. Prerequisite or concurrent: ZOO 240; sophomore standing.

**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 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 or BIO 351.

**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 423 Freshwater Fisheries Biology (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.

**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.

**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 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.

Directories of  
*Faculty*  
& *Staff*

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 Mechanical Engineering..... Safwat M. A. Moustafa

## COLLEGE OF

**LIBERAL ARTS** ..... Dean, Harold Hellenbrand  
 Associate Dean, Susan Currier  
 Art and Design ..... Eric B. Johnson  
 English ..... Linda H. Halisky  
 Ethnic Studies..... Robert F. Gish  
 Graphic Communication..... Harvey Robert Levenson  
 History..... Carolyn J. Stefanco  
 Humanities Program ..... Richard K. Simon  
 Journalism ..... Nishan R. Havandjian  
 Liberal Studies Program ..... Robert S. Cichowski  
 Modern Languages and Literatures ..... Bianca Rosenthal  
 Music ..... John G. Russell  
 Philosophy..... Paul S. Miklowiz  
 Political Science..... Dianne N. Long  
 Psychology and Human Development . Shawn Meghan Burn  
 Social Sciences ..... Richard A. Shaffer  
 Speech Communication ..... James R. Conway  
 Theatre and Dance ..... Alvin J. Schnupp  
 Women's Studies Program..... Carolyn J. Stefanco

**COLLEGE OF SCIENCE AND**

|  |  |
|--|--|
| <b>MATHEMATICS</b> .....                 | Dean, Philip S. Bailey<br>Associate Dean, Roxy L. Peck |
| Biological Sciences .....                | V. L. Holland  |
| Chemistry and Biochemistry .....         | Albert C. Censullo                                     |
| Mathematics .....                        | Thomas E. Hale   |
| Physical Education and Kinesiology ..... | Dwayne G. Head   |
| Physics .....                            | Richard A. Saenz                                       |
| Statistics .....                         | Robert K. Smidt  |

**UNIVERSITY CENTER FOR**

|                                |                       |
|--------------------------------|-----------------------|
| <b>TEACHER EDUCATION</b> ..... | Director, Susan Roper |
|--------------------------------|-----------------------|

**ADMINISTRATION AND FINANCE**

|   |                    |
|---|--------------------|
| Vice President for Administration and Finance .....                                     | Frank T. Lebens    |
| Associate Vice President for Administration .....                                       | Vicki Stover       |
| Associate Vice President for Finance/Director, Budget Planning and Administration ..... | Richard R. Ramirez |
| Fiscal Services, Director .....   | Robert Dignan      |
| Support Services, Director .....  | Ray Macias         |
| Facilities Planning, Director .....   | Robert E. Kitamura |
| Facility Services, Director .....   | Edward M. Naretto  |
| Human Resources and Employment Equity, Director .....                                   | Anna J. McDonald   |
| Risk Manager .....  | Joseph C. Risser   |
| University Police Chief .....   | L. Thomas Mitchell |

**STUDENT AFFAIRS**

|   |                       |
|---|-----------------------|
| Vice President for Student Affairs .....  | Juan C. González      |
| Associate Vice President, Student Affairs .....                                   | Denise M. Campbell    |
| Assistant to the Vice President for Student Affairs/Director of Advancement ..... | Polly Harrigan        |
| Associated Students, Inc., Executive Director (Interim) .....                     | Soncia R. Lilly       |
| Assessment and Testing Center, Director .....                                     | Stephan R. Lamb       |
| Campus Student Relations/ Judicial Affairs, Director .....                        | Sean A. Banks         |
| Career Services, Director .....   | Richard M. Equinoa    |
| Disability Resource Center, Director .....  | William Bailey        |
| Health and Psychological Services, Director .....                                 | Martin Bragg          |
| Housing and Residential Life, Director .....                                      | Preston C. Allen      |
| Student Academic Services, Director .....   | Armando A. Pezo-Silva |
| Student Life and Activities, Director .....                                       | Kenneth B. Barclay    |

**UNIVERSITY ADVANCEMENT**

|   |                      |
|---|----------------------|
| Vice President, University Advancement .....            | William G. Boldt     |
| Associate Vice President, University Advancement .....  | Vacant               |
| Alumni Relations, Director .....                        | Ben M. Beesley       |
| Community and Government Relations, Director .....      | Allen Haile          |
| Corporate and Foundation Relations, Director .....      | Vacant               |
| Major Gifts and The Centennial Campaign, Director ..... | Phyllis L. Momtazez  |
| Prospect Management and Research, Director .....        | Nicholas Giacona     |
| Planned Giving and Endowments, Director .....           | Michael S. McCormack |
| University Relations, Director (Interim) .....          | Brent H. Keetch      |
| Communications Director .....                           | Darlene Slack        |

**AUXILIARY ORGANIZATIONS****Associated Students, Inc.**

|   |                  |
|---|------------------|
| Executive Director (Interim) .....            | Soncia R. Lilly  |
| Associate Executive Director .....            | Rick Johnson     |
| Associate Executive Director .....            | John Stipicevich |
| Business Manager .....                        | Bill Ashby       |
| Children's Center, Director .....             | Tonya Iversen    |
| Human Resources Manager .....                 | Kacey Chun       |
| Recreational Sports, Director (Interim) ..... | Mark Harriman    |

**Foundation**

|   |                   |
|---|-------------------|
| Executive Director .....  | Alfred W. Amaral  |
| Associate Executive Director .....                                      | Robert E. Griffin |
| Campus Dining, Director .....   | Nancy Williams    |
| El Corral Bookstore, Director .....                                     | Frank Cawley      |
| Financial and Administrative Services, Director .....                   | Don Shemenske     |
| Human Resources Manager .....   | Joanne Petree     |
| Sponsored Programs Administrator .....                                  | Darrell Erickson  |
| Vocational Education Production and Academic Technology, Director ..... | 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 Present |

**FACULTY EMERITI**

(Dates indicate period of service)

**Robert E. Kennedy (1940–1979) ..... President Emeritus**

|  |   |
|--|---|
| Robert W. Adamson (1953–1983) .....        | Aeronautical and Mechanical Engineering |
| William Alexander (1958–1988) .....        | Political Science                       |
| John W. Algeo (1949–1954, 1985–1992) ..... | Animal Sciences and Industry            |
| Sabah Al-Hadad (1965–1996) .....           | Mathematics                             |
| 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                  |
| Charles T. Andrews (1972–1994) .....       | Accounting                              |
| 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                            |

- Emile E. Attala (1970–1997) ..... Computer Science  
 James H. Babb (1959–1982) ..... Graphic Communications  
 Paraschos Babos (1972–1991) ..... Biological Sciences  
 Alfred M. Bachman (1970–1994) ..... Mathematics  
 Allan S. Baillie (1978–1991) ..... Management  
 Thomas J. Baillew (1975–1993) ..... Architectural Engineering  
 Stanley L. Barr (1959–1980) ..... English  
 Katharine M. Barthels (1978–1996) Physical Education & Kinesiology  
 Ronald E. Batterson (1971–1994) ..... Architecture  
 Lawrence E. Baur, Jr. (1965–1997) ..... Accounting  
 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  
 Charles R. Black (1973–1989) ..... Mechanical Engineering  
 Jack Blackmon (1980–1996) ..... Architectural Engineering  
 Enrico P. Bongio (1948–1979) ..... Engineering Technology  
 James S. Booth (1972–1988) ..... Biological Sciences  
 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  
 Victor A. Buccola (1962–1996) ... Physical Education and Kinesiology  
 Richard A. Bucich (1963–1988) . Electronic and Electrical Engineering  
 L. LaVerne Bucy (1955–1978) ..... Animal Science  
 Charlotte B. Burns (1974–1992) ..... Ornamental Horticulture  
 Sarah E. Burroughs (1967–1997) ..... Food Science and Nutrition  
 Wallace Burt (1968–1986) ..... Accounting  
 William O. Buschman (1956–1980) ... Computer Science and Statistics  
 James M. Buxbaum (1978–1992) ..... Business Administration  
 Edward A. Cairns (1969–1991) ..... English  
 Edgar J. Carnegie (1963–1995) ..... Agricultural Engineering  
 Laurence H. Carr (1963–1980) ..... Engineering Technology  
 Lark P. Carter (1981–1994) ..... Dean, College of Agriculture  
 Arthur S. Cary (1974–1996) ..... Physics  
 Marjorie Cass (1957–1974) ..... Education  
 Everett M. Chandler (1951–1977) ..... Student Affairs  
 Daniel C. Chase (1954–1979) ..... Agricultural Management  
 Donald K. Cheek (1973–1997) ..... University Center for  
 Teacher Education  
 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, 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  
 Willi M. Coleman (1980–1997) ..... Ethnic Studies  
 Ralph C. Collins (1955–1974) ..... Education  
 E. Wesley Conner (1963–1988) ..... Ornamental Horticulture  
 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, Human Development  
 and Education  
 William D. Curtis (1961–1989) Psychology and Human Development  
 James A. D'Albro (1969–1994) ... Environmental Horticultural Science  
 Max Darnielle (1967–1989) ..... English  
 Otto C. Davidson (1968–1996) ..... Mechanical Engineering  
 Charles P. Davis (1958–1983) .... Civil and Environmental Engineering  
 Arnold M. Dean (1949–1982) ..... Soil Science  
 Warren W. DeLey (1971–1997) ..... Social Sciences  
 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  
 John W. Edmisten (1968–1994) ..... Architectural Engineering  
 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  
 Eugene D. Fabricius (1970–1995) ..... Electrical Engineering  
 Warren S. Farrell (1967–1981) ..... Agricultural Management  
 M. Dale Federer (1963–1987) .. Psychology and Human Development  
 Harry L. Fierstine (1966–1994) .. Assoc. Dean, College of Science and  
 Mathematics  
 Harry C. Finch (1962–1980) ..... Biological Sciences  
 Michael J. Fitzpatrick (1962–1992) Electronic and Electrical Engineering  
 James R. Flanagan (1959–1994) ..... Animal Sciences  
 William D. Forgeng (1980–1997) ..... Materials Engineering  
 Millard J. Fotter (1954–1976) ..... Industrial Engineering  
 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. Frieztsche (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  
 John F. Gillham (1973–1994) ..... Landscape Architecture  
 Margaret J. Glaser (1973–1992) University Center for Teacher Education  
 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  
 George G. Gowgani (1970–1997) ..... College of Agriculture  
 Rufus L. Graves, Jr. (1951–1954, 1957–1982) ..... Architecture  
 Theodore G. Graves (1947–1984) ..... Engineering Technology  
 C. Herold Gregory (1950–1970) Printing Technology and Management  
 James S. Greil (1974–1996) ..... Crop Science  
 Donald A. Grinde, Jr. (1977–1996) ..... History  
 Robin R. Grinnell (1967–1997) ..... Bioresource and Agricultural  
 Engineering  
 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  
 Adelaide T. Harmon-Elliott (1974–1996) ..... Mathematics  
 John E. Harrigan (1969–1996) ..... Architecture  
 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  
 John R. Healey (1947–1980) ..... Journalism  
 Anatol Helman (1957–1974) ..... Architecture  
 George J. Hellyer (1980–1995) ..... Agribusiness  
 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  
 Vaughan Hitchcock (1962–1997) Physical Education and Kinesiology  
 Wilbur C. Hogan (1959–1973)..... Philosophy  
 Roy B. Hollstien (1973–1988)..... Computer Science  
 Ray J. Holt (1955–1978)..... Physics  
 Walter E. Holtz (1954–1966, 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  
 William A. Howard (1980–1994)..... City and Regional Planning  
 Earl D. Huff (1970–1996)..... Political Science  
 LeRoy B. Hughes (1950–1971)..... Physical Education  
 Robert J. Huot (1963–1986)..... English  
 James R. Hutchinson (1971–1997)..... Graphic Communication  
 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  
 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, 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  
 Irvin J. Kogan (1957–1985)..... Engineering Technology  
 Joseph M. Kourakis (1970–1997)..... City and Regional Planning  
 Richard J. Krejsa (1968–1994)..... Biological Sciences  
 Royce L. Lambert (1969–1994)..... Soil Science  
 Lloyd H. Lamouria (1965–1987)..... Agricultural Engineering  
 Alexander Landyshev (1956–1972) Electronic and Electrical Engineering  
 James A. Langford (1955–1976)..... Education  
 Paul S. Lansman (1964–1979)..... Mathematics  
 Donald P. Lazere (1977–1995)..... English  
 Thomas Lee (1952–1988)..... Physical Education and  
 Recreation Administration  
 Robert B. Leonasio (1972–1992)..... Materials Engineering  
 Robert L. Levison (1969–1997)..... University Center for Teacher  
 Education  
 Vance D. Lewis (1946–1972)..... Physics and  
 School of Science and Mathematics  
 Karl D. Lilje (1981–1994)..... Engineering Technology  
 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  
 Y. Leon Maksoudian (1963–1994)..... Statistics  
 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. Mistic (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, 1969–1992)..... University Center  
 for Teacher Education  
 John H. Mott (1967–1983)..... English  
 Billy W. Mounts (1956–1977)... Health Center Physician and Surgeon  
 James L. Murphy (1981–1994)..... Industrial Technology  
 George T. Murray (1978–1992)..... Materials Engineering  
 Paul R. Neel (1962–1996)..... Dean, College of Architecture and  
 Environmental Design, Architecture  
 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  
 William E. Noble (1973–1995) ... Environmental Horticultural Science  
 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  
 Roger J. Osbaldeston (1972–1994)..... Landscape Architecture  
 Leon Osteyee (1957–1983) . Aeronautical and Mechanical Engineering  
 Philip H. Overmeyer (1958–1972)..... Business Administration  
 P. Lane Page (1963–1997)..... University Library  
 Gordon J. Paul (1969–1983)..... Accounting  
 Roland K. Pautz (1959–1995)..... Animal Science  
 Evelyn I. Pellaton (1966–1982)..... Physical Education  
 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  
 Timothy R. Plumb (1981–1997)..... Natural Resources Management  
 Clifford J. Price (1956–1974)..... Aeronautical Engineering  
 Derek Price (1957–1989)..... Mechanical Engineering  
 Charles W. Quinlan (1966–1994)..... Architecture  
 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, 1954–1977)..... Library  
 R. Howell Reece (1946–1964)..... Mechanical Engineering  
 Ronald D. Regan (1977–1991)..... Ornamental Horticulture  
 Robert G. Reynolds (1963–1996)..... Art and Design  
 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  
 Rhonda L. Riggins-Pimentel (1972–1994) ..... Biological Sciences  
 Eugene A. Rittenhouse (1949–1976) ..... Economics and Placement  
 Aryan I. Roest (1955–1990) ..... Biological Sciences  
 John A. Rogalla (1959–1992) ..... Agribusiness  
 Rolf E. Rogers (1975–1994) ..... Management  
 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, 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  
 Glenn E. Seeber (1954–1979) ..... Engineering Technology  
 Robert E. Sennett (1970–1997) ..... Civil and Environmental Engineering  
 Owen L. Servatius (1947–1983) ..... Management  
 James E. Simmons (1966–1994) ..... English  
 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  
 Nelson L. Smith III (1962–1994) ..... Industrial Technology  
 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  
 Mary L. Stallard (1965–1994) ..... Physical Education and Kinesiology  
 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  
 John S. Stuart (1964–1983) ..... Architecture  
 Daniel F. Stubbs (1963–1997) ..... Computer Science  
 Gerald J. Sullivan (1968–1996) ..... English  
 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  
 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  
 James H. W. Tseng (1969–1994) ..... Electrical Engineering  
 Pearl Turner (1951–1974) ..... Library  
 Robert G. Valpey (1972–1983) ..... Dean, School 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  
 Gustav N. Wassel (1980–1995) ..... Electrical Engineering  
 Barbara P. Weber (1966–1992) ..... Home Economics  
 Neil W. Webre (1969–1992) ..... Computer Science  
 James Webster, Jr. (1965–1987) ..... Agricultural Engineering  
 Henry J. Wessels (1970–1996) ..... Art and Design  
 John West (1968–1988) ..... School of Agriculture  
 Glenn V. Whaley (1963–1992) ..... University Library  
 Marvin J. Whalls (1968–1989) ..... Biological Sciences  
 Marylinda Wheeler (1975–1992) ..... Physical Education  
 Robert R. Wheeler (1961–1992) ..... Animal Sciences and Industry  
 Mary Lou White (1961–1979) ..... Physical Education  
 Francis F. Whiting (1946–1970) ..... Engineering Technology  
 Milo E. Whitson (1947–1974) ..... Mathematics  
 H. Glenn Wight (1952–1990) ..... Chemistry  
 J. Barron Wiley (1956–1978) ..... Education  
 Richard C. Wiley (1946–1983) Metallurgical and Welding Engineering  
 Maurice L. Wilks (1966–1983) ..... Architecture  
 Graydon J. Williams (1970–1991) ..... Music  
 David G. Williamson (1968–1996) ..... Chemistry  
 Irwin A. Willson (1958–1975) ..... Education  
 Harold O. Wilson (1936, 1946–1974) .. Administrative Vice President  
 Malcolm W. Wilson (1968–1989) ..... Academic Affairs Vice President  
 Victor F. Wolcott (1962–1983) ..... Business Administration  
 Paul Wolff (1971–1992) ..... Architecture  
 John A. Woodworth (1949–1974) ..... Mathematics  
 John Wordeman (1973–1988) ..... Graphic Communication  
 Lloyd J. Work (1958–1978) ..... Physics  
 Marshall S. Wright, Jr. (1969–1988) ..... Chemistry  
 Raymond A. Wysock (1967–1991) ..... Industrial Technology

## 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 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  
 1968–69 Robert M. Johnson, Mechanical Engineering  
 Bruce Kennelly, Chemistry  
 Alice E. Roberts, Education  
 1969–70 Donald W. Hensel, History  
 David H. Montgomery, Biological Sciences  
 Philip H. Overmeyer, Business Administration  
 Willard M. Pederson, English  
 Omer K. Whipple, Chemistry  
 1970–71 Robert L. Cleath, Speech  
 Kenneth E. Schwartz, Architecture  
 Hewitt G. Wight, Chemistry

- 1971–72 Stuart E. Larsen, Aeronautical Engineering  
Barton C. Olsen, History  
Ronald L. Ritschard, Biological Sciences  
Joseph N. Weatherby, Political Science (Social Sciences)
- 1972–73 Lyle G. McNeal, Animal Science  
Charles W. Quinlan, Architecture  
James E. Simmons, English
- 1973–74 William J. Phaklides, Engineering Technology  
Louis D. Pippin, Education  
Duane O. Seaberg, Agricultural Management
- 1974–75 Peter Jankay, Biological Sciences  
Josephine S. Stearns, Child Development  
George J. Suchand, Social Sciences
- 1975–76 James Hayes, Journalism  
William V. Johnson, Music  
Erna Knapp, Art
- 1976–77 Harry L. Fierstine, Biological Sciences  
Grant D. Venerable II, Chemistry  
Ralph M. Warten, Mathematics
- 1977–78 Timothy M. Barnes, History  
Donald P. Grant, Architecture and Environmental Design  
John C. Syer, Political Science
- 1978–79 Pat Pendse, Biological Sciences  
Dane Jones, Chemistry  
Adelaide Harmon-Elliott, Mathematics
- 1979–80 David J. Keil, Biological Sciences  
Thomas Ruehr, Soil Science  
Stephen Weinstein, Mathematics  
Michael D. Zohns, Ornamental Horticulture
- 1980–81 Sarah E. Burroughs, Food Science and Nutrition (Child  
Development and Home Economics)  
Christina Orr-Cahall, Art  
Kendrick W. Walker, Philosophy
- 1981–82 Christina A. Bailey, Chemistry  
Kenneth E. Ozawa, Physics  
Thomas L. Richards, Biological Sciences
- 1982–83 James Bermann, Agricultural Engineering  
Donald J. Koberg, Architecture  
Jack D. Wilson, Aeronautical and Mechanical Engineering
- 1983–84 Euel W. Kennedy, Mathematics  
William L. Preston, Social Sciences  
Michael J. Wenzl, English
- 1984–85 Robert S. Cichowski, Chemistry  
Harvey C. Greenwald, Mathematics  
Max E. Riedlsperger, History
- 1985–86 Edward H. Baker, Mechanical Engineering  
Sue McBride, Education  
Phillip K. Ruggles, Graphic Communication
- 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 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 & Recreation Admin.
- 1991–92 Mary E. Pedersen, Food Science and Nutrition  
John Snetsinger, History  
W. Fred Stultz, Psychology and Human Dev.
- 1992–93 Susan Duffy, Speech Communication  
Donald K. Maas, University Center for Teacher Education  
Charles M. Slem, Psychology and Human Development
- 1993–94 William T. Little, Foreign Languages and Literatures  
Steven R. Marx, English  
Raymond M. Nakamura, Physical Education & Kinesiology
- 1994–95 Ronald F. Brown, Physics  
Lee B. Burgunder, Business Administration  
Nancy Lucas, English
- 1995–96 David Keeling, Chemistry and Biochemistry  
John Russell, Music  
Richard Simon, English
- 1996–97 Leonard Davidman, University Center for Teacher Education  
Al Landwehr, English  
Robert Thompson, Agribusiness

**STAFF EMERITI***(Dates indicate period of service)*

- Jeanne C. Aceto (1980–1996) ..... College of Engineering  
Vic Allen (1951–1976) ..... Custodial Services  
Edna Anderson (1964–1986) ..... Foundation  
Clarence Armstrong, Jr. (1962–1994) ..... Facility Services  
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  
Luther A. Bertrando (1968–1994) ..... Administrative Systems  
Dorothy M. Bishop (1962–1980) ..... Education  
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  
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  
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  
Harriet M. Clendenen (1977–1994) ..... Disabled Student Services  
Mona Cochrane (1970–1995) ..... Health Services  
George W. Cockriel (1957–1977) ..... University Police  
Charles S. Coe (1980–1997) ..... College of Architecture and  
Environmental Design  
Clarice Cook (1979–1994) ..... El Corral Bookstore  
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 Dixson (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  
 Johanna K. Enos (1977–1994) ..... Health Services  
 Wilbur 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  
 Norma M. Fitton (1969–1994) ..... Psychology and Human Development  
 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  
 Gerard Gentilucci (1973–1991) ..... Plant Operations  
 E. Douglas Gerard (1952–1991) ..... Facilities Administration  
 Roy Gersten (1967–1984) ..... Associated Students, Inc.  
 John R. Gonzales (1969–1994) ..... Facility Services  
 Jean Gordon (1969–1992) ..... Library Services  
 Janice M. Gould (1960–1995) ..... Information Technology Services  
 Ruth Gran (1957–1975) ..... Health Center  
 Josephine R. Graves (1964–1982) ..... Health Center  
 Margaret Green (1960–1977) ..... Food Services  
 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  
 Bina Harrison (1972–1997) ..... El Corral Bookstore  
 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  
 Kathlene A. Henry Gorman (1982–1997) ..... Facility Services  
 Beverly J. Hensel (1972–1994) ..... College of Business  
 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 Hoover (1945–1946, 1962–1983) ..... Science and Mathematics  
 Irene R. Horvath (1950–1983) ..... Communicative Arts and Humanities  
 Lorraine H. Howard (1964–1991) ..... Psychological Services  
 Mary L. Howard (1981–1996) ..... Campus Dining  
 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  
 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  
 Joyce Kalicicki (1960–1996) ..... University Center for Teacher Education  
 Robert Kimble (1963–1992) ..... Theatre & Dance  
 Jack Kirchner (1969–1990) ..... Plant Operations  
 Edwin Koch (1961–1976) ..... Foundation Custodial  
 Catharine T. Krupp (1978–1996) ..... Library Services  
 Edna J. Kuhnes (1969–1984) ..... Library  
 Zoilo Lagunday (1977–1991) ..... Plant Operations  
 George Lancaster (1962–1979) ..... Plant Operations  
 S. Dianne Lane (1966–1996) ..... Library Services  
 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  
 Vernon Lopes (1973–1997) ..... College of Agriculture  
 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  
 Marguerite Maxwell (1977–1995) ..... Electrical Engineering  
 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  
 Mary E. Merritt (1980–1996) ..... University Advancement  
 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  
 Stella M. Nuncio (1962–1993) ..... Learning Resources and Curriculum  
 Margot R. Ochoa (1973–1996) ..... Support Services Purchasing  
 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  
 Peter K. Phillips (1968–1997) ..... Facilities Planning  
 Wilma Pierce (1971–1988) ..... Foundation  
 Shirley L. Platt (1978–1997) ..... Fiscal Services  
 Donna Porter (1962–1986) ..... Student Health Services  
 June Powell (1947–1991) ..... University Relations  
 Gerald N. Panches (1971–1992) ..... Enrollment Support Services  
 Helen Panches (1973–1992) ..... University Outreach  
 Joan M. Radabaugh (1980–1994) ..... Ornamental Horticulture  
 John Rankin (1974–1991) ..... Facility Services

Paula J. Ringer (1974–1994) ..... Enrollment Support Services  
 Jerry Roberts (1974–1992) ..... Payroll Services  
 Joan Roberts (1958–1980) ..... Foundation  
 Kerry Roberts (1967–1997) ..... El Corral Bookstore  
 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  
 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 (1957–1989) ..... Foundation Food Services  
 Tania Shwetz (1969–1992) ..... School of Liberal Arts  
 Joseph V. Silva (1977–1997) ..... Facility Services  
 Mary Smith (1960–1988) ..... Personnel and Employee Relations  
 David H. Snyder (1970–1989) ..... Enrollment Support Services/Admiss.  
 Alice Soto (1976–1997) ..... El Corral Bookstore  
 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  
 Martha J. Steward (1977–1994) ..... College of Architecture  
 and Environmental Design  
 Walter Stier (1970–1991) ..... School of Architecture and Env. Design  
 Elisa Story (1973–1994) ..... Enrollment Support Services  
 Mary Jo Summers (1962–1980) ..... Health Center  
 Frank Y. Sweeney (1963–1983) ..... Plant Operations  
 Alfred Tartaglia (1970–1991) ..... Plant Operations  
 Harold S. Tartaglia (1969–1986) ..... Plant Operations  
 Richard A. Tartaglia (1959–1989) ..... Plant Operations  
 Melvin Thomas (1960–1992) ..... Facilities Services  
 Richard P. Tibbetts (1972–1996) ..... Information Technology Services  
 Patricia K. Tupac-Yupanqui (1964–1996) ..... Social Sciences  
 Sondra M. Tuttle (1975–1991) ..... Industrial Technology  
 Donald E. Van Acker, Jr. (1976–1994) ..... Public Safety-Health/Safety  
 Larry R. Voss (1968–1992) ..... University Relations and Development  
 Gerry D. Wagner (1967–1993) ..... Dairy Science  
 Richard Walker (1979–1996) ..... Campus Dining  
 Merlin Ward (1946–1974) ..... Plant Operations  
 Thomas Ward (1969–1989) ..... Civil and Environmental Engineering  
 Charles Warren (1978–1996) ..... El Corral Bookstore  
 Edith Welter (1963–1988) ..... Business Affairs  
 Antoinette Wensley (1976–1997) ..... Fiscal Services  
 Boyd Wettlaufer (1960–1976) ..... Audiovisual  
 Gerald Whiteford (1960–1983) ..... El Corral Bookstore  
 Willard Whitmer (1967–1992) ..... Public Safety  
 Alfred T. Wilcox (1960–1975) ..... Custodial Services  
 John Wilcox (1963–1986) ..... Foundation  
 Smiley E. Wilkins (1974–1989) ..... Personnel and Employee Relations  
 Samuel Willis (1978–1992) ..... Farm Operations  
 Margaret Wilmot (1952–1979) ..... Library  
 Lawrence J. Wolf (1970–1990) ..... Financial Aid  
 Janis K. Woolpert (1982–1997) ..... College of Liberal Arts  
 Lawrence Wright (1976–1991) ..... Plant Operations  
 Patricia Wright (1978–1991) ..... Library  
 Frank H. Wyman (1956–1972) ..... Plant Operations  
 Kerry T. Yamada (1981–1994) ..... Student Affairs  
 Arthur J. Young (1958–1985) ..... Plant Operations  
 Peggy Young (1974–1992) ..... Mathematics Department  
 Davod S. Zarek (1971–1992) ..... Health and Psychological Services  
 Howard Zaugg (1966–1983) ..... Plant Operations

order to be considered for this award, an employee should be truly dedicated and loyal; exhibit expertise in job performance; demonstrate a willingness to assist others enthusiastically; take initiative in making his or her department more efficient and productive; maintain an excellent relationship with co-workers, faculty, and students; and make contributions to both the university and the community. Nominations are solicited from staff employees, faculty members, and department or division heads. Selection of the awardees is made by a committee of former recipients of the award. Outstanding Staff Employees Award recipients are listed here.

**1972–73**  
 Everette Dorrough

**1973–74**  
 Vic Allen  
 Florence Hauge  
 Lionel Middlecamp  
 Jim Neelands

**1974–75**  
 Robert Baldrige  
 John Lee  
 Gerry Wagner  
 Arthur Young

**1975–76**  
 Merriam Erickson  
 Viola Hughes  
 Mary Johnson  
 Boyd Wettlaufer

**1976–77**  
 Trudy Beck  
 Stella Nuncio

**1977–78**  
 Luther Bertrando  
 Pauline Shaffer  
 Joanna DeRosier

**1978–79**  
 Harold Miller  
 Doris Anderson  
 Richard Tartaglia  
 Frank Lebens

**1979–80**  
 Dale Lackore  
 Steven Riddell  
 Joan Roberts

**1980–81**  
 Joan Cirone  
 Farlin Halsey  
 Irene Lund

**1981–82**  
 James Neal  
 Connie Jonte  
 Frank Kassak

**1982–83**  
 Barbara Lund  
 Larry Grimes  
 Norman Johnson

**1983–84**  
 Jerald (Louie) Budoff  
 Walter Clark  
 Gail Simmons

**1984–85**  
 Alfred W. Amaral  
 Ethel Spry  
 Kathleen Lamoree

**1985–86**  
 James Landreth  
 Geraldine Montgomery  
 Vicki Stover

**1986–87**  
 Lee Brown  
 Gary Ketcham  
 French Morgan

**1987–88**  
 Lynette Klooster  
 Judi Pinkerton  
 Nancy Raetz

**1988–89**  
 Debbie Arseneau  
 June Powell  
 Jacquie Rossi

**1989–90**  
 Grace Arvidson  
 Janet Carlstrom  
 Ronald Christensen

**1990–91**  
 Barbara Ciesielski  
 Harriet Clendenen  
 Harriet Ross

**1991–92**  
 Wanda Bolt  
 Pam Parsons  
 Joe Risser

**1992–93**  
 Rosemary Bowker  
 Deborah L. Brothwell  
 Andy McMeans

**1993–94**  
 Connie Davis  
 Jim McLaughlin  
 Richard Tibbetts

**1994–95**  
 Francesca Fairbrother  
 Joyce Kalicicki  
 Lorraine Ridgeway

**1995–96**  
 George Enriquez  
 Cynthia Jelinek  
 Carol Montgomery

**1996–97**  
 Kristina Pena  
 Don Shemenske  
 Judy Swanson

**OUTSTANDING STAFF EMPLOYEE AWARD RECIPIENTS**

The 1972–73 academic year saw the inception of the Outstanding Staff Employee Award. This honor is bestowed upon permanent, full-time employees of the university, Foundation, or Associated Students, Inc. who are in at least their third year of employment at Cal Poly. In



# FACULTY AND STAFF

(Number in parentheses indicates year of appointment)

Listed as of March, 1998

- ABITIA, FRED (1969)..... Industrial Technology  
B.A., San Jose State College, 1964; M.A., 1966; Ed.D., Washington State University, 1971. Professor.
- ABSHIRE, FRANKLIN P. (1977)..... Mathematics  
B.S., Arizona State University, 1969; M.S., 1974. Professor. Registered Professional Engineer, Arizona, Ohio.
- 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)..... Electrical Engineering  
B.Sc., University of Nigeria, 1975; M.S.E., University of Michigan, 1978; Ph.D., University of Houston, 1984. 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, DONNA (1995) ..... College of Engineering  
B.A., California Polytechnic State University, San Luis Obispo, 1988. Alumni Affairs Coordinator.
- AIKEN, JAMES L. (1976)..... Health and 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, Psychological Services.
- ALLEN, PRESTON C. (1993) ..... Housing and Residential Life  
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. M.A., La Salle University, 1994. Disability Management Specialist, Disability Resource Center.
- ALPTEKIN, SEMA E. (1994)..... Industrial and Manufacturing Engineering  
B.Sc., Istanbul Technical University, Istanbul, 1973; M.Sc., 1975; Ph.D., 1981. Professor and Department Chair.
- 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. Professor.
- ANDERSON, C. ROBERT (1982)..... University Advancement  
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.
- ANDERSON, JOHN E. (1995) ..... Financial Aid  
B.S., Western Illinois University, 1968; M.S., Chicago State University, 1972; Ph.D., University of Northern Colorado, 1974. Director of Financial Aid.
- 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) ..... Global Affairs  
B.A., Humboldt State College, 1969; M.A., California State Polytechnic College, 1971; Ed.D., University of San Francisco, 1986. Coordinator.
- ANGLEY, STEPHEN F. (1982)..... Environmental Horticultural Science  
B.S., Berea College, 1969; M.S., Clemson University, 1972. Professor.
- 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 and Area Coordinator. Certified Public Accountant.
- ARNOLD, MARK (1997) ..... Journalism  
B.S., Grand Valley University, 1975; M.S., University of Missouri at Columbia, 1985; Ph.D., University of Alabama, 1996. Assistant Professor.
- ARVIZU-RODRIGUEZ, MARIA (1987)..... Student Academic Services  
B.S., California Polytechnic State University, San Luis Obispo, 1987. Academic Advisor/Summer Institute Coordinator.
- ASCOLI, RICHARD V. (1986)..... Health and Psychological 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.
- ASHBY, BILL (1991) ..... Associated Students, Incorporated  
B.A., University of California at Berkeley, 1989; M.B.A., California Polytechnic State University, San Luis Obispo, 1991. Business Manager.
- ATRE, SHARAD D. (1974) ..... Architecture  
B.Arch., University of Baroda, India, 1963; B.Arch., Washington University, 1965; M.Arch., University of Colorado, 1972. Professor. Registered Architect: California and India.
- ATWOOD, LINDA (1974) ..... Chemistry and Biochemistry  
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. Associate Professor. Registered Landscape Architect, California, and Massachusetts.
- AXELROTH, ELIE (1984)..... Health and Psychological Services  
B.A., State University of New York, Albany, 1976; M.A., University of Maryland, 1978; Psy.D., University of Denver, 1983. Psychologist.
- AYRAL-CLAUDE, ODILE M. (1976)..... Modern Languages and Literatures  
B.A., University of Wyoming, 1967; M.A., 1968; Ph.D., University of Colorado, 1975. Professor.
- BAGNALL, JAMES R. (1969) ..... Architecture  
B.A., Occidental College, 1957; M.Arch., University of California, Berkeley, 1974. Professor.
- BAILEY, CHRISTINA ANNE (1978) ..... Chemistry and Biochemistry  
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.

- BAILEY, WILLIAM (1995) ..... Student Academic Services  
B.A., University of California, Riverside, 1975; M.A., Pepperdine University, 1975. Director, Disability Resource Center.
- 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. Associate Professor.
- BALL, R. WAYNE (1969) ..... Health and Psychological 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. Physician.
- 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.
- BALTIERRA, EDWINA (1993) ..... College of Business  
B.A., California Polytechnic State University, San Luis Obispo, 1993. Academic Advisor.
- BANKS, SEAN A. (1996) ..... Student Affairs  
B.A., University of California, San Diego, 1988; M.Ed., University of San Diego, 1995; J.D., 1995. Director, Campus Student Relations/Judicial Affairs.
- BARATA, ANTONIO G. (1985) ..... Music  
B.A., Towson State University, 1977; M.M., Northwestern University, 1979; D.M.A., University of Illinois, 1985. 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 University Programs and Services  
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.
- 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. Associate Professor.
- BEARDSLEY, GEORGE L., JR. (1975) ..... Economics  
B.A., University of California, Berkeley, 1971; M.A., University of Pennsylvania, 1973; Ph.D., 1974. Professor.
- BECHTOL, JOHN, CPT. (1997) ..... Military Science  
B.A., University of Utah, 1987.
- BECKETT, JONATHON L. (1998) ..... Animal Science  
B.S., University of Wisconsin-River Falls, 1989; M.S., University of California, Davis, 1992; Ph.D., 1996. Assistant Professor.
- BEECHER, LLOYD N. (1969) ..... History  
B.A., California State College, Fullerton, 1965; M.A., 1966; Ph.D., University of Georgia, 1970. Professor.
- BEESELY, BEN M. (1993) ..... University Advancement  
B.S., California Polytechnic State University, San Luis Obispo, 1986. Director, Alumni Relations.
- 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 and Psychological Services  
B.S., University of Arizona, 1965. Pharmacist.
- BERG, LORRAINE M. (1983) ..... Health and Psychological Services  
R.N., Cuesta College, 1975; N.P. Family Planning, San Jose State University, 1982. Nurse Practitioner.
- BERGMAN, SKY (1995) ..... Art and Design  
B.S., University of South Florida, 1987; M.F.A., University of California, Santa Barbara, 1991. Assistant Professor.
- BERKEBILE, REBECCA A. (1997) ..... Health and Psychological Services  
B.S., California Polytechnic State University, San Luis Obispo, 1997; Health Education Assistant, S.A.F.E.R.
- BERMANN, JAMES (1964) ..... Bioresource and Agricultural Engineering  
B.S., California State Polytechnic College, 1959, 1961; M.S., Michigan State University, 1971; Ed.D., Brigham Young University, 1979. Professor.
- BERNER, LOUISE A. (1987) ..... Food Science and Nutrition  
B.S., Pennsylvania State University, 1979; M.S., Cornell University, 1982; Ph.D., 1986. Associate Professor.
- BERNING, LEANNE M. (1990) ..... Dairy Science  
B.S., California Polytechnic State University, San Luis Obispo, 1982; M.S., University of Wisconsin, 1985; Ph.D., University of Maryland, 1990. Associate 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) ..... Global Strategy and Law  
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, Computer Engineering  
B.S., Northwestern University, 1962; Sc.M., Ohio State University, 1971; Ph.D., 1974. Professor and Department Chair, Computer Science.
- 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. 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) ..... Global Strategy and Law  
B.A., California State University, Fresno, 1978; M.A., Sophia University, Tokyo, Japan, 1982; Ph.D., University of Oregon, 1988. Professor and Area Coordinator.
- BISHOP, URSULA (1990) ..... College of Science and Mathematics  
B.S., University of Oregon, 1982; M.A., California Polytechnic State University, 1994. Director of Access to Health Careers.
- BLATTNER, ERNEST W. (1983) ..... Mechanical Engineering  
M.S., Swiss Federal Institute, Zurich, 1953. Professor. Registered Professional Engineer, Utah.
- BLODGET, ROBERT L. (1974) ..... Psychology and Human Development  
B.A., Willamette University, 1965; Ed.D., University of Massachusetts, 1973. 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.
- BOLDT, WILLIAM (1994) ..... University Advancement  
B.S., University of Oregon, 1971; M.S., 1975; Ph.D., 1980. Vice President  
for University Advancement.
- BOMSTAD, LINDA (1994) ..... Philosophy  
B.A., University of California, Davis, 1974; M.A., 1976; Ph.D., 1982.  
Associate 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) ..... Marketing  
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.
- BOWDICH, CARY A. (1996) ..... College of Science and Mathematics  
B.S., University of New Mexico, 1977; M.S., Purdue University, 1983.  
Director of Advancement.
- 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.A., Creighton University, 1983; M.A., Idaho State, 1988. Head Coach.
- BOYNTON, WILLIAM C. (1985) ..... College of Business, Accounting  
B.S., Northeastern University, 1967; M.B.A., Michigan State University,  
1968; Ph.D., 1976. Professor and Dean. 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.
- BRADY, PAMALEE (1998) ..... Architectural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1979; M.S.,  
University of California, Berkeley, 1980; Ph.D., University of Illinois at  
Urbana-Champaign, 1998. Assistant Professor. Registered Civil Engineer,  
California.
- BRAGG, MARTIN (1995) ..... Health and Psychological Services  
B.A., Indiana University, Bloomington, 1971; M.A., University of California,  
Los Angeles, 1972; Ph.D., 1979. Director.
- BRANCART, VICTOR N. (1994) ..... Administration and Finance  
B.A., California State University, Fullerton, 1989. Associate Director, Budget  
Planning and Administration.
- BRAUN, DAVID B. (1996) ..... Electrical Engineering, Computer Engineering  
B.S., Stanford University, 1985; M.S., 1986; Ph.D. University of California,  
Santa Barbara, 1991. Assistant Professor.
- BRAUNINGER, ANDREA L. (1986) ..... Health and Psychological 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) ..... Environmental  
Horticulture Science  
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) ..... 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; M.A.,  
1994. 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.
- BROSS, KRISTINA (1997) ..... English  
B.A., Lawrence University, 1989; M.A., University of Chicago, 1990; Ph.D.,  
1997. Assistant Professor.
- BROTHWELL, DEBBIE L. (1976) ..... Administration and Finance  
B.A., California Polytechnic State University, San Luis Obispo, 1976.  
Associate Director, Budget Planning and Administration.
- 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. 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. Associate 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.
- BUCKALEW, W. CHRIS (1990) ..... Computer Science  
B.S., North Texas State University, 1980; M.S., 1984; Ph.D., 1990.  
Professor.
- BUFFA, ANTHONY J. (1970) ..... Physics  
B.S., Rensselaer Polytechnic Institute, 1964; M.S., University of Illinois,  
1966; Ph.D., 1969. Professor.
- BULLOCK, MISSI (1996) ..... Associated Students, Incorporated  
B.A., California Polytechnic State University, San Luis Obispo, 1996.  
Assistant Teacher, Children's Center.
- BURGUNDER, LEE B. (1983) ..... Global Strategy and Law  
B.A., Dartmouth College, 1977; M.B.A., Stanford University, 1981; J.D.,  
1981. Professor.
- BURN, SHAWN MEGHAN (1990) ..... Psychology and Human Development  
B.S., Virginia Commonwealth University, 1982; M.A., The Claremont  
Graduate School, 1984; Ph.D., 1988. Associate Professor and Department  
Chair.
- 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.
- BURT, CHARLES M. (1978) ..... Bioresource and 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 Technology Services B.S., California Polytechnic State University, San Luis Obispo, 1979. Director, Computing Systems and Operations and Support Applications.
- BURTON, ROBERT E. (1968) ..... History A.B., San Diego State College, 1962; M.A., University of Oregon, 1964; Ph.D., 1969. Professor.
- 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.
- CAMPBELL, DENISE (1995) ..... Student Affairs B.A., University of California, Irvine, 1977; M.A., American University, Washington, D.C. 1979. Associate Vice President for Student Affairs.
- CANO, RAÚL 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) ..... College of Engineering B.S., California State Polytechnic College, 1969; M.S., 1974; M.A., 1975. Director, MESA Engineering Program.
- CAPPELOTTI–BOWMAN, DARLENE (1988) ..... Financial Aid B.A., California State University, Humboldt, 1971; M.A., 1972. Counselor.
- 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.
- 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 Registrar.
- CASEY, GLEN R. (1982) ..... Agricultural Education and Communication 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) ..... Modern Languages and Literatures B.A., University of Chile, 1960; M.A., University of Rome, 1981; Ph.D., Wayne State University, 1986. Associate Professor.
- CAVALETTO, RICHARD A. (1990) ..... Bioresource and Agricultural Engineering B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S., University of California, Davis, 1983; Ph.D., 1987. Professor. Registered Mechanical Engineer, California.
- CAWLEY, FRANK (1996) ..... University Foundation B.A., St. Patrick's College, 1969; M.A., 1971; M.Div., St. Patrick's Seminary, 1971. Director, El Corral Bookstore.
- CENSULLO, ALBERT C. (1974) ..... Chemistry and Biochemistry B.S., Villanova University, 1969; Ph.D., Pennsylvania State University, 1975. Professor and Department Chair.
- 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. Associate 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.
- CHEDESTER, TERRI L. (1996) ..... Housing and Residential Life B.S., Oregon State University, 1986; M.S., Miami University of Ohio, 1990. Education and Training Specialist.
- CHEW, MARIE (1976) ..... Health and Psychological 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) ..... College of Liberal Arts B.S., California Polytechnic State University, San Luis Obispo, 1976; M.A., Mills College, 1978. Director of Advancement.
- CHIN, ELAINE Y. (1996) ..... University Center for Teacher Education B.A., University of Chicago, 1979; M.A.T., 1980; Ph.D., Stanford University, 1991. Associate Professor.
- 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.
- 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, KACEY (1996) ..... Associated Students, Incorporated B.A., California State University, Northridge, 1984. Human Resources Manager.
- 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 and Biochemistry B.S., Purdue University, 1964; Ph.D., Alfred University, 1968. Professor and Director, Liberal Studies.
- CIESIELSKI, BARBARA F. (1962) ..... Information Technology Services B.A., Fresno State University, 1962. Telephone Administration Coordinator, Communications Services.
- CIRONE, JOAN M. (1971) ..... Health and Psychological 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) ..... 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. 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. Associate 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.
- CLAY, GARY R. (1995) ..... Landscape Architecture B.L.A., Utah State University, 1974; M.L.A., University of Illinois, 1986; Ph.D., University of Arizona, 1996. Assistant Professor.
- CLOVER, ROBERT C. (1990) ..... Information Technology Services B.A., University of California, Berkeley, 1967; M.A., Chico State College, 1969; Ph.D., Oregon State University, 1974. Director, Integrated Media Services.
- COCHRAN, BURT, JR. (1976) ..... Health and Psychological Services M.D., University of Southern California Medical School, 1949. Certified American Board of Internal Medicine, 1957. Physician. Head, Medical Services.
- 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.
- COLOMÉ, 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.
- CONE, ALISON (1994) ..... Intercollegiate Athletics  
B.S., Washington State University, 1975; M.A., Cal State Dominguez Hills,  
1990. Sr. Associate Director of Athletics.
- CONG, BIN (1998) ..... Computer Science  
B.S., Nanjing University, China, 1982; M.S., Duke University, 1987; Ph.D.,  
University of Texas at Dallas, 1991. Associate Professor.
- CONNELY, 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.
- CONNOR, DAREN (1993) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1990.  
Program Coordinator, Craft Center and Outings.
- 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 and Interim Department  
Head.
- 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. Professor.
- COOKE, GILBERT D. (1995) ..... Architecture  
B.S. Arch., University of Cincinnati, 1962; M.Arch., Cranbrook Academy of  
Art, 1964. Department Director, Professor. NCARB, AIA, Registered  
Architect, Maryland.
- 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 and Biochemistry  
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.
- COOPER, ALLAN R. (1975) ..... Architecture  
B.A., Rice University, 1967; B.Arch., 1968; M.Arch., Cornell University,  
1971. Associate Director, 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.
- 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.
- CORDOVA, CARLOS (1994) ..... University Legal Counsel  
B.A., Loyola-Marymount University, 1980; M.A., University of California,  
Santa Barbara, 1982; J.D., University of California, Los Angeles, 1985.  
Member of the California Bar. Campus Attorney.
- 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 (1980) ..... History  
B.A., Brooklyn College (C.U.N.Y.), 1972; M.A., Ohio State University,  
1974; Ph.D., 1978. Professor.
- COTTON, JOHN (1995) ..... Architecture  
B.S., Allegheny College, 1957; B.S. Arch., California Polytechnic State  
University, San Luis Obispo, 1987; M.S. Arch., 1989. Associate Professor.
- COWELL, LENNIS (1985) ..... Intercollegiate Athletics  
B.S., California Polytechnic State University, San Luis Obispo, 1971; M.A.,  
1972. Head Coach.
- CRAIN, CARSON (1989) ..... College of Liberal Arts  
B.A., California Polytechnic State University, San Luis Obispo, 1972.  
Administrative Operations Analyst.
- CRAWFORD, TERRY (1992) ..... Intercollegiate Athletics  
B.S., University of Tennessee, 1970; M.S., 1972. Head Coach.
- CROZIER, ALEX (1992) ..... Intercollegiate Athletics  
B.S., California Polytechnic State University, San Luis Obispo, 1984. Head  
Coach.
- CROZIER, BRIDGET (1997) ..... Housing and Residential Life  
B.A., University of California, San Diego, 1994. Instructional Computing  
Assistant.
- 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, RUSSELL M. (1986) ..... Aeronautical Engineering  
B.S., California Polytechnic State University, 1977; M.Eng., 1985; Ph.D.,  
University of Southern California, 1988; E.A.E., 1982. Professor.
- CUNICO, GERALD E. (1988) ..... Industrial Technology  
B.S., University of New Mexico, 1964; M.S., 1968; Ed.D., Utah State  
University, 1973. Professor and Area Coordinator.
- 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, Disability Management, Disability Resource Center.
- CURRIER, SUSAN (1980) ..... College of Liberal Arts, English  
A.B., Mount Holyoke College, 1969; M.A., University of Massachusetts,  
1973; Ph.D., 1979. Professor and Associate Dean.
- DALTON, LINDA C. (1983) ..... Academic Affairs  
A.B., Radcliffe/Harvard, 1967; M.U.P., University of Washington, 1974;  
Ph.D., 1978. Vice Provost for Institutional Planning, and Professor. American  
Institute of Certified Planners.
- 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) ..... Marketing  
B.A., San Jose State University, 1972; M.A., 1974; Ph.D., Michigan State  
University, 1976. Professor.
- DATTA, SAMIR KUMAR (1968) ..... 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 and Psychological 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. Associate 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. Associate Professor.
- 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, HIRAM L. (1996) ..... University Library  
B.S., Missouri Valley College, 1966; M.L.S., Emporia State University, 1969;  
Ph.D., University of Michigan, 1984. Dean of Library Services.
- 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 and Psychological Services  
B.S., University of Oklahoma, 1956; C.L.T., M.T., A.S.C.P., P.H.  
Microbiologist. Clinical Laboratory Technologist.
- 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., State University of New York-Brockport, 1964; B.S.Arch, Minnesota,  
1989; M.Arch/Urban Design, University of Wisconsin, Milwaukee, 1992;  
Ph.D., Syracuse, 1970. Associate Professor.
- DeCOSTA, JEAN (1994) ..... Health and Psychological Services  
B.A., San Francisco State University, 1972; M.S., California Polytechnic  
State University, San Luis Obispo, 1986; Ph.D., Fielding Institute, 1993.  
Director, Employee Assistance Program.
- De JONG, ALVIN A. (1974) ..... Biological Sciences  
B.S., Seattle Pacific College, 1965; Ph.D., Washington State University,  
1972. Professor.
- DeKLEINE, GLORIA J. (1983) ..... Health and Psychological 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.
- DeMERS, GERALD E. (1989) ..... Physical Education and Kinesiology  
B.S., Mankato State College, 1971; M.S., 1972; Ph.D., University of Utah,  
1979. 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.
- DePIERO, FRED W., (1996) ..... Electrical Engineering, Computer Engineering  
B.S., Michigan State University, 1985; M.S., 1987; Ph.D., University of  
Tennessee, 1996. Assistant Professor.
- 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.
- DeWERTH-PALLMEYER, DWIGHT (1996) ..... Journalism  
B.A., Valparaiso University, 1979; M.A. University of Minnesota, 1981;  
Ph.D., Northwestern University, 1994. Assistant Professor.
- DIAZ, JOE V. (1976) ..... Health and Psychological Services  
B.A., University of Arizona, 1970; M.Ed., 1971; Ph.D., 1976. Psychologist.
- DICKERSON, ROBERT H. (1970) ..... Physics  
B.S., University of Arizona, 1959; M.S., 1963; Ph.D., 1964. Professor.
- 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.
- DILL, JOANNE L. (1988) ..... College of Liberal Arts  
B.A., California State University, Fullerton, 1983. Administrative Operations  
Analyst.
- 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. Assistant Director,  
Scholarship Program.
- 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) ..... Health and Psychological Services  
B.S., University of California, Los Angeles, 1958; M.S., University of  
Maryland, 1963; Ph.D., 1973. Psychologist.
- DITOMASSO, MARY (1996) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1990. Head  
Teacher, Children's Center.
- DOBSON, JOHN (1990) ..... Finance  
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.  
Assistant Director.
- DOMINGUEZ, ROJEAN Y. (1994) ..... Health and Psychological Services  
B.S., Central Michigan University, 1972; M.P.H., University of Michigan,  
1997. Health Educator.
- DOMPKE, JOANNE (1982) ..... Health and Psychological 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 and Psychological 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) ..... Agribusiness  
B.S., California State Polytechnic College, 1966; M.B.A., College of William  
and Mary, 1971. Professor.
- 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. Professor. American Institute of Certified Planners.

- 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)..... Global Strategy and Law  
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.
- DUNKLAU, KATHERINE (1997)..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1982. Project  
Manager, Facilities Planning.
- 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.
- EATOUGH, NORMAN L. (1968)..... Chemistry and Biochemistry  
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.
- ELFRINK, T. LEIGH (1980)..... Administration and Finance  
B.A., California Polytechnic State University, San Luis Obispo, 1978.  
Assistant Director, Facility Services.
- ELIJAH, MATHEWS M. (1980)..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1984; M.S.,  
1990. Supervising Custodian, Facility Services.
- ELLIS, REBECCA (1987)..... Management  
B.A., University of Wisconsin, Madison, 1969; M.A., 1971; M.S., 1981;  
Ph.D. 1984. Professor.
- ELROD, SUSAN L. (1997)..... Biological Sciences  
B.S., California State University, Chico, 1986; Ph.D., University of  
California, Davis, 1995. Assistant Professor.
- ELTZROTH, THOMAS E. (1967)..... Environmental Horticultural Science  
B.S., Ohio State University, 1965; M.S., 1966. Professor.
- ENDRES, LELAND S. (1969)..... Chemistry and Biochemistry  
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.
- 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.
- EPPRIGHT, CHRIS (1991)..... Intercollegiate Athletics  
B.S., Santa Clara University, 1990. Head Coach.
- EPSTEIN, GARY M. (1969)..... Mathematics  
B.A., University of California, Riverside, 1964; Ph.D., 1969. Professor.
- EQUINOVA, RICHARD M. (1973)..... Career Services  
B.S., California State Polytechnic College, San Luis Obispo, 1967; M.S.,  
1970. Director.
- ERICKSON, DARRELL (1990)..... University Foundation  
B.S., California Polytechnic State University, San Luis Obispo, 1973;  
M.B.A., Golden Gate University, 1993. Administrator, Sponsored Programs.
- ESCAMILLA, RAFAEL F. (1996)..... Physical Education and Kinesiology  
B.A., Linfield College, 1983; M.S., Washington State University, 1987;  
Ph.D., Auburn University, 1995. Assistant Professor.
- ESTES, ANGELA M. (1987)..... English  
B.A., Washington State University, 1973; M.A., University of Oregon, 1978;  
Ph.D., 1985. Professor.
- EVNINE, SIMON J. (1996)..... Philosophy  
B.A., Kings College, London, 1981; M.A., Bedford College, London, 1983;  
M.Phil., University College, London, 1988; Ph.D., University of California,  
Los Angeles, 1996. Assistant 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. Associate Professor.
- FARKYE, NANA Y. (1990)..... Dairy Science  
B.Sc. (Hon), University of Ghana, 1980; M.S., Utah State University, 1985;  
Ph.D., 1986. Associate Professor.
- 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, Texas, and Landscape Architect, Texas and Indiana.
- FELDMAN, JACOB (1971)..... Architectural Engineering  
B.S., University of Delaware, 1961; M.S., 1968. Professor and Interim  
Department Head. 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 and Interim Department  
Head, and Interim Director of the Dairy Products Technology Center.
- 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.
- FIEGEL, GREGG L. (1995)..... Civil and Environmental Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1990; M.S.,  
University of California, Davis, 1992; Ph.D., 1995. Assistant Professor.
- FIELD, GARY G. (1984)..... Graphic Communication  
Certificate of Printing, Melbourne School of Printing and Graphic Arts,  
Australia, 1966; Diploma in Printing Technology, Nottingham Trent  
University, England, 1970; M.B.A., University of Pittsburgh, 1975. Professor.  
Accredited Senior Imaging Scientist.
- 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.S., California State College, Bakersfield, 1986. Head Coach.
- FISH, MICHAEL (1995)..... Research and Graduate Programs  
B.A., St. Joseph's College, 1965; M.A., The Catholic University of America,  
1971. Director of Grants Development.
- FISHER, GENE L. (1991)..... Computer Science  
B.S., University of California, Irvine, 1973; Ph.D., 1985. Professor.
- FITZHENRY, WILLIAM (1997)..... English  
B.A., State University of New York at Buffalo, 1984; M.A., University of  
Colorado, 1991; Ph.D., Duke University, 1997. Assistant 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 and Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1977; M.S.,  
Texas A & M University, 1978; Ph.D., 1989. 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.
- 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. 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 and Interim Department Head.
- FOWLER, THOMAS, IV (1995)..... Architecture  
B.Arch., New York Institute of Technology/Old Westbury, 1984; M.Arch., Cornell University, 1994. Assistant Professor.
- FRANKEL, RICHARD B. (1988)..... Physics  
B.S., University of Missouri, 1961; Ph.D., University of California, Berkeley, 1965. Professor.
- FRATESSA, PAUL (1995)..... Architectural Engineering  
B.A., San Jose State College, 1961; M.S., 1965. Professor and Department Head. Registered Civil and Structural Engineer, California.
- FRAVNE, COLETTE (1992)..... Global Strategy and Law  
B.S., University of Delaware, 1980; M.B.A., University of San Diego, 1981; Ph.D., University of Washington, 1986. 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 and Psychological 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. 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 and Biochemistry  
B.A., University of Oregon, 1965; Ph.D., University of Idaho, 1970. Professor.
- FRIEDMAN, MARCIA A. (1973)..... Academic Records  
B.S., California Polytechnic State University, San Luis Obispo, 1984. Associate Registrar.
- FRISCH, SHERYL (1990)..... Art and Design  
B.A., University of California, Riverside, 1983; M.A., 1988. Slide Curator.
- FRITZ, SUZANNE (1992)..... Housing and Residential Life  
B.S., University of California, Davis, 1985; M.Ed., University of Vermont, 1987. Education and Training 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, Disability Resource Center.
- 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.B.A., University of Wisconsin, Milwaukee, 1965; M.Arch. 1973. Professor. Registered Architect: California, Wisconsin. NCARB Certificate.
- GALLAGHER, M. Gail (1978)..... Health and Psychological 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.
- GARTNER, WOLFGANG (1979)..... Intercollegiate Athletics  
B.A., University of the Pacific, 1973. Head Coach.
- 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. Coordinator, Leadership Programs.
- 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)..... Global Strategy and Law  
B.S., Indiana University, 1980; M.B.A., University of Washington, 1983; Ph.D., 1986. Professor.
- GIBERTI, BRUNO (1994)..... Architecture  
B.S. Arch., California Polytechnic State University, San Luis Obispo, 1980; M.Arch., University of California, Berkeley, 1989; Ph.D., 1994. Assistant Professor.
- GILL, JEFFERSON M. (1996)..... Political Science  
B.A., University of California, Los Angeles, 1984; M.B.A., Georgetown University, 1988; Ph.D., The American University, 1996. Assistant Professor.
- GILL, SAMANTHA J. (1997)..... Natural Resources Management, Bioresource and Agricultural Engineering  
B.S., Humboldt State University, 1991; M.S., 1993; Ph.D., University of California, Berkeley, 1997. Assistant Professor.
- GILLIS, WILLIAM T. (1987)..... Dairy Science  
B.S., Mississippi State University, 1973; M.S., 1975; Ph.D., 1979. 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. Director, Ethnic Studies; Professor of Ethnic Studies and English.
- GLASS, L. JOE (1970)..... Bioresource and 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 S. (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.
- GOEL, RAKESH K. (1997)..... Civil and Environmental Engineering  
B.Tech, Indian Institute of Technology, New Delhi, 1982; M.S., University of California, Berkeley, 1985; Ph.D., 1990. Assistant Professor. Registered Professional Engineer, California.
- GOERS, JOHN W. F. (1980)..... Chemistry and Biochemistry  
B.S., University of Illinois, 1969; Ph.D., University of California, Los Angeles, 1974. Professor.
- GOLDBERG, SAUL (1970)..... Electrical Engineering  
B.S., Fairleigh Dickinson University, 1963; M.E., University of Florida, 1964; Ph.D., 1968. Professor.
- GOLDENBERG, STUART (1970)..... Mathematics  
B.S., University of California, Los Angeles, 1965; M.S., University of California, Riverside, 1969; Ph.D., 1970. Professor.
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B.A., Texas Tech University, 1974; M.A., University of Texas, 1976; Ph.D., University of Illinois, 1981. Vice President for Student Affairs.



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B.A., University of California, Los Angeles, 1962; M.A., University of California, Santa Barbara, 1969; Ph.D., 1972. Professor.
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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.
- 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; M.S., Chapman University, 1995. Emergency Management Planner, Risk Management.
- GRANNEMAN, GARY A. (1978).....Electrical Engineering  
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. 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.
- GREIG, PATRICIA (1983).....Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1981. Program Coordinator, Children's Center.
- GRIFFIN, LANNY (1997).....Materials Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1992; Ph.D., University of California, Davis, 1996. Assistant 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, Computer Engineering  
B.A., St. Ambrose College, 1963; M.S., Illinois State University, 1968; Ph.D., Iowa State University, 1973. Professor and Director, Computer Engineering.
- 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.
- HAGEN, CHARLES T. (1980).....Philosophy  
B.A., Harvard University, 1968; M.A., University of Michigan, 1977; Ph.D., 1981. Professor.
- HAILE, ALLEN (1993).....University Advancement  
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. Director, Community and Government Relations.
- HALE, THOMAS E. (1966).....Mathematics  
B.S., Indiana State University, 1960; M.S., 1963; M.S., St. Louis University, 1967; Ph.D., 1973. Professor and Department Chair.
- HALISKY, LINDA H. (1984).....English  
B.A., Whittier College, 1968; M.A., University of California, Riverside, 1978; Ph.D., 1984. Professor and Department Chair.
- 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. Associate 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.
- HAMILTON, LYNN (1996).....Agribusiness  
B.S., Ohio State University, 1988; M.S., University of Minnesota, 1995; Ph.D., 1996. Assistant Professor.
- HAMPSEY, JOHN C. (1992).....English  
B.A., Holy Cross College, 1976; Ph.D., Boston College, 1982. Associate Professor.
- HAMPSON, BRIAN C. (1991).....Food Science and Nutrition  
B.S., University of Illinois at Champaign-Urbana, 1981; M.S., 1983; Ph.D., 1988. Associate Professor.
- HANLEY, JEREMIAH (JERRY) J. (1997).....Information Technology Services  
B.A., St. Bonaventure University, 1965; M.A., New York University, 1967. Vice Provost and Chief Information Officer.
- HANNINGS, DAVID W. (1974).....Environmental Horticultural Science  
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.
- HANSON, VICTORIA E. (1993).....University Advancement  
B.A., University of the Redlands, 1968; M.A., Colorado State University, 1975. Publications Editor.
- 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, Architect.
- HARMS, MARTIN J. (1997).....College of Architecture and Environmental Design  
B.Arch., University of Liverpool, 1962; M.S., University of Pennsylvania, 1985; Ph.D., 1991. Dean. Registered Architect, United Kingdom, North Carolina, and Pennsylvania. Member of the American Institute of Architects. RIBA.
- HARPER, LOUIS W. (1977).....Crop Science  
B.S., Montana State University, 1958; M.S., 1964. Professor. Pest Control Adviser, California.
- HARRIGAN, PAULINE W. (1983).....Student Affairs  
B.A., University of Massachusetts, 1979; M.S.W., University of Connecticut, 1981. Special Assistant to Vice President for Student Affairs/Director of Advancement.
- HARRIMAN, MARK (1992).....Associated Students, Incorporated  
B.S., Loma Linda University, 1980; M.A., California State University, Long Beach, 1982. Interim Director, Rec Sports.
- 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).....Electrical Engineering, Computer 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, PATRICIA (1984).....Student Life and Activities  
B.A., University of the State of New York, Albany, 1989; M.A., California Polytechnic State University, San Luis Obispo, 1995. Coordinator, Women's Programs and Services.
- 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 University, Beirut, Lebanon, 1970; M.A., University of Georgia, 1972; Ph.D., University of Texas at Austin, 1979. Professor and Department Head.
- HAWES, MICHAEL (1967)..... Electrical Engineering  
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. Professor.
- HAYNES, ROY (1989)..... College of Engineering  
B.S., Austin Peay State University, 1980. Academic Adviser, MESA 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.
- HEIDERSBACH, ROBERT (1986)..... Materials Engineering  
Met.E., Colorado School of Mines, 1963; M.E., University of Florida, 1968; Ph.D., 1971. Professor and Department Head. Registered Professional Engineer, California.
- HEISS, CYNTHIA J. (1997)..... Food Science and Nutrition  
B.S., Texas Christian University, 1985; M.S., Colorado State University, 1988; Ph.D., Texas Woman's University, 1993. Assistant Professor.
- HELLENBRAND, HAROLD (1998)..... College of Liberal Arts  
A.B., Harvard College, 1975; Ph.D., Stanford University, 1980. Dean.
- HENDERSON, STANLEY L. (1990)..... Dairy Science  
B.S., Iowa State University, 1973; M.S., Southern Illinois University, 1976; Ph.D., Utah State University, 1990. Professor.
- HENDRICKS, WILLIAM W. (1994)..... Natural Resources Management  
B.A., California State University, Chico, 1980; M.B.P.A., John F. Kennedy University, 1984; Ph.D., University of Utah, 1993. Assistant 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.
- HERLIHY, JACK J. (1975)..... Agribusiness  
B.S., Manhattan College, 1962; M.B.A., California Polytechnic State University, San Luis Obispo, 1978. Professor.
- HEWITT, CLARISSA (1976)..... Art and Design  
B.A., California State University, Northridge, 1971; M.F.A., Cranbrook Academy, 1976. Professor.
- HILL, PATRICK D. (1975)..... Architecture  
B.Arch., University of Illinois, 1970; M.S., 1972. Professor. Registered Architect, California.
- HILTPOLD, PAUL (1989)..... History  
B.A., University of Texas, 1974; M.A., 1976; Ph.D., 1981. Associate Professor.
- HINKLE, MARY ANN (1978)..... Financial Aid  
B.S., California State Polytechnic College, San Luis Obispo, 1969. Loan Program Manager.
- HITCHNER, LEWIS E. (1996)..... Computer Science, Computer Engineering  
A.B., Dartmouth College, 1967; M.S., University of California Berkeley, 1968; Ph.D., University of Utah, 1984. Associate 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, IRENE M. (1994)..... University Library  
B.F.A., Northeastern Illinois University, 1980; M.S., University of Illinois, Champaign, 1981. Associate Librarian.
- 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.
- HONDA, KRISTL J. (1998)..... Graphic Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., Rochester Institute of Technology, 1995. Assistant 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)..... Electrical Engineering  
B.S., California Institute of Technology, 1946; M.S., 1948; Ph.D., University of California, Los Angeles, 1966. Professor.
- HOSKINS, RALPH (1995)..... College of Liberal Arts  
B.F.A., Bowling Green State University, 1980. Director, Cal Poly Arts.
- 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-GREENE, DANIEL (1994)..... Office of the President  
B.S., University of California, Santa Cruz, 1975; M.S., University of Chicago, 1978; Ph.D., 1983. Executive Assistant to the President.
- 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, Computer Engineering  
B.S., National Taiwan University, 1959; M.S., University of California, Berkeley, 1964; Ph.D., 1969. Professor.
- HUDSON, LYNN M. (1996)..... History  
B.A., University of California, Santa Cruz, 1983; M.A., University of North Carolina, Chapel Hill, 1987; Ph.D., Indiana University, 1996. Assistant Professor.
- HUEHN, KEMPTON L. (1968)..... Mathematics  
B.S., Iowa State University, 1957; M.S., 1962; Ph.D., Colorado School of Mines, 1975. Professor.
- HUNT, ROGER M. (1979)..... Animal Science  
B.S., California State Polytechnic College, 1971; M.S., California Polytechnic State University, San Luis Obispo, 1978. 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) ..... Academic Affairs  
B.S., California Polytechnic State University, San Luis Obispo, 1988; M.A., 1996. Academic Resources Specialist.
- 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.
- IVERSEN, TONYA (1990) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.B.A., 1996. Director, Children's Center.
- 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, RALPH A. (1975) ..... Chemistry and Biochemistry  
B.A., Montclair State College, 1962; Ph.D., Cornell University, 1966. 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.
- JANOWICZ, ROSEMARIE (1993) ..... Health and Psychological Services  
B.S., California Polytechnic State University, San Luis Obispo, 1978. Clinical Laboratory Technologist.
- JASTER, EDWIN H. (1992) ..... Dairy Science  
B.S., University of Wisconsin, 1970; M.S., University of Arizona, 1977; Ph.D., 1979. Professor.
- 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/Instructor. Study Group Coordinator.
- JELINEK, CYNTHIA J. (1976) ..... College of Science and Mathematics  
B.S., Marietta College, 1967; M.A., California Polytechnic State University, 1994. 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.
- JERICICH, GEORGE D. (1976) ..... Art and Design  
B.A., San Jose State University, 1972; M.A., 1976; M.F.A., 1983. Professor.
- JIMÉNEZ-FLORES, RAFAEL (1995) ..... Dairy Science  
B.S., U. La Salle, Mexico City, 1981; M.S., Cornell University, 1984; Ph.D., University of California, Davis, 1989. Associate Professor.
- JOHNSON, EDWARD F. (1995) ..... Administration and Finance  
B.A., University of California, Santa Barbara, 1978. Energy and Utilities Manager, Facilities Planning.
- 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 and Department Chair.
- 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, MARK S. (1989) ..... Mechanical Engineering  
B.S., Stanford University, 1983; M.S., 1983; Ph.D. 1990. Associate Professor.
- JOHNSON, RICK (1987) ..... Associated Students, Incorporated  
B.A., University of the Pacific, 1978; M.A., 1982. Associate Executive Director.
- 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. Professor. Certified Professional Estimator, Licensed General Contractor.
- JOINES-NOVOTNY, LAURA E. (1989) ..... Architecture  
A.B. Vassar College, 1981; M.Arch., North Carolina State University, 1987. Associate 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 and Biochemistry  
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. Associate Professor.
- JUST, REBECCA (1987) ..... College of Business  
B.S., California Polytechnic State University, San Luis Obispo, 1994. Academic Advisor.
- KAIWI-LENTING, ANDRENE (1994) ..... Student Life and Activities  
B.A., California Polytechnic State University, San Luis Obispo, 1991. Coordinator of New Student Orientation Programs and Services.
- 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) ..... Electrical Engineering, Computer Engineering  
B.S., Massachusetts Institute of Technology, 1966; M.S., 1968; Ph.D., 1971. Professor and Department Chair, Electrical Engineering.
- KAMALU, NGOZI (1989) ..... Mechanical Engineering  
B.S., Portland State University, 1982; M.S., 1984; Ph.D., Washington State University, 1989. Assistant Professor.
- KAMINAKA, M. STEPHEN (1984) ..... Bioresource and Agricultural Engineering  
B.S., University of California, Davis, 1968; M.S., University of Hawaii, 1973; Ph.D., Cornell University, 1977. Professor.
- KANE, STEVEN (1994) ..... Student Academic Services  
B.A., California State Polytechnic University, Pomona, 1985; M.A., University of California, Los Angeles, 1989; Ph.D., 1993. Learning Disabilities Specialist, Disability Resource Center.
- KANE, RICHARD J., LTC. (1996) ..... Military Science  
B.A., University of Delaware, 1974; M.A., Clark University, 1977. Professor and Department Head.
- KANN, DAVID J. (1969) ..... English  
B.A., Brandeis University, 1964; M.A., New York University, 1966; Ph.D., Occidental College, 1971. Postdoctoral study, State University of New York, Buffalo. Professor and Director of Writing.
- KASPER, ERIC P. (1997) ..... Civil and Environmental Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., University of California, Davis, 1992; Ph.D., University of California, Berkeley, 1997. Assistant 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 and Biochemistry  
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. Associate Professor.
- KEETCH, BRENT H. (1967) ..... English, University Advancement  
B.A., Utah State University, 1965; M.A., 1966; Ph.D., University of Utah, 1971. Professor and Interim Director, University Relations.
- 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 and Biochemistry  
B.S., Polytechnic Institute of Brooklyn, 1953; Ph.D., University of Washington, 1966. Associate Professor.
- KELLEY, MEREDITH (1986) ..... Financial Aid  
B.S., University of the State of New York, Albany, 1991; M.A., California Polytechnic State University, 1994. Assistant Director, Operations.
- KELLOGG, WILLIAM C. (1983) ..... Agricultural Education and Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1976; M.S., 1983; Ph.D., Colorado State University, 1987. Professor.
- KENNEDY, EUCL 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.
- 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. Associate Professor.
- KING, RITA M. (1995) ..... University Center for Teacher Education  
B.Ed., University of Toledo, 1964; M.Ed., 1973; Ed.Spec., 1976; Ed.D., University of San Diego, 1988. Associate Professor.
- KINGSBURY, KEVIN B. (1996) ..... Chemistry and Biochemistry  
B.S., College of William and Mary, 1986; Ph.D., Stanford University, 1993. 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.
- KITTS, CHRISTOPHER L. (1995) ..... Biological Sciences  
B.Sc., University of Auckland, New Zealand, 1984; Ph.D., University of California, Santa Cruz, 1992. Assistant Professor.
- 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.
- 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.
- KRIEGER, DANIEL E. (1971) ..... History  
B.A., San Jose State College, 1965; Ph.D., University of California, Davis, 1973. Professor.
- KRISHNAN, R. (1987) ..... Marketing  
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.
- KRISTENSON, LINDA (1995) ..... College of Engineering  
B.A., University of Colorado, Boulder, 1967; M.A., 1970. Director of Development.
- KUBINSKI, A. MARK (1975) ..... Biological Sciences  
B.S., Gonzaga University, 1968; M.S., Washington State University, 1971; Ph.D., 1974. Professor.
- LaBARBERA, JEANNE (1984) ..... Associated Students, Incorporated  
B.A., University of California, Los Angeles, 1973; M.A., 1976; Ph.D., University of California, Santa Barbara, 1988. Galerie Curator.
- LABHARD, LEZLIE A. (1967) ..... Industrial Technology  
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.
- LAMB, STEPHAN R. (1979) ..... Student Academic Services  
B.A., Santa Clara University, 1973; M.A., University of the Americas, 1975. Director, Assessment and Testing Center.
- LAMBERT, WALTER M. (1975) ..... Student Life and Activities  
B.A., California State College, Long Beach, 1962. Coordinator of One-Card System and 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. 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. (1990) ..... Architecture  
B.Arch., California Polytechnic State University, San Luis Obispo, 1980; M.Arch., Columbia University, 1982. Associate Professor. Registered Architect, California.
- 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)..... Environmental Horticultural Science  
B.S., California State Polytechnic College, 1970; M.S., 1971. Professor.
- LAZERE, DONALD (1977)..... English  
B.A., Northwestern University, 1958; M.A., Columbia University, 1964;  
Ph.D., University of California, Berkeley, 1973. 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. Associate  
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.
- LEETHAM, LORLIE (1996)..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1991.  
Certified Public Accountant, Fiscal Services.
- LEONG, KINGSTON L. (1970)..... Biological Sciences  
B.S., University of Hawaii, 1963; M.S., 1966; Ph.D., Oregon State  
University, 1970. Professor.
- LEVENHAGEN, MICHAEL J. (1994)..... Global Strategy and Law  
B.A., Carroll College, 1979; M.B.A., University of Illinois at Champaign-  
Urbana, 1982; Ph.D., 1992. Associate Professor.
- LEVENSON, HARVEY ROBERT (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. Professor.
- LEVINE, ELENA (1997)..... Biological Sciences  
B.S., Yale University, 1989; Ph.D., University of California, San Francisco,  
1996. Assistant Professor.
- LEWIS, GEORGE M. (1967)..... Mathematics  
B.A., Stanford University, 1961; M.A., University of Southern California,  
1964; Ph.D., 1970. Professor.
- LI, ELDON Y. (1982)..... Management  
B.Commerce, National Chengchi University, Taiwan, 1975; M.S.B.A., Texas  
Tech University, 1978; Ph.D., 1981. Professor.
- LILLY, SONCIA R. (1995)..... Associated Students, Incorporated  
B.A., University of California, Irvine, 1986; M.A., California State University,  
San Bernardino, 1991. Interim Executive Director.
- LINDVALL, JOHN R. (1973)..... Finance  
B.A., Whitman College, 1962; M.B.A., Indiana University, 1971; Ph.D.,  
1973. Professor.
- LITTLE, WILLIAM T. (1983)..... Modern Languages and Literatures  
B.A., California State College, Northridge, 1966; M.A., Indiana University,  
1968; Ph.D., Washington University, 1973. Professor.
- LIU, MEI-LING (1994)..... Computer Science  
B.S., Iowa State University, 1972; M.S., 1974; M.S., California Polytechnic  
State University, San Luis Obispo, 1982; Ph.D., University of California,  
Santa Barbara, 1994. Assistant 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.
- 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 and Department  
Chair.
- LONG, JOSEPH (1995)..... Associated Students, Incorporated  
B.S., California State University, Long Beach, 1968; M.S., 1977. Assistant  
Director, Rec Sports.
- 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 and Communication  
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, Human Resources.
- LUND, MICHAEL W. (1984)..... Animal Science  
B.S., North Dakota State University, 1970; M.S., 1981. Professor.
- LUSCHEI, MARTIN (1969)..... English  
B.A., Nebraska Wesleyan University, 1952; MFA, University of Iowa, 1960;  
Ph.D., University of New Mexico, 1970. 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.S., St. Cloud State University, 1965; M.A., University of Iowa, 1969.  
Associate Director, Student Life and Activities, and Coordinator, Community  
Services.
- LYNN, ABRAHAM C. (1996)..... Architectural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.S.,  
University of California, Berkeley, 1991; Ph.D., 1996. Assistant Professor.
- 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) Electrical Engineering, Computer Engineering  
B.S., University of California, Los Angeles, 1976; M.S., 1978; Ph.D., Purdue  
University, 1987. Professor. Registered Professional Engineer, Colorado.
- MacCURDY, CAROL A. (1987)..... English  
B.A., Southwestern at Memphis, 1972; M.A., University of South Carolina,  
1975; Ph.D., 1980. Professor.
- MACIAS, RAY (1980)..... Administration and Finance  
B.A., University of Texas, 1965. Certified Purchasing Manager. Director,  
Support Services.
- MACNAIR, WILLIAM (1997)..... Administration and Finance  
B.Arch, Pratt Institute, Brooklyn, New York, 1968. Project Manager,  
Facilities Planning.
- 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.
- MALONEY, MARCY (1990) ..... Associated Students, Incorporated  
B.A., California Polytechnic State University, San Luis Obispo, 1976; M.A.,  
1991. Associate Director, Rec Sports.
- MARAVIGLIA, JAMES L. (1991) ..... Admissions  
B.S., Elmhurst College, 1976; M.S., Chicago State University, 1984. Director.
- MARK, WALTER R. (1972) ..... Natural Resources Management  
B.S., Utah State University, 1968; M.S., Colorado State University, 1970;  
Ph.D., 1972. Professor. Registered Professional Forester, California.
- MARLIER, JOHN F. (1981) ..... Chemistry and Biochemistry  
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.
- MARTINEZ, ERVIN R. (1996) ..... City and Regional Planning  
B.A., University of Puerto Rico, 1990; M.A., 1992. Assistant Professor.
- MARTINEZ, WILLIAM, JR. (1994) ..... Modern Languages and Literatures  
B.A., San Diego State University, 1986; M.A., 1988; Ph.D., University of  
California, Irvine, 1994. Associate Professor.
- MARTINEZ-INZUNZA, EVERARDO (1982) ..... Student Life and Activities  
B.S., California Polytechnic State University, San Luis Obispo, 1980; M.S.,  
1983. Associate Director, Student Life, and Coordinator, Multicultural  
Programs and Services.
- MARX, STEVEN R. (1988) ..... English  
A.B., Columbia University, 1963; A.M., 1966; Ph.D., Stanford University,  
1981. 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 and Biochemistry  
B.S., Whitworth College, 1969; Ph.D., Colorado State University, 1979.  
Professor.
- 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.
- McBURNEY, 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.
- McCORMACK, MICHAEL (1997) ..... University Advancement  
B.S., United States Military Academy, 1963; M.S., University of California,  
Berkeley, 1973; M.B.A., Golden Gate University, 1984. Director, Planned  
Giving and Endowments.
- 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) ..... Human Resources and Employment Equity  
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. Work Study Program Manager.
- 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.
- McINTOSH, KIRK, CPT. (1997) ..... Military Science  
B.A., Arizona State University. 1994.
- McKIBBIN, CARROLL R. (1974) ..... Political Science  
B.A., B.S., University of California, 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. Associate Professor.
- McMORRAN, WAYNE E. (1962) Electrical Engineering, Computer 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. Pest  
Control Adviser, California.
- McQUAID, PATRICIA (1996) ..... Management  
B.S., Case-Western Reserve University, 1978; M.B.A., Eastern Michigan  
University, 1982; M.S., Auburn University, 1988; Ph.D., Auburn University,  
1996. Assistant Professor.
- MEAGHER, JAMES M. (1988) ..... Mechanical Engineering  
B.S., University of Akron, 1978; M.S., 1981; Ph.D., University of California,  
Berkeley, 1987. Professor.
- MEHDIZADEH, A. MASOUD (1984) ..... Mechanical Engineering  
B.S., Abadan Institute of Technology, 1978; M.S., University of Southern  
California, 1980; Ph.D., 1984. Professor.
- MELDAL, SIGURD (1998) ..... Computer Science  
Cand. Mag., University of Oslo, Norway, 1979; Cand. Real., 1982; Dr.  
Scient., 1986. Associate Professor.
- MELLICK, TARA (1996) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1996. Head  
Teacher, Children's Center.
- 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. Classification and Employee Relations  
Manager, Human Resources.
- MELVIN, SUSAN (1992) ..... Associated Students, Incorporated  
B.A., California State University, Los Angeles, 1973. Head Teacher,  
Children's Center.
- MENDENHALL, JOHN P. (1980) ..... Art and Design  
B.F.A., University of Illinois, 1972; M.A., Stanford University, 1974.  
Professor.
- MENG, SHIEN YI (1968) ..... 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) ..... Marketing  
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.
- 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 and Department Chair.
- MILLÁN, JOSÉ A. (1998)..... Student Academic Services  
B.S., California Polytechnic State University, San Luis Obispo, 1991. Upward Bound Program Coordinator/Academic Guidance Counselor.
- MILLER, CHARLES R. (Tad) (1987) ..... Accounting  
B.A., College of Wooster, 1970; M.B.A., University of Arizona, 1980; Ph.D., 1987. Professor. Certified Public Accountant.
- MILLER, MICHAEL B. (1997)..... Art and Design  
B.A., University of California, Irvine, 1986; M.F.A., University of Southern California, 1988. Assistant Professor.
- MILLER, SANDRA D. (1984)..... Architecture  
B.A., Oberlin College, 1963; M.Arch., University of California, Berkeley, 1978. Professor. Registered Architect, California.
- MILOSEVIC, MARY (1980) ..... Career Services  
B.A., Sonoma State College, 1978; M.A., California Polytechnic State University, San Luis Obispo, 1988. Computing Consultant.
- MIMNAUGH, FAITH (1996) ..... Intercollegiate Athletics  
B.A., Loyola University of Chicago, 1986; M.S., North Carolina State, 1994. Head Coach.
- MITCHELL, L. THOMAS, III (1994)..... Administration and Finance  
B.S., San Jose State University, 1985. Chief of Police, Public Safety Services.
- MOAZZAMI, SARA (1991) ..... Civil and Environmental Engineering  
B.S., George Washington University, 1981; M.S., University of California, Berkeley, 1982; Ph.D., 1987. Associate Professor.
- MOIR, NEIL J. (1970) ..... Chemistry and Biochemistry  
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.
- MOLINE, MARK A. (1998)..... Biological Sciences  
B.A., St. Olaf College, 1987; Ph.D., University of California, Santa Barbara, 1996. Assistant Professor.
- MOMTAZEE, PHYLLIS (1997)..... University Advancement  
A.B., J.D., Washington University, St. Louis, Missouri, 1965; M.Ed., University of Missouri, St. Louis, 1993. Director, Major Gifts and The Centennial Campaign.
- MONTECALVO, JOSEPH (1983) ..... Food Science and Nutrition  
B.S., University of Rhode Island, 1972; M.S., 1975; Ph.D., 1979. Professor.
- MONTGOMERY, WAYNE R. (1982)..... University Library  
A.B., University of California, Berkeley, 1977; M.L.S., University of California, Los Angeles, 1981; M.A., California Polytechnic State University, San Luis Obispo, 1988. Senior Assistant Librarian.
- MOORE, ALISA SPARKIA (1997)..... College of Engineering  
B.A., Michigan State University, 1977; J.D., University of Michigan, 1981. Director of College Relations.
- MOORE, CAROLE M. (1980) ..... Career Services  
B.A., California Polytechnic State University, San Luis Obispo, 1976; M.A., 1978. Career Counselor/Cooperative Education Coordinator.
- 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. Associate 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.
- 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. 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.
- MOUSTAFA, AMER A. (1997) ..... City and Regional Planning  
B.Sc.Arch., University of Aleppo, Syria, 1983; M.S.Arch.S., Massachusetts Institute of Technology, 1989. Assistant Professor.
- 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 and Department Chair. 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. Professor. ARCPACS Certified Crop Scientist.
- 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. 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, 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. 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) ..... 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)..... 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, Facility Services.
- NEGRANTI, ROBERT M. (1974) ..... Health and Psychological Services  
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 (1979) ..... Associated Students, Incorporated  
B.S., California State Polytechnic College, 1971; M.A., California Polytechnic State University, San Luis Obispo, 1979. Experiential Education Director, Chumash Challenge.
- NICHOLS, GARY (1997) ..... Housing and Residential Life  
B.A., California State University, Long Beach, 1974. Housing Services Manager.
- NICOVICH, RALPH R. (1978) ..... Enrollment Support Services  
B.S., California Polytechnic State University, San Luis Obispo, 1975; M.S., 1983. System Specialist, Network Analyst and DLAN 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.
- NOEL, JAY E. (1990) ..... Agribusiness  
B.S., University of California, Davis, 1973; M.S., 1974; Ph.D., 1979. Associate Professor.
- 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.
- 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.
- OLAFSON, KATE (1992) ..... Associated Students, Incorporated  
B.A., Iowa State University, 1985; M.Ed., Loyola University, Chicago, 1992. Assistant Director, Rec Sports.
- OLVERA, NELDA (1993) ..... Student Academic Services  
B.A., California Polytechnic State University, San Luis Obispo, 1993; M.A., 1994. Academic Advisor, Instructor.
- 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.S., 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.
- 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.
- 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.
- OVERMAN, DOUG (1976) ..... Administration and Finance  
B.S. California Polytechnic State University, San Luis Obispo, 1976. Assistant Director, Facility Services.
- OZAWA, KENNETH S. (1963) ..... Physics  
B.S., John Carroll University, 1959; M.S., 1960; Ph.D., University of Kansas, 1975. Professor.
- PAL, NIRUPAM (1995) ..... Civil and Environmental Engineering  
B.S., Calcutta University, India, 1984; M.S., 1986; Ph.D., New Jersey Institute of Technology, 1993. Assistant Professor.
- 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 Area Coordinator.
- 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.
- PARKER-KENNEDY, CHRIS (1989) ..... Student Academic Services  
B.A., University of Kansas, Lawrence, 1975. Deaf Services Specialist/ Academic Advisor, Disability Resource Center.
- PATTEE, ROBERT K. (1991) ..... Administration and Finance  
B.S., Texas A&M, 1976. Associate Director, Facility Services.
- PATTERSON, WILLIAM B. (1977) ..... Mechanical Engineering  
B.S., U.S. Naval Academy, 1962; M.S., Air Force Institute of Technology, 1972. Associate Professor.
- PATTERSON, W. KEITH (1998) ..... Crop Science  
B.S., B.A., University of Arkansas, 1969; M.S., 1978; Ph.D., University of Missouri, 1985. Assistant Professor.
- PATTON, LINDA J. (1991) ..... Mathematics  
B.A., University of California, San Diego, 1985; M.A., 1987; Ph.D., 1991. Associate Professor.
- PEACH, DAVID (1987) ..... College of Business, Management  
B.Sc., Ohio University, 1962; M.B.A., 1964; D.B.A., Harvard University, 1969. Professor and Director, Graduate Management Programs.
- PECK, ROXY L. (1979) ..... College of Science and Mathematics,  
Statistics  
B.A., University of California, Riverside, 1972; Ph.D., 1979. Associate Dean and Professor.
- 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 and Psychological Services  
B.S., University of the Philippines, 1961. N.P., California Polytechnic State University, San Luis Obispo, 1976. Nurse Practitioner.
- 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.



- PETREE, JOANNE (1991)..... University Foundation  
B.S., California Polytechnic State University, San Luis Obispo, 1987. Human Resources Manager.
- 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.
- PHARAOH, CLAYTON (1986)..... Architectural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1972; M.S., 1975. Assistant Professor. Registered Civil and Structural Engineer, California.
- 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. Pest Control Adviser, California.
- 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.
- 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.
- PRICE, RITCH (1994)..... Intercollegiate Athletics  
B.S., Willamette University, Oregon, 1978; M.S., California State University, Hayward, 1987. Head Coach.
- 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.
- RABELO, LUIS C. (1998)..... Industrial and Manufacturing Engineering  
B.S., Technological University of Panama, 1983; M.S., Florida Institute of Technology, 1987; M.S., University of Missouri-Rolla, 1988; Ph.D., 1990. Professor.
- RAGSDALE, DAVID O. (1991)..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1984. Registered Environmental Health Specialist. Environmental Health and Safety Manager, Risk Management.
- RAINEY, PAUL E. (1987)..... College of Engineering, Materials 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, Industrial and Manufacturing Engineering and Materials Engineering, and Associate Dean. Registered Professional Engineer, Texas.
- RAMIREZ, RICHARD M. (1975)..... Administration and Finance  
B.B.A., New Mexico State University, 1971. Associate Vice President for Finance, and Director, Budget Planning and Administration.
- RAMSEY, JERE (1989)..... College of Business  
B.A., California State University, Fresno, 1977; M.B.A., Southern Methodist University, 1987. Director, Student Services.
- 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.
- REGIER, RONALD (1987)..... Academic Affairs  
B.A., University of Puget Sound, 1973; M.F.A., Michigan State University, 1977; M.A., University of Wisconsin, 1987. Managing Director, Performing Arts Center.
- 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.
- RICE, MARGARET (PEGGY) S. (1996)..... Chemistry and Biochemistry  
B.S., University of California, Los Angeles, 1979; Ph.D., University of Oregon, 1990. Assistant Professor.
- 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, ROBERT P., JR. (1995)..... Environmental Horticultural Science  
B.S., University of Georgia, 1973; M.S., Michigan State University, 1974; Ph.D., 1977. Associate Professor.
- 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 and Department Chair. Certified Professional Soil Scientist.
- RICE, WALTER E. (1964)..... College of Business, Economics  
B.A., San Francisco State College, 1960; M.A., 1963; M.A., Claremont Graduate School, 1970; Ph.D., 1973. Professor and Associate Dean.
- 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)..... Finance  
B.S., University of Idaho, 1968; M.S., Purdue University, 1969; Ph.D., 1976. Professor and Area Coordinator.
- RIFE, WILLIAM C. (1977)..... Chemistry and Biochemistry  
B.A., North Central College, 1956; Ph.D., University of Illinois, 1960. Professor.
- RIGLER, MARY (SAM) N. (1994)..... Chemistry and Biochemistry  
B.S., Oakland University, 1982; Ph.D., Wayne State University, 1994. Assistant 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.
- RINZLER, PAUL (1997)..... Music  
B.A., University of California at Santa Barbara, 1977; M.A., 1980; D.A., University of Northern Colorado, 1988. Assistant Professor.
- RISSE, JOSEPH C. (1982)..... Administration and Finance  
B.A., Humboldt State College, 1971; M.A., Humboldt State University, 1978. Associate in Risk Management. Risk Manager.
- 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. 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 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.
- ROGERS, ERIKA (1998) ..... Computer Science  
B.S., University of Waterloo, 1984; M.S., Georgia Institute of Technology,  
1985; Ph.D., 1992. Associate Professor.
- ROGERS, JOHN C. (1986) ..... Marketing  
B.S., Point Park College, 1970; M.B.A., Pennsylvania State University, 1972;  
Ph.D., Virginia Polytechnic Institute and State University, 1979. Professor.
- 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.
- 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.
- 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) ..... Modern Languages and Literatures  
B.S., University of Washington, 1952; M.A., 1966; Ph.D., 1970. Professor  
and Department Chair.
- RUBBA, JOHANNA E. (1995) ..... English  
B.A., Rutgers University, 1975; M.A., Southern Illinois University, 1986;  
Ph.D., University of California, San Diego, 1993. Assistant Professor.
- 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.
- RUMMELL, KATHRYN (1997) ..... English  
B.A., Centre College, 1990; M.A., University of North Carolina at Chapel  
Hill, 1992; Ph.D., 1997. Assistant 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 and Department Chair.
- 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.
- RYUJIN, DONALD H. (1989) ..... Psychology and Human Development  
B.A., Stanford University, 1968; M.A., University of Michigan, 1972; Ph.D.,  
1983. Professor.
- SABOL, JOSEPH E. (1972) ..... College of Agriculture, Agricultural Education  
and Communication  
B.S., Fresno State College, 1963; M.Ed., University of California, 1965;  
Ph.D., Colorado State University, 1976. Director of Outreach Services,  
Professor.
- SAENZ, RICHARD A. (1980) ..... Physics  
A.B., University of California, Berkeley, 1972; M.S., Cornell University,  
1975; Ph.D., 1977. Professor and Department Chair.
- 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 Universität, Berlin, 1970-71. Professor.
- SCHAFFER, CAROLE L. (1987) ..... Housing and Residential Life  
B.A., Alfred University, 1985; M.S., 1987. Assistant Director for Residential  
Life and Education.
- SCHAFFNER, ANDREW (1997) ..... Statistics  
B.S., California Polytechnic State University, San Luis Obispo, 1992; M.S.,  
University of Washington, 1994; Ph.D., 1997. Assistant Professor.
- 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.
- SCHEFTIC, CAROL (1997) ..... University Center for Teacher Education  
B.S., Carnegie-Mellon University, 1971; MAT, University of Pittsburgh, 1973;  
Ph.D., 1985. Associate Professor.
- SCHEIMAN, CHRIS J. (1996) ..... Computer Science, Computer Engineering  
B.S., Rose-Hulman Institute of Technology, 1987; M.S., University of  
California, Santa Barbara, 1990; Ph.D., 1994. Assistant Professor.
- SCHLEMER, LIZABETH T. (1993) ..... College of Engineering  
B.S., California Polytechnic State University, 1981; M.S., M.B.A., University  
of Southern California, 1986. Director of Women's Engineering Program.  
Registered Professional Engineer, California.
- SCHLICK, STEVE (1996) ..... Intercollegiate Athletics  
B.A., University of California, Santa Barbara, 1979; M.S., University of Notre  
Dame, 1994. Head Coach.
- SCHNEIDER, JEFF (1995) ..... Intercollegiate Athletics  
B.S., Virginia Tech, 1983. Head Coach.
- 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.
- SCHOONOVER, ROD W. (1994) ..... Chemistry and Biochemistry  
B.S., University of Kansas, Lawrence, 1986; M.S., University of Michigan,  
Ann Arbor, 1989; Ph.D., 1993. Assistant Professor.
- 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.
- SCHWARTZ, DEBORA (1996) ..... English  
A.B., Bryn Mawr College, 1982; M.A., Princeton University, 1986; Ph.D.,  
1994. Assistant 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 and Department Chair.
- SCRIVEN, TALMAGE ERNEST (1980) ..... Philosophy  
B.A., University of South Florida, 1976; M.A., 1977; Ph.D., University of  
Southern California, 1980. Professor.

- SCZECHOWSKI, JEFFREY G. (1994)..... Civil and Environmental Engineering  
B.S., University of Colorado, Boulder, 1985; M.S., North Carolina State  
University, 1988; Ph.D., University of Colorado, Boulder, 1994. Assistant  
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. Associate 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.
- 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 Technology Services  
B.A., University of Southern California, 1972. Director, Instructional  
Technology Development.
- SHABAN, ALI O. (1984)..... Electrical Engineering  
B.S., University of Tripoli, 1974; M.S., University of Southern California,  
1978; Ph.D., Oregon State University, 1985. Professor.
- SHAFFER, MARY K. (1980)..... Information Technology Services  
B.A., Sonoma State University, 1974. Budget Planning Specialist.
- SHAFFER, RICHARD A. (1974)..... Social Sciences  
B.A., Stanislaus State College, 1971; M.A., University of Notre Dame, 1974;  
Ph.D., 1975. Professor and Department Chair.
- 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.
- SHANK, CAROLYN B. (1974)..... Natural Resources Management  
B.S., California State Polytechnic College, 1969; M.S., 1975; Ed.D.,  
University of Utah, 1981. Professor.
- SHARP, HARRY, JR. (1975)..... Speech Communication, Academic Affairs  
A.B., College of the Pacific, 1959; M.S., Purdue University, 1961; Ph.D.,  
1967. Professor and Senior University 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)..... College of Agriculture  
B.S., University of Idaho, 1977; M.S., Purdue University, 1980; Ph.D., Utah  
State University, 1989. Associate Dean. Registered Professional Entomologist.
- SHEMENSKE, DONALD (1982)..... University Foundation  
B.A., St. Mary's College, 1979. Director, Financial and Administrative  
Services.
- SHETLER, JOY S. (1994)..... Electrical Engineering, Computer Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1979; M.S.,  
University of California, Santa Barbara, 1986; Ph.D., 1991. Associate  
Professor. Registered Professional Engineer, Texas.
- 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.
- SHIN, HAN (1996)..... Finance  
B.A., Yonsei University, Seoul, Korea, 1987; M.B.A., Ohio State University,  
1990; Ph.D., 1995.
- SHIERS, ALDEN F. (1975)..... Economics  
B.S., University of Maine, 1967; Ph.D., University of California, Santa  
Barbara, 1977. Associate Professor.
- SIEMBIEDA, WILLIAM J. (1997)..... City and Regional Planning  
B.A., University of California, Berkeley, 1965; MCRP, University of  
California, Berkeley, 1967; MPA, California State University, San Diego,  
1970; Ph.D., University of California, Los Angeles, 1990. Professor and  
Department Head. American Institute of Certified Planners.
- SILVESTRI, MICHAEL G. (1978)..... Chemistry and Biochemistry  
B.S., University of California, Santa Barbara, 1973; Ph.D., University of  
California, Santa Cruz, 1977. Professor.
- SIMEK, JAN W. (1977)..... Chemistry and Biochemistry  
B.A., Kalamazoo College, 1970; M.S., Stanford University, 1971; Ph.D.,  
1975. Professor.
- SIMON, RICHARD K. (1988)..... English  
B.A., University of Michigan, 1967; M.A., 1968; Ph.D., Stanford University,  
1977. Professor and Coordinator, Humanities Program.
- SINGER, BEVERLY R. (1997)..... Ethnic Studies  
B.A., College of Santa Fe, 1975; M.A., University of Chicago, 1977; Ph.D.,  
University of New Mexico, 1996. Assistant Professor.
- SLACK, DARLENE L. (1983)..... University Advancement  
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. Associate Athletic Director, Athletic Advancement.
- 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 and Department Chair.
- SMITH, N. BROOKS (1996)..... Health and Psychological Services  
B.S., University of California, San Francisco, School of Medicine; M.D.,  
1962. Physician.
- 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, PATRICK (1976)..... University Foundation  
B.A., University of Central Florida, 1975. Director, Visual Education  
Productions and Academic Technology.
- SMITH, TERRY L. (1980)..... Soil Science  
B.S., University of Nebraska, Lincoln, 1972; M.S., 1975; Ph.D., Iowa State  
University, 1980. Professor.
- SNETSINGER, JOHN (1970)..... Global Affairs, 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 and Interim Director of  
Global Affairs.
- SOENEN, LUC A. (1989)..... Finance  
B.S., Leuven University, Belgium, 1970; M.B.A., Cornell University, 1972;  
D.B.A., Harvard University, 1977. Professor.
- SOLOMON, KENNETH H. (1996)..... Bioresource and Agricultural Engineering  
B.S., Harvey Mudd College, 1967; M.A., Claremont Graduate School, 1976;  
M.S., Utah State University, 1979; Ph.D., 1983. Professor and Department  
Head. Registered Agricultural Engineer, California.

- 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.  
Coordinator, Educational Opportunity Program.
- 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.
- SPRADLIN, WENDY (1978)..... College of Liberal Arts  
B.A., California Polytechnic State University, San Luis Obispo, 1978; M.A.,  
1984. Coordinator, Advising Center.
- STALEY, CLINTON A. (1988)..... Computer Science, Computer Engineering  
B.A., Principia College, 1980; M.S., University of California, Santa Barbara,  
1982; Ph.D., 1987. Professor.
- STANTON, GEORGE C. (1981)..... Student Academic Services  
B.A., Lake Forest College, 1963; M.A., Cornell University, 1968; Ph.D.,  
Stanford University, 1980. Test Officer, Assessment and Testing Center.
- STEARNS, DANIEL J. (1986)..... Computer Science, Computer Engineering  
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 and Area Coordinator.
- STEFANCO, CAROLYN J. (1990)..... History  
B.A., University of Colorado, 1979; M.A., S.U.N.Y., Binghamton, 1981;  
Ph.D., Duke University, 1987. Associate Professor and Department Chair.
- STEPHENS, SCOTT L. (1997)..... Natural Resources Management  
B.S., California State University, Sacramento, 1985; M.S., 1988; Ph.D.,  
University of California, Berkeley, 1995. Assistant Professor.
- STEWART, PATRICIA A. (1971)..... Student Academic Services  
B.S., California State Polytechnic College, 1970; M.A., California  
Polytechnic State University, San Luis Obispo, 1972. Academic  
Adviser/Instructor. Coordinator, Academic Skills Center.
- STEWART, SUSAN (1983)..... Student Academic Services  
B.A., California Polytechnic State University, San Luis Obispo, 1983.  
Information Technology Consultant.
- STIPICEVICH, JOHN (1985)..... Associated Students, Incorporated  
B.A., San Jose State University, 1985. Associate Executive Director.
- 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 University Programs  
and Services  
B.A., California State University at Northridge, 1974; M.A., 1978. Director,  
Extended Education.
- STOVER, VICKI R. (1969)..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1979;  
M.B.A., 1986; D.P.A., University of LaVerne, 1996. Associate Vice  
President for Administration.
- 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. Associate  
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.
- STROHMANN, ROLLIN D. (1969)..... Bioresource and 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.
- STUBLER, CRAIG P. (1997)..... Soil Science  
B.S., California Polytechnic State University, San Luis Obispo. Technician.
- 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)..... Academic Personnel  
B.S., California Polytechnic State College, San Luis Obispo, 1970; M.S.,  
1971; additional graduate study: Brigham Young University; D.P.A.,  
University of La Verne, 1997. Associate Vice President for Academic  
Personnel.
- 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 and Department Chair.
- SULLIVAN, JASON (1993)..... Intercollegiate Athletics  
B.A., University of New Hampshire, 1993. Sports Information Director.
- SUN, CHENG (1989)..... 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. Associate 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.
- SUTLIFF, MICHAEL A. (1997)..... Physical Education and Kinesiology  
B.A., Biola University, 1986; M.S., National University, 1990; Dr. of Arts,  
Middle Tennessee State University, 1992. Assistant Professor.
- SWANSON, CLIFTON E. (1967)..... Music  
B.A., Pomona College, 1963; M.M., University of Texas, 1965; additional  
graduate study, University of California. Professor.
- SWARTZ, TERESA A. (1991)..... Marketing  
B.S., Clarion University of Pennsylvania, 1974; M.B.A., 1977; Ph.D., Ohio  
State University, 1981. Professor and Area Coordinator.
- SWEARINGEN, DON E. (1974)..... Architecture  
B.Arch., Oklahoma State University, 1968; M.Arch., University of Illinois,  
1972. Professor. Registered Architect, Arizona.
- 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.  
Coordinator, Supplemental Instruction. Academic Adviser/Instructor,  
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. Assistant Director, Counseling.
- TANDON, SHYAMA (1983)..... 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.
- TAYLOR, LINDA L. (1997) ..... Student Academic Services  
B.S., University of Connecticut, 1992; M.S., Central Missouri State, 1978.  
Information Technology Consultant.
- TENNANT, ROLANDA (1991) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1979. Head  
Teacher, Children's Center.
- 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. (1992) ..... Theatre and Dance  
M.F.A., University of California, San Diego, 1992. Assistant Professor.
- THOMA, JENNIFER A. (1981) ..... Academic Records  
B.S., California Polytechnic State University, San Luis Obispo, 1977. Systems  
Analyst.
- THOMPSON, JOHN JAY (1998) ..... Modern Languages and Literatures  
B.A., University of California, Santa Barbara, 1986; M.A., Yale University,  
1987; M.Phil., 1989; Ph.D., 1993.
- THOMPSON, RICHARD P. (1990) ..... Natural Resources Management  
B.S., Oklahoma State University, 1974; M.S., 1978; Ph.D., Texas A&M  
University, 1990. 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.
- THRASHER, SHARRON M. (1997) ..... Health and Psychological Services  
B.A., Occidental College, 1984; Ph.D., Boston University, 1993.  
Psychologist.
- TICE, RUSSELL L. (1965) ..... Chemistry and Biochemistry  
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. Associate Professor.
- 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. Associate Professor.
- 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 Catholica de  
Chile, 1961; M.A., University of Notre Dame, 1965; Ph.D., University of  
Southern California, 1974. Professor.
- TRYON, BETTE J. (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.
- TSO, JIN (1988) ..... Aeronautical Engineering  
B.S., National Taiwan University, 1971; M.S., 1973; Ph.D., Johns Hopkins  
University, 1983. Professor and Department Chair.
- TURNQUIST, CARL E. (1989) ..... Construction Management  
B.S., University of Illinois, 1963; M.B.A., University of Florida, 1966.  
Professor.
- TWAY, THOMAS G. (1996) ..... Health and Psychological Services  
B.S., California Polytechnic State University, San Luis Obispo, 1975;  
Phar. D., University of the Pacific, School of Pharmacy, 1981. Pharmacist.
- URREIZTIETA, IREL (1994) ..... Modern Languages and Literatures  
B.A., University of Arizona, 1967; M.A., 1969; M.A., 1977; Ph.D., 1980.  
Professor.
- UYTTEWAAL, KIMBERLY C. (1998) ..... Office of the President  
B.A., University of California, Berkeley, 1983; M.A., New York University,  
1988. Administrative Assistant.
- 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. Associate Professor.
- VALLE, VICTOR (1992) ..... Ethnic Studies  
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. 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 DRAANEN, NANINE A. (1996) ..... Chemistry and Biochemistry  
B.S., California Polytechnic State University, San Luis Obispo, 1985; Ph.D.,  
University of California, Berkeley, 1992. Assistant 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) ..... Modern 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.
- VILLARREAL, EMILIA E. (1994) ..... Computer Science  
B.S., Massachusetts Institute of Technology, 1980; M.S., The University of  
Texas at Austin, 1987; Ph.D., 1995.
- 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.
- WACK, PAUL (1997) ..... City and Regional Planning  
B.A., San Fernando Valley State College, 1969; M.A., California State  
University, Northridge, 1974; MPA, University of Southern California, 1976.  
Assistant Professor. American Institute of Certified Planners.
- 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. Librarian.
- WALKER, KENDRICK W. (1973) ..... Philosophy  
B.A., University of Southern California, 1965; M.A., 1969; Ph.D., 1974.  
Professor.
- WALKER, NANCY J. (1996) ..... Health and Psychological Services  
B.S., California State University, Fresno, 1982; N.P., 1986. Nurse  
Practitioner.
- WALKER, ROBERT E. (1983) ..... Bioresource and 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)..... University Center for Teacher Education  
B.S., California State Polytechnic College, 1967; M.A., California  
Polytechnic State University, San Luis Obispo, 1973. Additional graduate  
study, University of California, Santa Barbara. Special Assistant to the  
Director.
- 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, Materials Engineering  
B.S., Rensselaer Polytechnic Institute, 1973; M.S., 1976; Ph.D., 1985.  
Associate Dean, Professor, Materials Engineering.
- WALTER, VIRGINIA R. (1974)..... Environmental Horticultural Science  
B.S., Ohio State University, 1970; M.S., 1972. Professor and Interim  
Department Head.
- 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. Coordinator of Club Management.
- WARD, ROBIN (1997)..... Mathematics  
B.A., Immaculata College, 1986; M.A., Villanova University, 1989; Ph.D.,  
University of Virginia, 1997.
- WARFIELD, DAVID L. (1975).....Crop Science  
B.S., University of California, Davis, 1966; M.S., 1968; Ph.D., Washington  
State University, 1973. Professor.
- WARREN, CHRISTINA E. (1992).....Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1992. Head  
Teacher, Children's Center.
- WATERBURY, ARCHIE M. (1973).....Biological Sciences  
B.A., San Jose State College, 1966; M.A., 1968; Ph.D., University of  
California, Davis, 1972. 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).....Finance  
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.
- WEBB, KAREN (1995).....Administration and Finance  
B.A., University of California, Los Angeles, 1978. Associate Director, Budget  
Planning and Administration.
- WECKLER, PAUL R. (1997).....Bioresource and Agricultural  
Engineering, Food Science and Nutrition  
B.S., California Polytechnic State University, San Luis Obispo, 1982; M.S.,  
Utah State University, 1984; Ph.D., Oklahoma State University, 1989.  
Assistant Professor.
- WEGGEL, DAVID (1997).....Architectural Engineering  
B.S., Drexel University, 1990; M.S., 1992; Ph.D., University of Texas at  
Austin, 1997. Assistant Professor.
- WEHNER, DAVID (1994).....College of Agriculture,  
B.S., University of Notre Dame, 1972; M.S., Pennsylvania State University,  
1975; Ph.D., 1979. Associate Dean.
- WEINSTEIN, STEPHEN T. (1969).....Mathematics  
B.A., University of Southern California, 1960; M.A., 1965; Ph.D., 1972.  
Professor.
- WEISENTHAL, HOWARD (1984).....Architecture  
B. Arch., University of Florida, 1972; M. Arch., 1974. Professor. Registered  
Architect, Florida.
- WELSH, LARRY (1997).....Intercollegiate Athletics  
B.S., No. Arizona University, 1966; M.A., 1968. Head Coach.
- 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.
- WESTOVER, JAMES D. (1971).....Chemistry and Biochemistry  
B.S., Arizona State College, 1960; M.S., 1962; Ph.D., Brigham Young  
University, 1966. Professor.
- WETZEL, S. JEAN (1996).....Art and Design  
B.A., Rockford College, 1982; M.A., University of Kansas, 1985; M.Phil.,  
1986; Ph.D., 1991. Assistant 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. Pest Control Adviser, California.
- 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.
- WHITE, SUSAN (1990).....Student Academic Services  
B.A., Mills College, Oakland; M.A., Antioch University, 1982. Program  
Coordinator/Academic Advisor, Student Support Services.
- WHITEFORD, MARY A. (1982).....Academic Programs  
B.S., New York University, 1978. Academic Programs Analyst.
- WIDMANN, JAMES M. (1996).....Mechanical Engineering  
B.S., Michigan Technological University, 1987; M.S., Stanford University,  
1988; Ph.D., 1994. Assistant Professor.
- WILK, EDWARD A. (1966).....University Library  
B.A., Western Michigan University, 1965; M.S.L., 1966. Associate Librarian.
- WILLIAM, C. EPSTEIN (1998).....Construction Management  
B.S., University of Miami, 1984; M.D., University of Florida, 1988; Ph.D.,  
1995. Associate Professor. Certified General Contractor, Florida. Registered  
Professional Engineer, Florida.
- WILLIAMS, DOUGLAS W. (1983).....Bioresource and Agricultural Engineering  
B.S., Kansas State University, 1967; M.S., Iowa State University, 1969;  
D.Eng., 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.
- WILLS, MAX T. (1967).....Chemistry and Biochemistry  
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).....College of Liberal Arts  
B.A., Brigham Young University, 1971; M.A. 1980. Manager of Cal Poly  
Theatre and Program Manager of Cal Poly Arts. Administrative Operations  
Analyst.
- 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. Professor.
- WINGER, DONLEY J. (1963) ..... Electrical Engineering  
B.S., University of North Dakota, 1960; M.S., 1963; Ph.D., Iowa State  
University, 1971. Professor.
- WOLF, MARIANNE MCGARRY (1994) ..... Agribusiness  
B.A., The Johns Hopkins University, 1976; M.S., 1977; Ph.D., 1979.  
Associate 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) ..... Electrical Engineering  
B.E.E., Cornell University, 1964; M.S., University of Hawaii, 1966; Ph.D.,  
University of California, Santa Barbara, 1975. Professor.
- WONG, KINSLEY (1989) ..... Housing and Residential Life  
B.S., California Polytechnic State University, San Luis Obispo, 1990.  
Assistant Director for Housing Information Systems.
- WONG, MATTHEW (1995) ..... Housing and Residential Life  
B.S., California Polytechnic State University, San Luis Obispo, 1995.  
Instructional Computing Assistant.
- WOODY, LISA E. (1994) ..... Associated Students, Incorporated  
B.A., Stockton State College, 1992; EDM, Temple University, 1994.  
Manager of Program Services, Recreational Sports.
- WOOLARD, DONALD S. (1986) ..... Architecture  
B.Arch., (Hons.) University of Auckland, 1964; M.F.A., University of  
Hawaii, 1970; Ph.D., University of Queensland, 1980. Professor. Registered  
Architect, Australia, California.
- WOOLDRIDGE, ROBERT, CPT. (1997) ..... Military Science  
B.A., California Polytechnic State University, San Luis Obispo, 1993.
- 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 and  
Department Head.
- WU, SING-CHOU (1969) ..... Statistics  
B.A., National Taiwan University, 1959; M.S., Utah State University, 1966;  
Ph.D., Colorado State University, 1970. Professor.
- YANG, PHILIP Q. (1995) ..... Ethnic Studies  
B.A., Zhongshan University, P.R. of China, 1982; M.A., University of  
California, Los Angeles, 1988; Ph.D., 1993. Assistant Professor.
- 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) ..... 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.  
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. Registered Professional Engineer, Great Britain  
and Malaysia.
- YORK, MARILYN R. (1975) ..... Global Affairs  
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) ..... Bioresource and 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.
- ZINGG, PAUL J. (1993) ..... Academic Affairs  
B.A., Belmont Abbey College, 1968; M.A., University of Richmond, 1969;  
Ph.D., University of Georgia, 1974. Provost and Vice President for Academic  
Affairs.
- ZOHNS, MARK A. (1986) ..... Bioresource and Agricultural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S.,  
University of California, Davis, 1983; D.Engr., 1986. Professor. Registered  
Mechanical Engineer, California.
- ZOHNS, MICHAEL D. (1974) ..... Environmental Horticultural Science  
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. Member,  
American Society of Landscape Architects.

# APPENDIX

## "STUDENT-RIGHT-TO-KNOW" DISCLOSURE OF GRADUATION RATE

In 1993-94, the graduation rate for Cal Poly freshmen who entered the university in Fall 1990 was 55.9%. 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 Campus Student Relations and 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, Campus Student Relations and 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 Section 41201 of Title 5, *California Code of Regulations*. 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.

Taxpayers who claim Hope Scholarship or Lifetime Learning tax credit will be required to provide the campus with the name, address, and Taxpayer Identification Number to the campus.

## 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:

**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, including state grants, 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 and graduation 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 students with disabilities may be obtained from the Disability Resource Center, Student Services Bldg. (124), 756-1395.

Information concerning Cal Poly policies, procedures, and facilities for students and other to report criminal actions or other emergencies occurring on campus may be obtained from Public Safety, Building 74, 756-7410.

Information concerning Cal Poly annual campus security report may be obtained from the Office of Administration and Finance, Administration 116, 756-2171.

Information concerning the prevention of drug and alcohol abuse may be obtained from the Office of the Vice President for Student Affairs, Administration 209, 756-1521.

Information concerning grievance procedures for students who feel aggrieved in their relationships with the university, its policies, practices and procedures, or its faculty and staff may be obtained from the Director, Campus Student Relations and Judicial Affairs, Office of Student Affairs, Administration 206, 756-2794.

The federal Military Selective Service Act (the "Act") requires most males residing in the United States to present themselves for registration with the Selective Service System within thirty days of their eighteenth birthday. Most males between the ages of 18 and 25 must be registered. Males born after December 31, 1959 may be required to submit a statement of compliance with the Act and regulations in order to receive any grant, loan, or work assistance under specified provisions of existing federal law. In California, students subject to the Act who fail to register are also ineligible to receive any need-based student grants funded by the state or a public postsecondary institution.

Selective Service registration forms are available at any U.S. Post Office, and many high schools have a staff member or teacher appointed as a Selective Service Registrar. Applicants for financial aid can also request that information provided on the Free Application for Federal Student Aid (FAFSA) be used to register them with the Selective Service. Information on the Selective Service System is available and the registration process may be initiated online at <http://www.sss.gov>.

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

The 23 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 1996/97 (including capital outlay funding in the amount of \$153,000,000) is \$2,037,557,000. However, the total cost of education for CSU is \$2,631,016,000, which must provide support for a projected 258,000 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 \$10,198. Of this amount, the average student fee support per FTE is \$2,263. (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 \$2,263,

depending on whether they are part-time, full-time, resident, or nonresident students.)

| 1995/96                      | Amount          | Average Cost Per FTE Student | Percentage |
|------------------------------|-----------------|------------------------------|------------|
| Total Cost of Education..... | \$2,631,016,000 | \$10,198                     | 100.0      |
| -State Appropriation* .....  | 1,884,557,000   | 7,305                        | 71.6       |
| -Student Fee Support .....   | 583,886,000     | 2,263                        | 22.2       |
| -Support from Other Sources. | 162,593,000     | 630                          | 6.2        |

Detail:

|   |                 |
|---|-----------------|
| Total State Support (including capital outlay)  | \$2,037,557,000 |
| Total Support (including State General Fund appropriation, student fee support, and support from other sources) | \$2,631,016,000 |

\* Includes a supplemental appropriation of \$2.5 million for the Economic Improvement Initiative; does not include a \$5.1 million retirement reduction due to rate decreases during 1997/98; does not include \$6.5 million reappropriated for lease bond payments.

\*\* Based on final campus budget submissions subsequent to the passage of the Budget Act. Totals may differ slightly from other CSU published amounts.

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# Index

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- A**bsence, leaves of, 82.  
 Academic calendar, 19.  
 Academic freedom, statement on, 28.  
 Academic obligations, 85.  
 Academic placement, 69.  
 Academic probation or disqualification, 86.  
     graduate students, 92.  
 Academic programs, 20.  
 Academic renewal, 85.  
 Academic requirements and policies, 69.  
     graduate students, 92.  
 Academic residence requirements, 74.  
 Academic Skills Center, 48.  
 Academic standards, 85.  
 Academic year, 18.  
 Accelerated "4+1" engineering program, 179.  
 Accounting, 162.  
     (BUS) courses, 338.  
 Accreditation, 26.  
 Activity classes, 18.  
 Add/drop, 82.  
 Administration, university, 487.  
 Administrative-academic probation or disqualification, 86.  
 Administrative services credential, 297.  
 Admissions, 53.  
     early, regular decision, 54.  
     graduate, 89.  
     undergraduate requirements, 53–58.  
 Advanced placement, 71.  
 Advancement to candidacy, 92.  
 Aeronautical engineering, 183.  
     AERO courses, 302.  
     M.S. program, 187.  
 Aeronautics concentration, 184, 186.  
 Agribusiness, 103.  
     AGB courses, 306.  
     minor, 105.  
     specialization, MBA, 171.  
 Agribusiness finance and appraisal concentration, 103, 105.  
 Agribusiness marketing concentration, 103, 105.  
 Agribusiness policy concentration, 103, 105.  
 Agricultural communication minor, 99, 222.  
 Agricultural education, and communication, 106.  
     AGED courses, 310.  
 Agricultural engineering, bioresource and, 111.  
     (BRAE) courses, 332.  
 Agricultural engineering technology specialization, 101.  
 Agricultural enterprise projects, 98.  
 Agricultural mechanics concentration, 106, 108.  
 Agricultural products and processing concentration, 106, 108.  
 Agricultural resources management concentration, 106, 108.  
 Agricultural science, 106.  
 Agricultural supplies and services concentration, 106, 108.  
 Agricultural systems management, 111, 114.  
     (BRAE) courses, 332.  
 Agricultural teaching credentials, 106.  
 Agriculture, College of, 96.  
     AG courses, 305.  
     M.S. program, 100.  
     Alcohol on campus, 520.  
     Alumni Association, 34.  
     Animal production concentration, 106, 108.  
     Animal science, 109.  
         ASCI courses, 324.  
     Anatomy-physiology concentration, 267, 269.  
     Anthropology, 256.  
         ANT courses, 312.  
     Anthropology/geography minor, 257.  
     Application filing period, 53.  
     Application for graduate admission, 89.  
     Applied social psychology concentration, 249, 253.  
     Architectural engineering, 143.  
         ARCE courses, 313.  
     Architectural management track, 147, 171.  
     Architecture, 145.  
         ARCH courses, 315.  
         M.S. program, 148.  
         off-campus programs, 40, 145.  
     Architecture and Environmental Design, College of, 141.  
     Art, courses, 320.  
         minor, 225.  
     Art and design, 223.  
     ASI Children's Center, 45.  
     Assessment and Testing Center, 49.  
     Associated Students, Inc. (ASI), 43.  
     Astronautics concentration, 186.  
     Astronomy, 287.  
         ASTR courses, 327.  
     Athletics, eligibility, 87.  
         intercollegiate, 51.  
     Attendance, 81.  
     Auditing of courses, 84.  
     Average annual cost of education, 521.
- B**achelor's degree, definition, 17.  
     requirements, 74.  
 Bacteriology, 267.  
     BACT courses, 327.  
 Bilingual crosscultural language and academic development (BCLAD), 295.  
 Biochemical engineering specialization, 180.  
 Biochemistry, 274.  
 Biological sciences, 267.  
     M.S. program, 273.  
 Biology, concentration, 267.  
     BIO courses, 328.  
 Bioresource and agricultural engineering, 111.  
 Biotechnology minor, 266.  
 Botany, 267.  
     BOT courses, 331.  
 Business administration, 161.  
     master's program, 170.  
 Business and industrial economics concentration, 166.  
 Business, College of, 158.  
     advising center, 160.  
     BUS courses, 338.  
     Business minor, 168.

- Calendar, academic, 19.  
 California State University, 30.  
 Campus dining, 35.  
 Campus map, inside back cover.  
 Campus student relations and judicial affairs, 28, 46.  
 CAPTURE, 81.  
 Career Services, 46.  
 Catalog, choice of, 74.  
     guide to, 17.  
 Center for Teacher Education, 291.  
 Change of major, 75.  
 Change of rules and policies, 2.  
 Cheating and plagiarism, 29.  
 Chemistry, 274.  
     CHEM courses, 349.  
 Child development, 249.  
     CD courses, 343.  
 Children's Center, 45.  
 Chiropractic, 36.  
 City and regional planning, 149.  
     CRP courses, 356.  
     M.C.R.P., 151.  
     M.C.R.P./M.S. Engineering, 152, 182.  
 Civil engineering, 187.  
     CE courses, 345.  
 Civil and environmental engineering, M.S., 192.  
 CLAD, 295.  
 Class attendance, 81.  
 Classification, student, 71.  
 Clinical laboratory technology, 37.  
 Clubs and organizations of ASI, 43.  
 College level examination program (CLEP), 73.  
 Commencement, 76.  
 Commercial/corporate health promotion concentration, 280.  
 Commercial/tourism management concentration, 136.  
 Community service programs, 49.  
 Commuter services, 34.  
 Comprehensive examination, 93.  
 Computer engineering, 194.  
     CPE courses, 355.  
 Computer facilities, 34.  
 Computer science, 197.  
     CSC courses, 362.  
     minor, 198.  
     M.S. program, 200.  
 Concentrations, definition, 18.  
     list of, 20.  
 Concurrent enrollment, 35.  
 Conduct and discipline, 87.  
 Conferences, 35.  
 Conservation, 267.  
 Construction management, 153.  
     CM courses, 353.  
     minor, 154.  
 Continuing education in agriculture, 35.  
 Cooperative education (CoOp), 46.  
 Counseling and family psychology concentration, 249.  
 Counseling and guidance specialization, 292.  
 Counseling (psychological) services, 47.  
 Course numbering system, 18.  
 Courses, definition, 17.  
     list by prefix, 300.  
 Craft Center, 44.  
 Credentials, 295.  
 Credential track, liberal studies, 239.  
 Credit by examination, 73.  
 Credit cards, use of, 61.  
 Credit for, community college courses, 70.  
     military service, 73.  
     noncollegiate instruction, 73.  
 Credit/no credit grading, 83.  
 Criminal justice concentration, 256.  
 Crop science, 117.  
     CRSC courses, 359.  
     minor, 121.  
 Crosscultural language and academic development (CLAD), 295.  
 Cross-cultural studies concentration, 256.  
 CSU, The, 30.  
 Culminating experience, 93.  
 Cultural pluralism requirement, U.S., 81.  
 Curriculum substitution, 75.  
 Curriculum and instruction specialization, 293.  
**D**airy products technology specialization, 101.  
 Dairy science, 122.  
     DSCI courses, 368.  
 Dance, minor, 262.  
     DANC courses, 367.  
 Dean's list, 75.  
 Debts owed to the university, 61.  
 Definitions, 17.  
 Degree, definitions, 17.  
     programs, 20.  
     requirements, 74.  
 Dentistry, 36.  
 Design reproduction technology concentration, 231.  
 Determination of residence for nonresident tuition purposes, 57.  
 Developmental psychology concentration, 249.  
 Dining, campus, 35.  
 Diplomas, 74.  
 Disability Resource Center, 49.  
 Disciplinary procedures, 87.  
 Discrimination, statement on racism and, 28.  
 Dismissal, 86.  
 Disqualification, 86.  
 Distinguished teachers, 491.  
 Double majors, 75.  
 Dropping a class, 82.  
**E**cology and systematic biology, 267.  
 Economics, 165.  
     ECON courses, 370.  
     minor, 168.  
 Education, University Center for Teacher, 290.  
     EDUC courses, 373.  
     M.A. program, 292.  
     teaching credentials, 295.  
 Educational administration specialization, 293.  
 Educational leave, 82.  
 Educational Opportunity Program, 49.  
 Electrical engineering, 201.  
     EE courses, 377.  
     honors program, joint BS/MS, 202.  
     M.S. program, 204.  
 Electronic publishing and imaging concentration, 231.

- Electronics, 201.  
 Electronics concentration, 284.  
 Electro-optics concentration, 284.  
 Elementary education, 295.  
 Eligibility for, athletics, 87.  
   student activities, 87.  
 ELM (Entry level mathematics), 69.  
 Employment, students, 46.  
 Engineering, College of, 174.  
   advising center, 176.  
   BS + MS, accelerated "4+1" program, 179.  
   ENGR courses, 389.  
   M.S. program, 178.  
 Engineering management specialization, 172, 181.  
 English, 226.  
   ENGL courses, 383.  
   M.A. program, 229.  
   minor, 228.  
 English placement test, 69.  
 Enrollment, in major programs, 24.  
   status, 81.  
 Enterprise project, 98.  
 Entry level mathematics (ELM) requirement, 69.  
 Environmental design, 142.  
   concentration, 155, 157.  
   EDES courses, 372.  
   specialization, 148.  
 Environmental engineering, 187.  
   ENVE courses, 390.  
 Environmental geography concentration, 256.  
 Environmental horticultural science, 124.  
   (OH) courses, 451.  
 Environmental management concentration, 133, 138.  
 Environmental science and technology concentration, 138.  
 Escape Route, 44.  
 Ethics and society concentration, 245.  
 Ethnic Studies, 230.  
   ES courses, 392.  
 Evaluation for graduation, 74.  
 Examination, credit by, 72.  
   physical, 83.  
 Exchange programs, 39.  
 Expenses, 60, 62.  
 Experimental classes, 18.  
 Express club, campus, 36.  
 Extended Education, 35.
- F**acilities, 11.  
 Faculty, list of, 495.  
   emeriti, 488.  
 Fairness Board, 87.  
 Farm and ranch management concentration, 103, 105.  
 Fees and expenses, 61.  
 Financial aid, 63.  
 Financial management, concentration, 162.  
   (BUS) courses, 338.  
 First class meeting, 82.  
 Fisheries, marine biology and, concentration, 267.  
 Food science, 126.  
   minor, 129.  
 Food science and nutrition, 126.  
   FSN courses, 399.  
   specialization, 101.  
 Food service, 35.  
 Foreign languages, 241.  
   FORL courses, 397.  
 Foreign (international) students, 55, 91.  
   graduate students, 91.  
 Forest resources, management concentration, 133, 135.  
   urban forestry concentration, 133, 135.  
   watershed, chaparral, and fire management  
     concentration, 133, 135.  
 Forestry and natural resources, 132.  
   FNR courses, 393.  
 Formal study plan, 93.  
 Foundation, 37.  
 Fraternities, 49.  
 French, minor, 241.  
   FR courses, 397.  
 Freshman requirements, admissions, 55.  
 Fruit science, 116.  
   FRSC courses, 397.  
   minor, 121.  
 Full-time status, undergraduate, 81.  
   graduate, 94.
- G**alerie, 44.  
 Gender harassment, 28.  
 General agriculture specialization, 101.  
 General education requirements, 77.  
 General engineering, 205.  
 Geographic information systems minor, 118.  
 Geography, 256.  
   GEOG courses, 402.  
 Geology, 284.  
   GEOL courses, 403.  
 German, minor, 241.  
   GER courses, 403.  
 Gerontology minor, 250.  
 Global strategy and law, 163.  
 Grade point average, 74, 83.  
   graduate students, 94.  
 Grading, 83.  
 Graduate, academic requirements, 92.  
   admission, 89.  
   programs, 89.  
 Graduate courses taken by undergraduates, 75, 94.  
 Graduate studies—business (GSB) courses, 407.  
 Graduation, evaluation for, 74.  
   graduate students, 94.  
 Graduation rate, 518.  
 Graduation requirements, 74.  
   graduate students, 92.  
 Graduation with honors, 76.  
 Graduation writing requirement (GWR), 75.  
   graduate students, 94.  
 Grants, 67.  
   research, 38.  
 Graphic communication, 231.  
   GRC courses, 404.  
   minor, 233.  
 Graphic design concentration, 231.  
 Greek organizations, 49.  
 Grievance procedures, 87.  
 Guide to using Cal Poly catalog, 17.

- H**arassment, sexual, 28.  
 gender, 29.  
 Health education concentration, 280.  
 Health sciences, preprofessional preparation, 36.  
 Health services, 47.  
 screening, 83.  
 Higher education GPA, 83.  
 History, 234.  
 HIST courses, 410.  
 minor, 234.  
 History of Cal Poly, 13.  
 Holding records, 81.  
 Holidays, school, 19.  
 Honors, academic, 75.  
 courses in high school, 56.  
 program, joint BS/MS electrical engineering, 202.  
 Housing and residential life, 47.  
 Human development, 249.  
 (CD) courses, 343.  
 (PSY) courses, 464.  
 Human resources management concentration, 163.  
 Humanities, 236.  
 HUM courses, 414.  
 values, technology and society minor, 236.
- I**mmunizations, 83.  
 Incomplete, grade of, 84.  
 Industrial and manufacturing engineering, 208.  
 IME courses, 415.  
 Industrial and technical studies, M.A., 173.  
 Industrial engineering, 208.  
 specialization, 180.  
 Industrial technology, 167.  
 IT courses, 421.  
 Institutional and financial assistance, 520.  
 Integrated technology management specialization, 180.  
 Integrative technology minor, 169.  
 Intercollegiate athletics, 51.  
 eligibility, 87.  
 International agricultural development specialization, 102.  
 International affairs concentration, 247.  
 International baccalaureate examination, 72.  
 International business management concentration, 163.  
 International (foreign) students, 55.  
 graduate, 91.  
 International programs, 39.  
 International relations minor, 249.  
 International trade and development concentration, 166.  
 Intramural sports, 45.  
 Italian, 241.  
 ITAL courses, 424.
- J**apanese, 241.  
 JPNS courses, 426.  
 Journalism, 237.  
 JOUR courses, 424.  
 Judicial affairs, 28, 46.
- K**inesiology, 280.  
 KINE courses, 426.  
 M.S. program, 282.
- L**aboratory classes, 18.  
 Land resources concentration, 138, 140.  
 Landscape architecture, 155.  
 LA courses, 430.  
 Late registration, 81.  
 Learning handicapped specialist credential, 298.  
 Leaves, of absence, 82.  
 medical, 82.  
 planned educational, 82.  
 Lecture classes, 18.  
 Liberal Arts, College of, 220.  
 Liberal studies, 239.  
 LS courses, 434.  
 Library, Robert E. Kennedy, 38.  
 LIB courses, 433.  
 Linguistics minor, 228.  
 Living expenses, 60, 62.  
 Loan funds, 66.  
 London study program, 41.
- M**ajors, change of, 75.  
 courses, 17.  
 definition, 17.  
 list of programs, 20.  
 Management concentration, 163.  
 (BUS) courses, 338.  
 graduate programs, 170.  
 Management information systems, concentration, 164.  
 (BUS) courses, 338.  
 Manufacturing engineering, 208.  
 Map of campus, inside back cover.  
 MAPE (Mathematics placement exam), 70.  
 Marine biology and fisheries concentration, 267.  
 Marketing management concentration, 164.  
 (BUS) courses, 338.  
 Marriage, family and child counseling license (MFCC), 256.  
 Master's degrees, 89.  
 Master of business administration (MBA), 170.  
 MBA/MS Engineering, 172, 181.  
 Materials engineering, 214.  
 MATE courses, 434.  
 specialization, 180.  
 Mathematics, 277.  
 MATH courses, 438.  
 entry-level requirement (ELM), 69.  
 minor, 277.  
 M.S. program, 279.  
 placement examination (MAPE), 70.  
 Maximum unit load, 82.  
 Master of city and regional planning, 151.  
 MCRP/MS Engineering, 152, 183.  
 McPhee's games area, 45.  
 Meal plans, 35, 60, 62.  
 Measles immunizations, 83.  
 Mechanical engineering, 217.  
 ME courses, 442.  
 specialization, 180.  
 Mechatronics concentration, 219.  
 Medical leaves of absence, 82.  
 Medical service, 47.  
 Medical technology, 37, 267, 272.  
 Medicine, 37, 267, 272.  
 Microbiology, 267, 272.  
 Military Science, 130.  
 MSC courses, 446.  
 Military service, credit for, 73.

- Minors, 76.  
 definition, 18.
- Modes of instruction, 18.
- Modern languages and literatures, 241.
- Multicultural Center, 50.
- Multiple subject teaching credential, 295.
- Music, 243.  
 MU courses, 447.  
 minor, 244.
- N**  
 Natural resources, management, 132.  
 recreation concentration, 132-137.
- Nondiscrimination policy, 27.
- Nursing, 37.
- Nutritional science, 126.  
 minor, 129.
- O**  
 Optometry, 37.
- Organizations concentration, 256.
- Ornamental (environmental) horticulture, 124.  
 concentration, 107, 108.  
 OH courses, 451.
- Outstanding staff, 494.
- Overseas programs, 39.
- P**  
 Pacific rim concentration, 256.
- Packaging minor, 169.
- Parents association, 48.
- Parks and forest recreation, 132.
- Pattee, Alan, scholarships, 62.
- Pharmacy, 37.
- Philosophy, 245.  
 PHIL courses, 455.  
 minor, 245.
- Photography and digital imagery concentration, 223.
- Physical education, and kinesiology, 280.  
 KINE courses, 426.  
 PE courses, 454.
- Physical science, 284.  
 PSC courses, 464.
- Physical therapy, 37.
- Physician assistant, 37.
- Physics, 284.  
 PHYS courses, 457.
- Placement services, 46.
- Placement exams, academic (AP), 71.
- Plagiarism and cheating, 29.
- Planned educational leave, 82.
- Plant production concentration, 107.
- Plant protection minor, 120.
- Plant protection science, 116.
- Policies on the rights of individuals, 27.
- Political science, 247.  
 POLS courses, 460.
- Polymers and coating concentration, 274.
- Postbaccalaureate applicants, 90.
- Poultry management minor, 109.  
 PM courses, 460.
- Prefixes, colleges, departments, and courses, 300.
- Pre-law concentration, 247.
- Pre-physical therapy concentration, 280.
- Preprofessional preparation, health sciences, 36.
- Prerequisites, definition, 18.  
 eligibility for enrollment, 81.  
 graduate students, 94.
- Presidents, past Cal Poly, 488.  
 Honors list, 75.
- Printing management concentration, 231.
- Privacy rights, 518.
- Probation, 86.  
 graduate students, 92.
- Professional practice specialization, 148.
- Program board, ASI, 44.
- Program, change of major, 75.
- Project report, 95.
- Psychological Services, 47.
- Psychology, 249.  
 PSY courses, 464.  
 minor, 250.  
 M.S. program, 254.
- Psychology and human development, 249.
- Public administration concentration, 247.  
 minor, 247.
- Public health, 37.
- Public Safety Services, 38.
- Pupil personnel services credential, 297.
- Q**  
 Quality hours, 83.  
 points, 83.
- Quantitative economics concentration, 166.
- Quarter system, 18.  
 units, 18.
- R**  
 Racism, statement on, 28.
- Reading/language arts specialist credential, 298.
- Reading specialization, 294.
- Recreation administration, 136.  
 REC courses, 469.
- Recreational sports, 45.
- Recreation and open space concentration, 155, 157.
- Recreation Center, 45.
- Refund of fees, 60.
- Regional landscape assessment concentration, 155, 157.
- Registration, 81.  
 fees, 60.
- Religious studies, 245.  
 RELS courses, 472.
- Renewal, academic, 85.
- Repeating a course, 84.  
 graduate students, 94.
- Requirements, general education, 77.
- Requirements, graduation, 74.
- Research and, Graduate Programs, 89.  
 project involvement, 38, 95.
- Residence, academic requirements, 74.  
 determination of, 57.  
 halls, 47.
- Residential Life and Education, 47.
- Returning students, 54, 83.  
 graduate students, 95.
- Rights of the individual, 27.
- Rose float, 42, 44.
- ROTC, 130.
- Rules and policies, changes in, 2.



- Safety on campus, 38.**  
 Satisfactory progress, 84.  
 Scholarships, 62.  
 Science and Mathematics, College of, 264.  
     advising center, 265.  
     SCM courses, 472.  
 Second, bachelor's degree, 75.  
     master's degree, 95.  
 Second edition, 45.  
 Secondary school teaching, 295.  
 Seminar classes, 18.  
 Senior project, 74.  
 Sexual harassment policy, 27.  
 Single subject teaching credential, 295.  
 Social sciences, 256.  
     SOCS courses, 474.  
 Social security number use, 518.  
 Social services concentration, 256.  
 Sociology, 256.  
     SOC courses, 472.  
     minor, 258.  
 Soil science, 138.  
     SS courses, 477.  
     specialization, 102.  
 Sororities, 49.  
 Spanish minor, 242.  
     SPAN courses, 474.  
 Special education credential, 298.  
     specialization, 294.  
 Specializations, definition, 18.  
     list of, 20.  
 Special programs and resources, 33.  
 Speech communication, 260.  
     SPC courses, 475.  
     minor, 260.  
 Sports, clubs, 45.  
     intercollegiate, 51.  
     intramural, 45.  
 Staff emeriti, 492.  
 State aid to the physically handicapped, 67.  
 State university fee, 60.  
 Statement of intent to register (SIR), 54.  
 Statement on academic freedom, 28.  
 Statement on racism and discrimination, 28.  
 Statistics, 288.  
     STAT courses, 479.  
     minor, 288.  
 Student Academic Services, 48.  
 Student life and activities, 49.  
     eligibility for activities, 87.  
 Student affairs, 42.  
 Student body fee, 61.  
 Student classification, 71.  
 Student conduct and discipline, 87, 518.  
 Student employment, 46.  
 Student governance, 43.  
 Student life and activities, 49.  
 Studio art concentration, 223.  
 Study and travel, U.S. and abroad, 40.  
 Study-service connection, 49.  
 Summer Institute, 49.  
 Supervision courses, 18.  
 Support courses, 17.  
 Systematic biology, ecology and, 267.  
 Systemwide tests, 69.  
**T**  
 Teacher preparation, 295.  
 Teaching credentials, 295.  
     (Kinesiology) concentration, 280.  
     (Social Sciences) concentration, 256.  
 Teaching English as a second language (TESL) certificate program, 228.  
 Technical communication certificate program, 228.  
 Testing Center, Assessment and, 49.  
 Tests, admission requirements, 57.  
     English placement (EPT), 69.  
     Entry level mathematics (ELM), 69.  
     systemwide requirements, 69.  
 Theatre, and dance, 262.  
     TH courses, 482.  
     minor, 262.  
 Thesis, 95.  
 Time limit, graduate students, 95.  
 TOEFL, graduate students, 91.  
     undergraduate students, 55.  
 Transcripts, 60, 83.  
 Transfer, credit, 70.  
     requirements, 56.  
 Transportation planning specialization, 152, 182.  
 Travel Time, 45.  
 Travel, study and, U.S. and abroad, 39.  
 Tuition, determination of residence for nonresident tuition, 57.  
     fees, 60.  
**U**  
 Unit load, maximum, 82.  
 Units, definition, 18.  
     number required for graduation, 74.  
 University Center for Teacher Education, 290.  
 University advancement, 41.  
 University union, 44.  
 University year, 18.  
 Upward Bound, 49.  
 U.S. cultural pluralism requirement, 81.  
**V**  
 Values, technology and society minor, 236.  
 Vegetable science, 117.  
     VGSC courses, 483.  
 Veterinary science, 37, 109.  
     VS courses, 483.  
 Vocational agriculture, services to, 39.  
 Volunteer services, 49.  
**W**  
 Water engineering specialization, 180.  
 Water science minor, 99.  
 Week of welcome (WOW), 50.  
 Wildlife biology concentration, 267.  
 Withdrawal, from courses, 85.  
     for term, 85.  
     from previous terms, 85.  
 Writing, graduation requirement, 75.  
 Women's programs and services, 50.  
 Women's Studies, minor, 263.  
     WS courses, 484.  
**Z**  
 Zoology, 267.  
     ZOO courses, 484.

# DIRECTORY OF FACILITIES

| Facility                                     | Bldg.#     | Loc.    | Facility                                 | Bldg.# | Loc.  | Facility                           | Bldg.# | Loc.   |
|--|------------|---------|--|--------|-------|------------------------------------|--------|--------|
| Administration                               | 01         | D 7     | Foundation                               |        |       | Public Safety Administrative       |        |        |
| Agricultural Engineering                     | 08         | C 5     | Warehouse                                | 82     | B 1   | Offices                            | 80     | C 6    |
| Agricultural Sciences                        | 11         | C 5     | Graphic Arts                             | 26     | E 5   | Recreation Center                  | 43     | E 6    |
| Agriculture, Alan A. Erhart                  | 10         | D 5     | Gymnasium, Crandall                      | 60     | E 4   | Research Development               | 04     | B-C 4  |
| Air Conditioning                             | 12         | E 4-5   | Gymnasium (Mott Physical Education)      | 42     | E 6-7 | Residence Halls                    |        |        |
| Albert B. Smith Alumni and Conference Center | 28         | E 5     | Health Center                            | 27     | E 5   | Diablo Hall                        | 101    | C 7    |
| Architecture and Environmental Design        | 05         | D 4     | Heron Hall                               | 117    | F 3-4 | Fremont Hall                       | 109    | D 8    |
| Beef Unit                                    | 16         | B 5     | Hillcrest                                | 81     | D 7   | Lassen Hall                        | 104    | C-D 7  |
| Business                                     | 03         | D 3     | Horse Unit                               | 32     | A 4   | Muir Hall                          | 107    | D 8    |
| Cal Poly Theatre                             | 44         | E 7     | Horseshoeing Unit                        | 30     | B 6-7 | Palomar Hall                       | 102    | C 7    |
| Campus Produce Store                         | 24         | C 4-5   | Housing Office                           | 29     | D 7   | Santa Lucia Hall                   | 106    | D 7    |
| Chase Hall                                   | 115        | E 4     | Housing Warehouse                        | 80     | C 6   | Sequoia Hall                       | 108    | D 7    |
| Child Development Lab                        | 87         | F 4     | Jespersen Hall                           | 116    | E 3   | Shasta Hall                        | 100    | C 7    |
| Children's Center                            | 133        | F 4     | Library, Robert E. Kennedy               | 35     | D 4   | Sierra Madre Hall                  | 113    | E 9    |
| Computer Science/ Frank E. Pilling           | 14         | D-E 5   | Manufacturing                            | 36     | C 5   | Tenaya Hall                        | 110    | D-E 8  |
| Cottages                                     | 85, 86, 87 | F 4     | Mathematics and Home Economics           | 38     | D 5   | Trinity Hall                       | 105    | D 7    |
| Crandall Gymnasium                           | 60         | E 4     | McPhee University Union                  | 65     | D 6-7 | Whitney Hall                       | 103    | C-D 7  |
| Crops Unit                                   | 17         | C 2     | Meats Unit                               | 39     | B 7   | Yosemite Hall                      | 114    | E-F 10 |
| Dairy Science                                | 18         | B 1     | Modoc Hall                               | 119    | D 3   | Rodeo Arena                        | —      | C 3    |
| Dexter, Walter F.                            | 34         | D 4     | Mott Physical Education                  | 42     | E 6-7 | Rose Float Shop                    | 78     | B 6    |
| Dining Complex                               | 19         | E 6     | Music Center, H. P. Davidson             | 45     | E 7   | Sandwich Plant                     | 19     | E 6    |
| Dining, Vista Grande                         | 112        | E 8     | Mustang Stadium                          | 61     | E 3   | Science                            | 52     | D 6    |
| Education                                    | 02         | D 4     | Natorium                                 | 46     | E 4   | Science, Fisher                    | 33     | D 6    |
| El Corral Bookstore                          | 65         | D 6     | Old Power Plant                          | 76     | E 4   | Science North                      | 53     | D 6    |
| Engineering                                  | 13         | D 3     | Ornamental Horticulture                  | 48     | A 4-5 | Sheep Unit                         | 54     | C 3    |
| Engineering East                             | 20         | D 5     | Physical Education, Robert E. Mott       | 42     | E 6-7 | Stadium, Mustang                   | 61     | E 3    |
| Engineering East Faculty Offices             | 20         | D 5     | Performing Arts Center                   | 06     | E 7   | Student Services                   | 124    | E 4    |
| Engineering South                            | 40         | E 5-6   | Pilling, Frank E./ Computer Science      | 14     | D-E 5 | Swine Unit                         | 56     | A 1-2  |
| Engineering West                             | 21         | D-E 4   | Plant Operations and Receiving Warehouse | 70     | C 6   | Theatre                            | 44     | E 7    |
| English                                      | 22         | C-D 5-6 | P E Classrooms/Offices                   | 43-1   | E 6   | Transportation Services            | 71     | C 6-7  |
| Erhart Agriculture                           | 10         | D 5     | Police Station                           | 74     | C 5-6 | University Art Gallery             | 34     | D 4    |
| Faculty Offices-North                        | 47         | C-D 6   | Poultry Unit                             | 50     | C 1   | University Dining Complex          | 19     | E 6    |
| Faculty Offices-East                         | 25         | D 6     | President's Residence                    | 51     | E 4-5 | University Union, Julian A. McPhee | 65     | D 6-7  |
| Farm Shop                                    | 09         | C 5     | Public Safety                            | 74     | C 5-6 | Veterinary Hospital                | 57     | B 1-2  |
| Feed Mill                                    | 23         | C 6     |  |        |       | Visitors Information               | 134    | F 10   |
| Fire Station                                 | 74         | C 5-6   |  |        |       | Vista Grande                       | 112    | E 8    |
| Fisher Science, Clyde P.                     | 33         | D 6     |  |        |       | Visual Education Productions (VEP) | 82     | B-C 1  |
| Food Processing                              | 24         | C 4-5   |  |        |       | Welding Shop                       | 58     | C 5    |
| Foundation Admin.                            | 15         | C 6     |  |        |       |                                    |        |        |

## PERMITS ARE NOT HONORED IN METERED SPACES

Permits required & meters enforced Monday-Thursday, 7 am until 10 pm, Friday, 7 am until 5 pm, all year including academic breaks.

### GENERAL:

C-4; G-1, G-2; R-2; H-2, H-12, H-13, H-14, H-16  
Sheep Unit & Outlying farm areas designated for parking

### SPONSORED GUEST:

A-1; C-2, C-3, C-4, C-5; H-2, H-10  
Graphic Arts, Alumni Center

### STAFF:

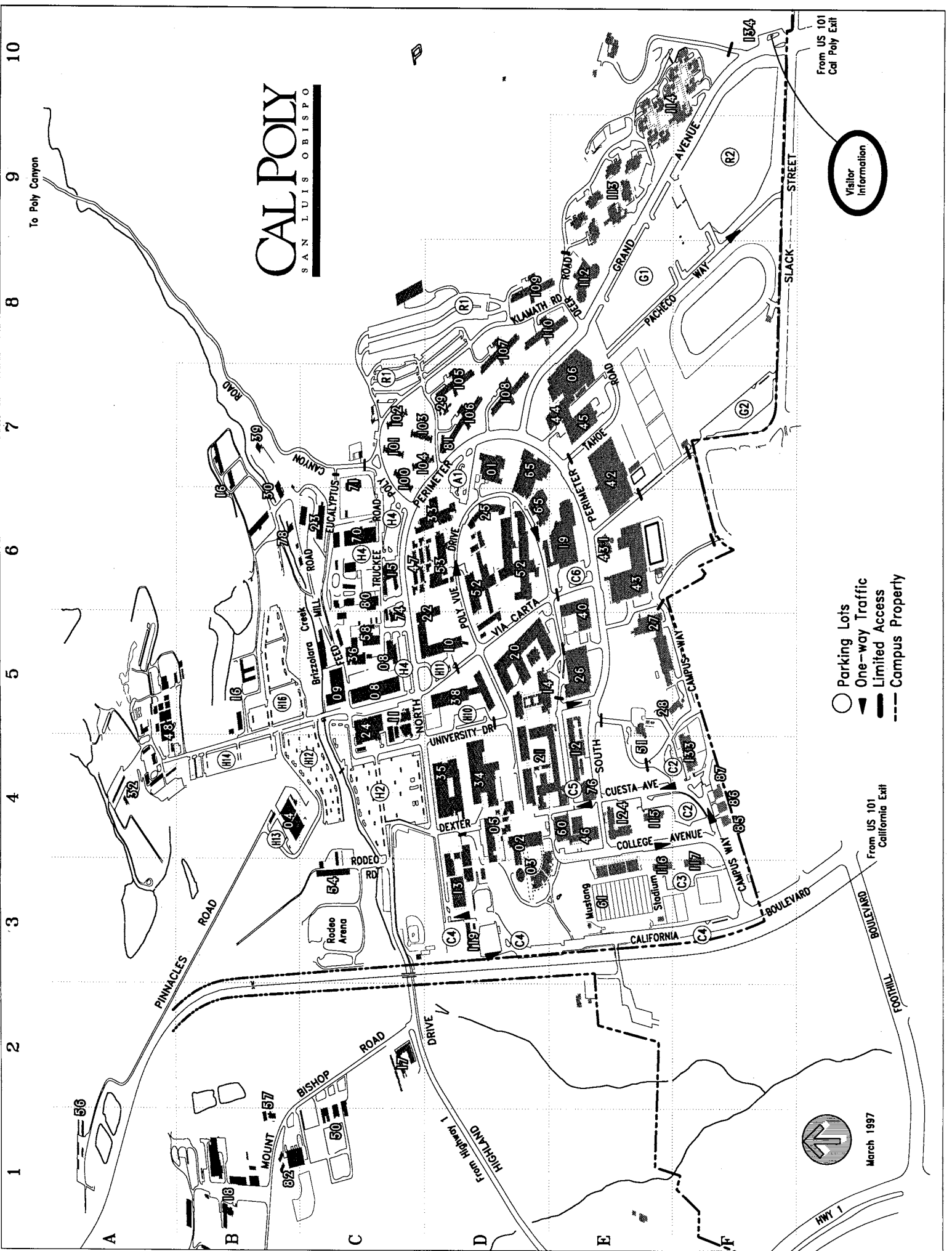
C-2, C-3, C-4, C-5; H-2, H-4, H-10, H-11, H-13; G-1  
Alumni Center, N. Via Carta, Ornamental Horticulture Unit

### DISABLED PARKING:

A-1; C-2, C-3, C-4, C-5, C-6; G-1, G-2; H-2, H-4, H-10, H-11  
S. Perimeter, Graphic Arts, College Ave., Health Center, Grand Ave., Poly View Dr., N. Via Carta, University Dr., Mountain Ln.

### METERS:

A-1; C-2, C-3, C-4, C-5, C-6; G-1, G-2; H-2, H-10, H-13  
R-1, R-2  
S. Perimeter, Graphic Arts, College Ave., Alumni Center, Health Center (Campus Way), Grand Ave., N. Via Carta, Safety Way East, Dexter Rd., Mountain Ln.



# CAL POLY

SAN LUIS OBISPO

To Poly Canyon

From US 101  
Cal Poly Exit

Visitor  
Information

- Parking Lots
- ▶ One-way Traffic
- ▬ Limited Access
- - - Campus Property

From US 101  
California Exit



March 1997

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E  
F

PINNACLES ROAD

RODEO ROAD

MOUNT ROAD

BISHOP ROAD

DRIVE

UNIVERSITY DR

DEXTER

COLLEGE AVENUE

CUESTA AVE

SOUTH

VIA CARTA

POLY AVE

TRUCKEE ROAD

EUCALYPTUS CREEK

BRIZZOLARA HILL

ROAD

ROAD

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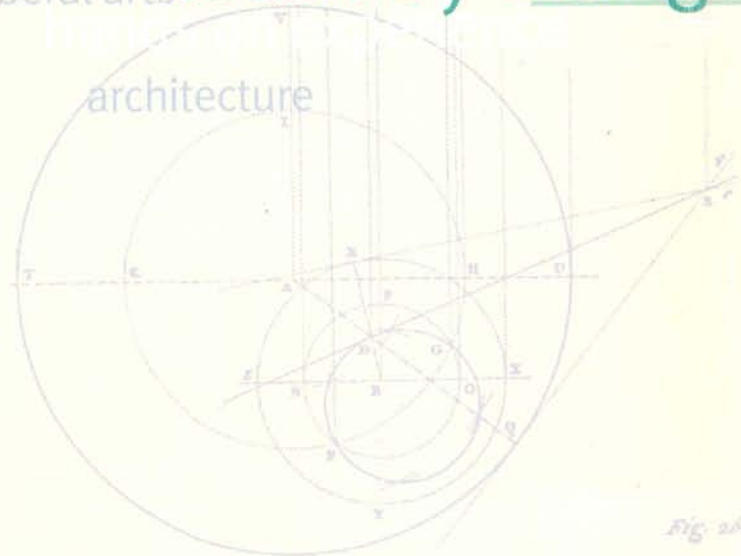
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California Polytechnic State University  
San Luis Obispo, California 93407

A Campus of The  
California State University

math  
science  
agriculture engineering  
business  
[art][technology]  
[science] environmental design  
liberal arts **learn by doing**



**CAL POLY**

