

## Changes in Rules and Policies

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

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Read details on Change in Rules and Policies.



All faculty listings are for full time tenure track or tenured employees.

I designed this cover using photographs and geometric shapes which, I believe are symbolic of Cal Poly Pomona's polytechnic mission. The students and the buildings represent the University, while the rose represents our concern for the environment. The geometric shapes and the futuristic green lines beamed from the CLA building symbolize Cal Poly Pomona's rapid progress and advancement into an era of technological innovation. Yellow and green are the university's colors and, as used in this design, portray growth and development, and promise a bright future.

Catalog cover by Jai Baek  
Cal Poly Pomona student

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**JUNE 1997**

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**SEPTEMBER 1997**

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**DECEMBER 1997**

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**JANUARY 1998**

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**ACADEMIC CALENDAR 1997-99**

Some dates are subject to change. Refer to quarterly Schedule of Classes for recent changes related to holiday observance, registration deadlines, and commencement ceremonies. This is not to be construed as an employee work calendar. For the purpose of degree evaluation, the academic year is defined as Fall, Winter, Spring, and Summer quarters.

**SUMMER QUARTER, 1997***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs.

*Academic Instruction*

- June 23. . . . . Beginning of university year. Classes begin for all students  
 July 4. . . . . Independence Day—Academic Holiday (If a 4/10 work week is adopted for summer quarter, this holiday will be observed on the preceding Thursday.)  
 September 2-5. . . . . Final examinations  
 September 1. . . . . Labor Day—Academic Holiday  
 September 9. . . . . Last day to submit approved Master's Thesis/Project for binding; grades due

*Scheduling and Registration*

- June 25-July 24. . . . . Orientation of new students for fall quarter  
 June 30. . . . . Last day to drop classes without courses being recorded  
 July 7. . . . . Last day to add classes or register late  
 July 9. . . . . Last day to withdraw and receive refund of Student Services and State University fees  
 July 10. . . . . Last day to apply for current quarter graduation  
 July 17. . . . . Withdrawal after this date permitted only by petition and for serious and compelling reasons  
 July 28-August 12. . . . . Students schedule classes for fall quarter  
 August 14. . . . . Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

**FALL QUARTER, 1997***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs.

*Academic Instruction*

- September 22. . . . . Beginning of academic year and fall quarter for faculty  
 September 25. . . . . Classes begin for all students  
 November 7. . . . . Veteran's Day—Academic Holiday  
 November 27-28. . . . . Thanksgiving—Academic Holiday  
 December 8-12. . . . . Final examinations  
 December 13-Jan. 4. . . . . Christmas break  
 December 16. . . . . Last day to submit approved Master's Thesis/Project for binding; grades due

*Scheduling and Registration*

- October 28. . . . . Orientation of new students for winter quarter  
 October 1. . . . . Last day to drop classes without courses being recorded  
 October 6. . . . . Last day to add classes or register late  
 October 9. . . . . Last day to withdraw and receive refund of Student Services and State University fees  
 October 15. . . . . Withdrawal after this date permitted only by petition and for serious and compelling reasons  
 October 24. . . . . Last day to apply for current quarter graduation  
 November 12. . . . . Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control  
 November 6-20. . . . . Continuing students schedule classes for winter quarter

**WINTER QUARTER, 1998***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs.

*Academic Instruction*

January 5 . . . . . Classes begin for all students  
 January 19 . . . . . Martin Luther King's Birthday—Academic Holiday  
 February 13 . . . . . President's Day—Academic Holiday  
 March 16-20 . . . . . Final examinations  
 March 24 . . . . . Last day to submit approved Master's Thesis/Project for binding; grades due

*Scheduling and Registration*

January 27 . . . . . Orientation of new students for spring quarter  
 January 9 . . . . . Last day to drop classes without courses being recorded  
 January 14 . . . . . Last day to add classes or register late  
 January 20 . . . . . Last day to withdraw and receive refund of Student Services and State University fees  
 January 26 . . . . . Withdrawal after this date permitted only by petition and for serious and compelling reasons  
 January 23 . . . . . Last day to apply for current quarter graduation  
 February 3-14 . . . . . Students schedule classes for spring quarter  
 February 23 . . . . . Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

**SPRING QUARTER, 1998***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs.

March 30 . . . . . Classes begin for all students  
 May 25 . . . . . Memorial Day—Academic Holiday  
 June 8-12 . . . . . Final examinations  
 June 10 . . . . . Last day to submit approved Master's Thesis/Project for binding  
 June 13 . . . . . Commencement (Contact major department office for specific date and time)  
 June 16 . . . . . Grades due

*Scheduling and Registration*

April 28 . . . . . Orientation of new students for summer quarter  
 April 3 . . . . . Last day to drop classes without courses being recorded  
 April 8 . . . . . Last day to add classes or register late  
 April 13 . . . . . Last day to withdraw and receive refund of Student Services and State University fees  
 April 17 . . . . . Withdrawal after this date permitted only by petition and for serious and compelling reasons  
 April 24 . . . . . Last day to apply for current quarter graduation  
 May 15 . . . . . Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control  
 May 4-15 . . . . . Students schedule classes for summer quarter

**SUMMER QUARTER, 1998***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs. The University will observe a 4/10 work week June 15 through September 4, 1998. Administrative offices will be open from 7:00 a.m. to 6:00 p.m. and closed on Fridays.

*Academic Instruction*

June 22 . . . . . Beginning of university year. Classes begin for all students  
 July 2 . . . . . Independence Day—Academic Holiday  
 August 31-Sept. 3 . . . . . Final examinations

**FEBRUARY 1998**

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**JUNE 1998**

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**JULY 1998**

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**AUGUST 1998**

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**SEPTEMBER 1998**

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**OCTOBER 1998**

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**NOVEMBER 1998**

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**DECEMBER 1998**

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**JANUARY 1999**

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**FEBRUARY 1999**

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September 7 . . . . . Labor Day—Academic Holiday

September 8 . . . . . Last day to submit approved Master's Thesis/Project for binding; grades due

*Scheduling and Registration*

June 22-July 23. . . . . Orientation of new students for fall quarter

June 29. . . . . Last day to drop classes without courses being recorded

July 6 . . . . . Last day to add classes or register late

July 8 . . . . . Last day to withdraw and receive refund of Student Services and State University fees

July 16 . . . . . Withdrawal after this date permitted only by petition and for serious and compelling reasons

July 23 . . . . . Last day to apply for current quarter graduation

July 27-August 11 . . . . . Students schedule classes for fall quarter

August 13 . . . . . Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

**FALL QUARTER, 1998***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs.

*Academic Instruction*

September 21 . . . . . Beginning of academic year and fall quarter for faculty

September 24 . . . . . Classes begin for all students

November 13. . . . . Veteran's Day—Academic Holiday (a ceremonial observance will be held on campus on November 11, 1998)

November 26-27 . . . . . Thanksgiving—Academic Holiday

December 7-11 . . . . . Final examinations

December 12-Jan. 3 . . . . . Christmas break

December 15. . . . . Last day to submit approved Master's Thesis/Project for binding; grades due

*Scheduling and Registration*

October 27. . . . . Orientation of new students for winter quarter

September 30 . . . . . Last day to drop classes without courses being recorded

October 5. . . . . Last day to add classes or register late

October 8. . . . . Last day to withdraw and receive refund of Student Services and State University fees

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

October 14. . . . . Last day to apply for current quarter graduation

November 11. . . . . Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

November 5-19 . . . . . Continuing students schedule classes for winter quarter

**WINTER QUARTER, 1999***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs.

*Academic Instruction*

January 4 . . . . . Classes begin for all students

January 18 . . . . . Martin Luther King's Birthday—Academic Holiday

February 12 . . . . . President's Day—Academic Holiday

March 15-19 . . . . . Final examinations

March 23. . . . . Last day to submit approved Master's Thesis/Project for binding; grades due

*Scheduling and Registration*

January 26 . . . . . Orientation of new students for spring quarter

January 8 . . . . . Last day to drop classes without courses being recorded

January 13 . . . . . Last day to add classes or register late



January 15 . . . . .	Last day to withdraw and receive refund of Student Services and State University fees
January 25 . . . . .	Withdrawal after this date permitted only by petition and for serious and compelling reasons
January 25 . . . . .	Last day to apply for current quarter graduation
February 3-16 . . . . .	Students schedule classes for spring quarter
February 22 . . . . .	Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

**SPRING QUARTER, 1999***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs.

March 29. . . . .	Classes begin for all students
May 31 . . . . .	Memorial Day—Academic Holiday
June 7-11 . . . . .	Final examinations
June 9. . . . .	Last day to submit approved Master's Thesis/Project for binding
June 12. . . . .	Commencement (Contact major department office for specific date and time)
June 15. . . . .	Grades due

*Scheduling and Registration*

April 27 . . . . .	Orientation of new students for summer quarter
April 2 . . . . .	Last day to drop classes without courses being recorded
April 7. . . . .	Last day to add classes or register late
April 12 . . . . .	Last day to withdraw and receive refund of Student Services and State University fees
April 16 . . . . .	Withdrawal after this date permitted only by petition and for serious and compelling reasons
April 16. . . . .	Last day to apply for current quarter graduation
May 3-14. . . . .	Students schedule classes for summer quarter
May 14 . . . . .	Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

**SUMMER QUARTER, 1999***Applications and Admission*

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs. Check with the Admissions Office for application filing periods for impacted programs.

*Academic Instruction*

June 21. . . . .	Beginning of university year. Classes begin for all students
July 5 . . . . .	Independence Day—Academic Holiday
August 30-Sept. 2 . . . . .	Final examinations
September 6 . . . . .	Labor Day—Academic Holiday
September 7 . . . . .	Last day to submit approved Master's Thesis/Project for binding; grades due

*Scheduling and Registration (deadlines may vary, check Schedule of Classes for current dates)*

June 28-July 22. . . . .	Orientation of new students for fall quarter
June 28. . . . .	Last day to drop classes without courses being recorded
July 1 . . . . .	Last day to add classes or register late
July 6 . . . . .	Last day to withdraw and receive refund of Student Services and State University fees
July 14. . . . .	Withdrawal after this date permitted only by petition and for serious and compelling reasons
July 15 . . . . .	Last day to apply for current quarter graduation
July 26-August 10. . . . .	Students schedule classes for fall quarter
August 12 . . . . .	Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

**JUNE 1999**

S	M	T	W	T	F	S
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**JULY 1999**

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**AUGUST 1999**

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**SEPTEMBER 1999**

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**OCTOBER 1999**

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**NOVEMBER 1999**

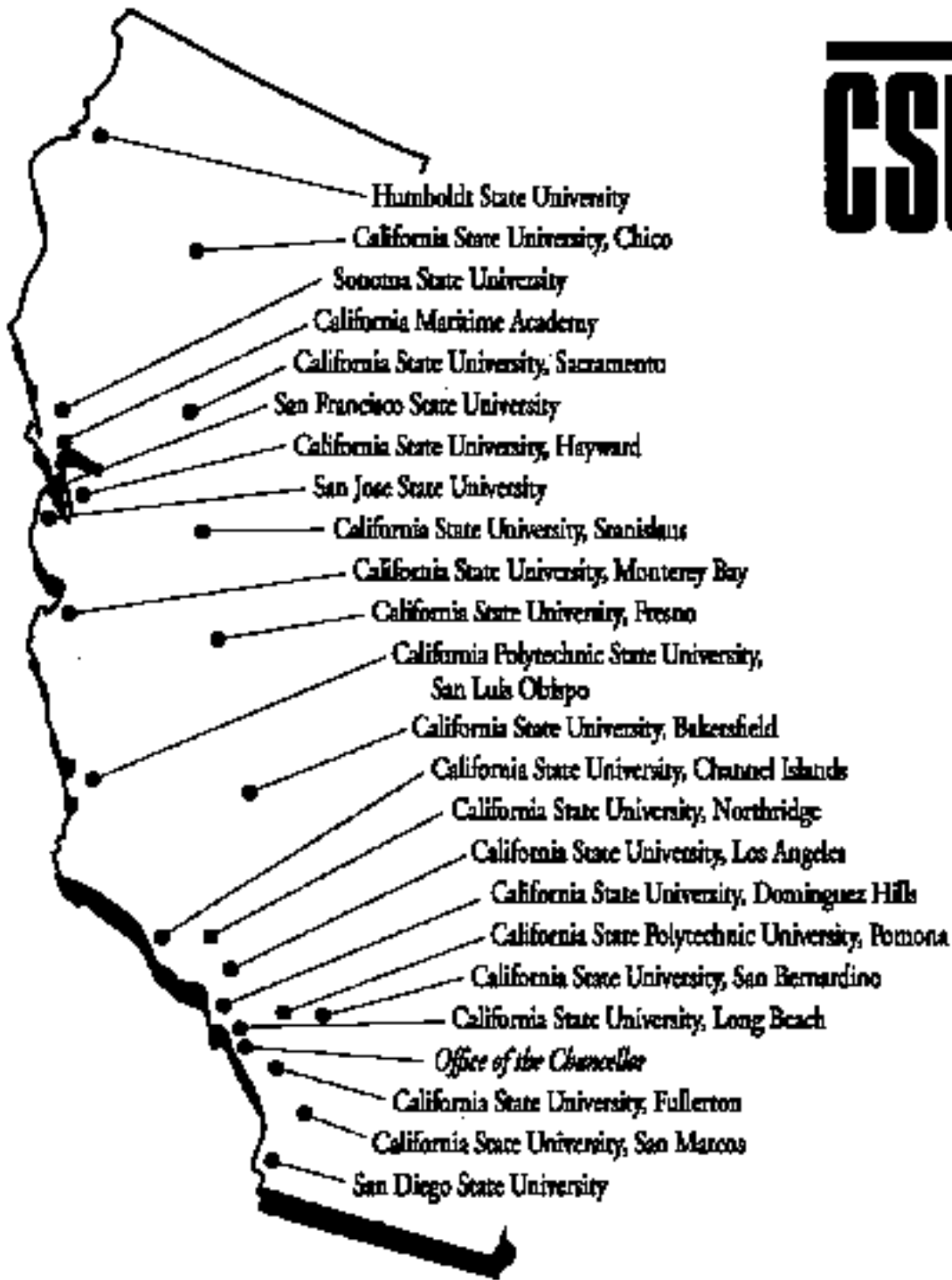
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**JANUARY 2000**

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**CSU**

# THE CALIFORNIA STATE UNIVERSITY

## The California State University

The individual California State Colleges were brought together as a system by the Donahoe Higher Education Act of 1960. In 1972 the system became The California State University and Colleges and in 1982 the system became The California State University.

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 on the respective campuses.

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

Academic excellence has been achieved by The California State University through a distinguished faculty, whose primary responsibility is superior teaching. While each campus in the system has its own unique geographic and curricular character, all campuses, as multipurpose institutions, offer undergraduate and graduate instruction for professional and occupational goals as well as broad liberal education. All of the campuses require for graduation a basic program of general education 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 educational institutions of 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.

### STATEWIDE EXTERNAL DEGREE PROGRAMS

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

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

Master of Public Administration  
Christopher Leu and Warren Campbell  
Department of Political Science  
California State University, Northridge  
Northridge, CA 91330  
(818) 885-3900

Dr. Robert Tumelty, Regional Program Director  
Department of Health Care Administration  
California State University, Long Beach  
1250 Bellflower Blvd.  
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B. S. Nursing  
M. S. Nursing  
Ms. Kathleen Johnson, R.N., M.S.N.,  
Regional Program Director  
Statewide Nursing Program  
California State University, Dominguez Hills  
Carson, CA 90747  
(213) 516-4060

### TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY

#### EX OFFICIO TRUSTEES

The Honorable Pete A. Wilson Governor of California	State Capitol Sacramento 95814
The Honorable Gray Davis Lieutenant Governor of California	State Capitol Sacramento 95814
The Honorable Cruz Bustamante Speaker of the Assembly	State Capitol Sacramento 95814
The Honorable Delaine Eastin State Superintendent of Public Instruction	721 Capitol Mall Sacramento 95814
Dr. Charles B. Reed Chancellor of The California State University	400 Golden Shore Long Beach 90802-4275

#### OFFICERS OF THE TRUSTEES

Governor Pete A. Wilson President	Mr. William Hauck Vice Chairman
Ms. Martha C. Fallgatter Chairman	Chancellor Charles B. Reed Secretary-Treasurer

### APPOINTED TRUSTEES

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

Mr. Roland E. Arnall (1998)  
Ms. Martha C. Fallgatter (2003)  
Mr. William D. Campbell (2003)  
Mr. Ralph R. Pesqueira (2004)  
Mr. Ted J. Saenger (1997)  
Mr. Anthony M. Vitti (1997)  
Mr. James H. Gray (1998)  
Mr. Ronald L. Cedillos (1999)  
Dr. Bernard Goldstein (1995)

Mr. William Hauck (2001)  
Dr. Joan Otomo-Corgel (2001)  
Mr. Michael D. Stennis (2002)  
Mr. Frank Y. Wada (1997)  
Mr. Stanley T. Wang (2002)  
Mr. Ali C. Razi (2001)  
Mr. Laurence K. Gould (2004)

Correspondence with Trustees should be sent:

c/o Trustees Secretariat  
The California State University  
400 Golden Shore, Suite 134  
Long Beach, California 90802-4275

## OFFICE OF THE CHANCELLOR

**The California State University**  
400 Golden Shore  
Long Beach, California 90802-4275  
(562) 985-2500

Dr. Charles B. Reed  
Ms. Molly Corbett Broad  
(Vacant)  
Mr. Sam Strafacci  
Mr. Richard West

Dr. Douglas X. Patino  
Ms. Christine Helwick

Chancellor—CSU System  
Executive Vice Chancellor  
Senior Vice Chancellor, Academic Affairs  
Interim Senior Director, Human Resources  
Senior Vice Chancellor, Business and  
Finance  
Vice Chancellor, University Advancement  
General Counsel





## CAMPUSES - THE CALIFORNIA STATE UNIVERSITY

### California State University, Bakersfield

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

### California State University, Channel Islands

2151 Alessandro Drive, Suite 290  
Ventura, California 93001  
Mr. J. Handel Evans, Acting President  
(805) 643-2585

### California State University, Chico

First & Normal Streets  
Chico, California 95929-0150  
Dr. Manuel A. Esteban, President  
(916) 898-6116

### California State University, Dominguez Hills

1000 East Victoria Street  
Carson, California 90747-0005  
Dr. Robert C. Detweiler, President  
(562) 516-3300

### California State University, Fresno

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

### California State University, Fullerton

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

### California State University, Hayward

25800 Carlos Bee Blvd.  
Hayward, California 94542  
Dr. Norma S. Rees, President  
(510) 881-3000

### Humboldt State University

Arcata, California 95521-8299  
Dr. Alistair W. McCrone, President  
(707) 826-3011

### California State University, Long Beach

1250 Bellflower Boulevard  
Long Beach, California 90840-0115  
Dr. Robert C. Maxson, President  
(562) 985-4111

### California State University, Los Angeles

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

### California Maritime Academy

200 Maritime Academy Drive  
Vallejo, California 94590  
Mr. Jerry Aspland, President (Interim)  
(707) 648-4200

### California State University, Monterey Bay

100 Campus Center  
Seaside, California 93955-8001  
Dr. Peter P. Smith, President  
(408) 582-3330

### California State University, Northridge

18111 Nordhoff Street  
Northridge, California 91330  
Dr. Blenda J. Wilson, President  
(818) 885-1200

### California State Polytechnic University, Pomona

3801 West Temple Avenue  
Pomona, California 91768  
Dr. Bob H. Suzuki, President  
(909) 869-7659

### California State University, Sacramento

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

### California State University, San Bernardino

5500 University Parkway  
San Bernardino, California 92407-2397  
Dr. Albert Karnig, President  
(909) 880-5000

### San Diego State University

5300 Campanile Drive  
San Diego, California 92182  
Dr. Stephen L. Weber, President  
(619) 594-5000

### San Francisco State University

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

### San Jose State University

One Washington Square  
San Jose, California 95192-0001  
Dr. Robert L. Caret, President  
(408) 924-1000

### California Polytechnic State University, San Luis Obispo

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

### California State University, San Marcos

333 S. Twin Oaks Valley Road  
San Marcos, California 92096-0001  
Dr. Bill W. Stacy, President  
(760) 752-4000

### Sonoma State University

1801 East Cotati Avenue  
Rohnert Park, California 94928-3609  
Dr. Ruben Arminana, President  
(707) 664-2880

### California State University, Stanislaus

801 West Monte Vista Avenue  
Turlock, California 95380  
Dr. Marvalene Hughes, President  
(209) 667-3122









## CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

### UNIVERSITY ADMINISTRATION

Bob H. Suzuki, President

Peter A. Dual, Vice President for Academic Affairs

Gene I. Awakuni, Vice President for Student Affairs and University Advancement

Patricia L. Farris, Vice President for Administrative Affairs

Edward C. Hohmann, Interim Vice President for Instructional and Information Technology

### UNIVERSITY MISSION STATEMENT

California State Polytechnic University, Pomona, is a comprehensive university with a polytechnic emphasis in the application of science, technology, and the arts to the needs of the professions and society. By linking the theoretical and the practical in all areas of study, the University aims to generate the understanding, attitudes, and perspectives that will enable students and graduates to solve complex problems and enrich local and world communities. Cal Poly Pomona is dedicated to advancing knowledge and learning and to preparing students for life, leadership, and careers in a changing, multicultural world. Through its programs and services, the University promotes academic excellence, educational equity, diversity in the campus community, and an understanding and appreciation of different cultures; it creates an environment that supports the intellectual, personal, and professional development of each individual.

### UNIVERSITY GOALS

The Strategic Planning Task Force identified six major University goals. These goals were ranked in priority order by the Task Force and are listed in this order below, starting with the highest priority goal.

#### *Goal 1. To promote excellence in teaching and educational programs.*

Inasmuch as Cal Poly Pomona's primary mission is teaching, efforts must be continued to improve teaching effectiveness and curricula, and to place increasing emphasis on conducting research on the teaching and learning process. These efforts should be aimed at helping all students in our increasingly diverse student body to succeed academically. Through the activities of the Faculty Center for Professional Development and the increasing involvement of faculty, Cal Poly Pomona has the opportunity to develop a national reputation as an institution in the forefront of improving and reforming undergraduate education. Indeed, one can envision the day when Cal Poly Pomona can proudly proclaim that it knows more about effective teaching than any institution in the country and offers an education the quality of which is second to none.

Master's degree programs must also be rethought. Too often, research institutions are allowed to set the standards for these programs. Yet, research institutions tend not to value such programs, assigning them low priority and using them as a screening device for the selection of doctoral candidates. Instead of taking its lead from these institutions, the University should be in the forefront of defining unique, high quality master's degree programs that are able to meet the needs of students and society and, therefore, valuable in themselves.

#### *Goal 2. To enhance resource planning, development, and management.*

As the University moves into an era in which State resources are likely to continue to be scarce, among its highest priorities should be to become more creative and entrepreneurial in finding ways of generating

supplementary income from non-State sources and to upgrade its infrastructure and streamline its administrative processes in order to use and manage resources more effectively and efficiently. Major investments and efforts must be made in these areas if the University wishes to accomplish its goals, continue to advance as an institution, and achieve the level of distinctive excellence to which it aspires.

#### *Goal 3. To promote and enhance research, scholarly, professional, and creative activity.*

In order to maintain the faculty members intellectual vitality, enrich and enhance their teaching, and enable them to contribute to solving societal problems, the University must support the research, scholarly, professional, and creative activities of the faculty and create a more supportive environment for such activities. These activities may take many forms, including basic research, applied research, synthesis from existing research, artistic creations, and presentation of papers at professional meetings. They should also include research in the teaching and learning process and the development of innovative curriculum and of new, more effective approaches to teaching. As a way of greatly enriching their education, students, both undergraduate and graduate, should also be provided with opportunities to engage in such activities.

#### *Goal 4. To enhance supportive services for students.*

As society becomes more complex and the student population more diverse, the University must provide a wide array of supportive services that will ensure the academic, social and personal development of each student. These services should be provided with the view that students are the University's highest priority and that every effort will be made to serve them as effectively as possible.

#### *Goal 5. To develop a collegial campus environment and to support the sense of a university community.*

Cal Poly Pomona must strive to maintain an open, democratic community through the participation of faculty, staff, and students in the governance of the University and through an empowering approach to management. A greater sense of community must also be promoted by improving communication on campus and by developing a campus climate in which everyone feels welcome and comfortable.

#### *Goal 6. To involve the University in the broader community.*

The University must bring its considerable human and material resources to bear in helping the broader community solve pressing societal problems in such areas as urban renewal, economic development, and environmental improvement. As the world becomes increasingly interdependent, the University must also address itself to global issues through its international activities and programs.

### HISTORICAL DEVELOPMENT

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

In the last 50 years, Cal Poly Pomona's expansive campus has grown from its humble beginnings as a horse ranch to a university with over 16,803 students and 2,200 faculty and staff members. Three men played a vital role in this remarkable transformation: W. K. Kellogg, Charles B. Voorhis, and Julian McPhee.



## W. K. Kellogg Develops Arabian Horse Ranch

W. K. Kellogg, known for his famous “corn flakes,” had a life-long passion for Arabian horses. After purchasing 377 acres at a cost of \$25,000, Kellogg developed the land into a world-renowned Arabian horse ranch. The first building erected contained the horse stables. Now renamed the Union Plaza, Kellogg affectionately called the hacienda-style building his “Arabian Palace.”

On May 17, 1932, a crowd of more than 20,000 spectators converged on the ranch to witness Kellogg’s donation of his Arabian Horse Ranch, including 87 horses, to the University of California. In return for the generous grant, the University agreed to keep the Arabian horses and continue the Sunday horse shows that began in 1927 and continued to draw thousands of people, including some of Hollywood’s biggest stars.

In 1927, Charles B. Voorhis purchased 150 acres of land near San Dimas to build a facility for deserving and underprivileged boys. “Uncle Charlie,” as he was known by his students, viewed his facility as a place where students could study an abbreviated, but intense, agricultural program.

In 1933, Julian McPhee, assumed the presidency at California State Polytechnic University at San Luis Obispo. Known for his tight fiscal policy, McPhee saved the University during the years of the Great Depression. After those bleak years, McPhee’s vision of expanding Cal Poly Pomona to Southern California came closer to reality.

## Cal Poly Pomona Expands

Plagued with financial problems, Voorhis was forced to close his doors only ten years after he had opened his facility. The demise of the Voorhis facility gave McPhee the opportunity to expand Cal Poly Pomona. In August of 1938, Charles Voorhis donated his facility as a gift to the California State University System. In August of 1938, McPhee’s request for the land was approved and the entire horticulture program was moved from San Luis Obispo to the new Southern California campus.

Further expansion was halted by the onset of World War II. The southern Cal Poly campus was closed when the majority of its students were called to active duty and the former Kellogg ranch was transformed into an Army remount station. After the war, the ranch faced an uncertain future, but in 1949 the 813-acre W.K. Kellogg Arabian Horse Ranch was deeded to the state, a proposal to which The Kellogg Foundation agreed, provided the Sunday horse shows resumed.

In 1949, the first Cal Poly Pomona Float was entered in the Tournament of Roses Parade and won the Award of Merit. The Rose Float tradition continues today and marks the partnership of the two Cal Poly campuses.

In 1956, the first classes were held on the campus in the present-day science building. Six programs in agriculture, leading to four bachelor of science degrees, were offered. The Class of 1957, consisting of 57 agricultural majors, were the first graduates of Cal Poly Pomona. By 1959, the curricula of the college included six degree programs in the arts and sciences and four in engineering.

## Women Join Cal Poly Pomona

Many changes occurred in 1961 which affected Cal Poly Pomona profoundly. The Master Plan for Higher Education established the California State College System with its own Board of Trustees, and women enrolled at the University for the first time with 329 women joining the student body of 2,436 men. In that same year, the Legislature enacted Education Code Section 22606, which identified the primary function of the State Colleges as “...the provision of instruction for undergraduate students and graduate students, through the master’s degree, in the liberal arts and sciences, in applied fields and in the professions, including the teaching profession.” The Legislature recognized the special respon-

sibility of this institution as a “polytechnic college” by adding Education Code Section 40051 which authorized the college to emphasize “...the applied fields of agriculture, engineering, business, home economics, and other occupational and professional fields.”

In 1966, the California State Polytechnic College, Kellogg-Voorhis, was established as a separate institution from the San Luis Obispo school. Both campuses were awarded full university status in 1972. On June 1, 1972, the campus name was officially changed to California State Polytechnic University, Pomona. In 1982, The California State University and Colleges became The California State University.

Over the years, Cal Poly Pomona has grown from a small campus with six undergraduate programs enrolling 550 men in 1956 to a nationally and internationally recognized university with 71 undergraduate and graduate programs enrolling currently over 16,803 men and women, and over 2,886 students receiving degrees in June 1996. But the legend of Kellogg’s Arabian horse ranch has not been lost. The agricultural tradition begun by Voorhis and McPhee continues today. Cal Poly Pomona continues to be a leader in engineering education, providing well-trained graduates to meet current needs. And with an eye to the future, Cal Poly Pomona continues to expand its programs and facilities with the modern Classroom/Laboratory/Administration Building and the Center for Regenerative Studies, recent additions to the face of the campus.

## ACCREDITATION

The university is accredited as a degree-granting institution by the Western Association of Schools and Colleges and is authorized by the California State Commission for Teacher Preparation and Licensing to recommend candidates for credentials in the following areas: Agriculture Specialist Credential, Adaptive Physical Education Credential, Bilingual/Cross Cultural Specialist Credential, Designated Subjects Credential, Business and Marketing Education, Multiple Subject Teaching Credential, Single Subject Teaching Credential, Reading Specialist Teaching Credential, Special Education Specialist Credentials, including Learning Handicapped, Severely Handicapped, and Resource Specialist Certificate.

The College of Agriculture is accredited by the American Veterinary Medical Association for its Animal Health Science program; approved by the American Dietetics Association for its Didactic Program in Dietetics; and granted developmental accreditation by the American Dietetics Association for its Dietetic Internship Program.

The College of Business Administration is accredited by the American Assembly of Collegiate Schools of Business (AACSB) for all its undergraduate and graduate programs.

The College of Engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) for its baccalaureate programs in aerospace engineering, civil engineering, chemical engineering, electrical engineering, industrial engineering, manufacturing engineering, and mechanical engineering, and by the Technology Accreditation Commission of ABET for its baccalaureate program in engineering technology. The baccalaureate program in agricultural engineering is also accredited by ABET. This program is housed in the College of Agriculture.

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

The College of Science is accredited by the American Chemical Society

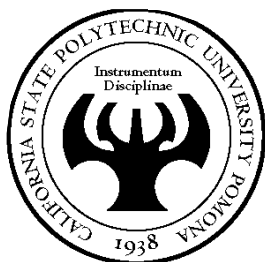
for its program in chemistry and by the Computing Sciences Accreditation Board for its program in computer science.

The School of Hotel and Restaurant Management is accredited by the Commission for Programs in Hospitality Administration for its program in Hotel and Restaurant Management.

The Animal Health Science option in the Department of Animal and Veterinary Sciences is accredited by the American Veterinary Medical Association and the California Veterinary Medical Board.

The Student Health Center is accredited by the California Cooperative Ambulatory Survey Program, jointly sponsored by the Accreditation Association for Ambulatory Care and the California Medical Association.

## THE UNIVERSITY SEAL



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

## THE UNIVERSITY SYMBOL



The California State Polytechnic University logo was created from two on-campus structures, the CLA Building and the Arabian horse barn arch, suggesting a transition into an age of innovation—a linking of the theoretical and the practical. The leaf acknowledges the past tree logo and represents our lush and unique campus. It also represents the student flourishing within the nurturing Cal Poly Pomona environment. The placement and shape of the leaf create an implied P, representing the fact that we are a polytechnic university located in Pomona. The logo is the university symbol and is used on all printed material.

## THE CAMPUS

Out of all the California State University campuses, Cal Poly Pomona may be the most unique. It spans approximately 1,400 acres and has over 60 buildings. There are numerous classrooms, a student union, an

Arabian horse center, and a multi-level library that houses over two million items including periodicals, bound volumes, and microforms. Cal Poly Pomona is considered a mid-sized campus in comparison to other schools in the Cal State system, but it often has the feel of a small, private campus. Most classroom buildings are within reasonable walking distance of one another and the campus sits in a small valley surrounded by hills, qualities that help create the sense of community one finds at this university. There are also many organizations on campus for students to become involved in and it is very easy to meet fellow students. This campus is not a large, daunting university with great halls and impersonal classrooms, but a mid-sized teaching university. The emphasis is on students and making sure they get the most out of their educational experience at this university.

While Cal Poly Pomona has the reputation of being an agricultural and engineering school, it offers a variety of other areas of study. Business, the arts, and hotel and restaurant management are just a few of the many programs offered here. Of the 16,803 students on campus, 1,765 are graduate and credential students. With a student body that comes from a variety of geographical locations and cultures, Cal Poly Pomona is a very ethnically diverse campus.

One of the most desirable qualities of Cal Poly Pomona is its location. It is near most major freeways and close to major civic centers and business districts. This makes it easily accessible for working commuters. For students looking for a diverse education with interactive teaching and the added bonus of a convenient location Cal Poly Pomona is often the right choice.

## LOCATION

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

A multi-level interchange, which is a link for the San Bernardino, Corona, Orange, Foothill, Pomona and Riverside Freeways, is located near the northeast corner of the campus. Approximately 40 minutes from the downtown areas of Los Angeles and San Bernardino, the university is also within easy freeway access from communities in Los Angeles, Orange, San Bernardino and Riverside counties. (See freeway map in the back section of the catalog.)

## CLASSROOM/LABORATORY/ADMINISTRATION BUILDING

The Classroom/Laboratory/Administration building (CLA), with its unique triangular tower and sandstone finish, is one of the most striking architectural structures on campus. The 235,000 square foot structure contains 10 lecture rooms, 40 faculty offices, an instructional television studio, and 625 computer workstations arranged in 21 computer laboratories. In addition to housing the campus Computer Resource Center and Academic Senate and Staff Council offices, the CLA is also home to various executive, business, and student affairs offices, including Admissions, Records/Evaluations, Financial Aid, Student Outreach and Recruitment, the Test Center, and Academic Affairs.

## LIBRARY

The centrally-located University Library (15) is housed in a six-story building with floor space of 204,880 square feet and reader stations for

2,604 students. The collections exceed 2.7 million items; included are 621,184 volumes, 2,106,948 microforms, 2,077 software packages, 12,313 maps, and 58,500 technical reports. The Library also houses the W. K. Kellogg Arabian Horse Collection, which consists mainly of current and out-of-print books and periodicals dealing with the Arabian Horse. The Library subscribes to 2,855 periodicals and 20 newspapers. The Library's special facilities and services include a state-of-the-art computer classroom/lab for interactive, hands-on instruction in databases and systems for information retrieval, access to a CD-ROM local area network, an on-line public access catalog, computer-assisted search services, group study rooms, lockers, photo and microform copiers, facilities for disabled students, a 24-hour computer lab, a 24-hour study lab, and information guides. Specialized workshops are periodically offered to students and faculty. Personal assistance in using the Library's resources is available at four service desks and by appointment with reference and instruction services staff. Through reciprocal lending agreements and document delivery services, students may acquire materials from other libraries. The Library is open 83.5 hours a week, Monday-Sunday. For further information, call (909)869-3074, or visit the Library's home page at <http://www.csupomona.edu/library/welcome.html>.

### AGRICULTURAL FACILITIES

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

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

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

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

The W. K. Kellogg Arabian Horse Center (29) and horse show arena are operated as an instructional facility and also used for the Sunday Arabian horse shows. The Equine Research Center (67) forms part of this complex.

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

### ARTS FACILITIES

Facilities for the College of Letters, Arts and Social Sciences (CLASS) are found in many areas of the campus. The college offices, along with the Departments of Behavioral Science and Geography and Anthropology, are located in the CLASS Building (5). Besides general classrooms and faculty offices, the building also houses the Instructional Technology and Academic Computing Center, broadcast laboratories, Social Data Center and Computer Lab, the Anthropology Lab, the Geography Lab, and the School of Education and Integrative Studies. Other college departments are located in the University Office Building (94): History

and Political Science.

The departments of Economics, Philosophy, and Communication are located on the third floor of the Administration Building (1). The offices of the student newspaper, *The Post*, are located on the Second Floor. Facilities for teaching art classes are located in the Aerospace, Chemical, and Industrial Engineering Building (12). The Learning Resource Center and related faculty offices are in the Library Building (15).

The Performing Arts Center is a two-building complex for instruction in music and theatre. The Theatre Building (25) contains a 500-seat theater, a large rehearsal room adaptable as a small central-staging theater, make-up and costume rooms, scenery shops, classrooms, and offices. The Music Building (24) includes a 180-seat recital hall, choral and orchestra rooms, faculty offices for English, music, and foreign languages, individual practice rooms, and a music library. The dance studio is located in the physical education facility.

The physical education facility (41-44) houses the Kinesiology and Health Promotion Department office and includes multipurpose buildings for instruction in physical education, athletics, and specialized health, athletic training and adaptive physical education programs. These facilities include gymnasiums, swimming pools, handball and tennis courts, fields for team sports, a track, a baseball field, a softball field, and a football field.

### BUSINESS ADMINISTRATION FACILITIES

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

### JAMES AND CAROL COLLINS CENTER FOR HOSPITALITY MANAGEMENT

The James and Carol Collins Center for Hospitality Management (79) is located atop a hill adjacent to the Kellogg West Center for Continuing Education and overlooks the Diamond Bar, Walnut, and Pomona valleys. Completed in November 1989, the 14,000 square foot facility houses a production kitchen and dining room with a 125 person seating capacity, a demonstration auditorium, a computer laboratory, a kitchen laboratory and research facility, a hotel laboratory, and faculty offices. The building was constructed through a major fund-raising effort which included leaders in the restaurant and hotel services industry. State-of-the-art kitchens provide a hands-on environment for students developing food service management techniques. Some instructional and faculty offices for the Center are located in building 94.

### COMPUTING FACILITIES

Computing resources are provided to students and faculty for educational purposes. The general computer resources under the responsibility of the Instructional and Information Technology division consists of a Digital Equipment Corporation VAXcluster (VAX 6000-430 and a VAX 6000-410) and an AT&T 3B15.

Students have access to computing specialty centers at other CSU campuses over various wide area networks. On-campus computer access can be accomplished from any of the Computing Resource Center Labs. These labs are equipped with Sun SparcStations IPC, Apple, IBM, and Unix personal computers. One lab is for the exclusive use of faculty. Off-campus access can be achieved through the network



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

### **DISTANCE LEARNING CENTER**

Cal Poly Pomona has been involved in video-based distance learning since 1984 and is nationally known for its activities. Cal Poly Pomona's Distance Learning Center, a unit of Instructional Technology and Academic Computing (ITAC), is responsible for all off-campus instruction delivered through technology.

ITAC has two specially-designed distance learning studio classrooms. Capable of transmitting live classes to receiving locations throughout the world, these studio classrooms have state of the art graphics equipment as well as a variety of audio, video and computer facilities.

Of note are Cal Poly Pomona's broadcast facilities. The university operates its own four channel instructional television system. In addition, the university transmits into five cable television systems, allowing broadcasts to some 100,000 homes. The university also has direct microwave links to Keystone Communications which permits Cal Poly Pomona to transmit its programs by satellite to locations throughout the United States and both Europe and Asia. ITAC also operates a compressed video network, which provides two-way video connections to facilities throughout the world.

In addition to technology, ITAC maintains a staff of media production specialists, instructional designers, and program specialists to support faculty and distant students.

### **ENGINEERING FACILITIES**

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

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

### **ENVIRONMENTAL DESIGN FACILITIES**

The 50,000 square foot Environmental Design Building (7) houses studio-laboratories, multipurpose research facilities, a resource center, print room, and classrooms for architecture, landscape architecture and urban and regional planning, as well as faculty offices and the college offices. Additional studios, classrooms, a shop, and photo laboratory, are located in the adjacent College of Agriculture Building (2). Graduate studies are also housed in building 71.

### **INSTRUCTIONAL TECHNOLOGY CENTER (ITAC)**

ITAC is Cal Poly Pomona's instructional technology center for teaching and learning. Cal Poly Pomona has over 50 computer access points, 50 smart classrooms, 3 television studios, multimedia design support facilities, and digital editing studios. ITAC is responsible for providing access, support, and training for technology on campus. Students have access to a wide range of computing facilities, both on the campus and remotely, via PPP access. Computers available for general student access include PCs, Macs, Sun Workstations, and Silicon Graphics workstations. Various training sessions are available every week along with

on-line and telephone support. Provisions have also been made for disabled students to access technology.

All students enrolling at Cal Poly Pomona automatically receive both an e-mail account and a publishing space for their world wide web pages. In order to activate these accounts, students must sign an ethical use statement concerning appropriate use of computer technology. ITAC also coordinates the campus technology access program in cooperation with the campus Bronco Bookstore. Computer leasing arrangements have been made to support student and faculty access to technology.

Cal Poly Pomona has been involved in distance learning since 1984 and has received national recognition. ITAC is responsible for the technical coordination of all off-campus instruction delivered through technology. ITAC has developed one of California's most advanced digital education networks, known as MediaVision, through the internet, world wide web, and enhanced broadcast capabilities.

The MediaVision group uses state-of-the-art broadcast studios, smart classroom technology, and the internet to transmit educational content all over the world. A staff of over 20 full-time professionals, including instructional designers, graphic artists, writers, producers, and engineers, support MediaVision projects on campus.

### **SCIENCE FACILITIES**

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

### **ASSOCIATED STUDENTS, INC. AND UNIVERSITY UNION**

The Associated Students, Incorporated (ASI) is a registered tax-exempt, non-profit corporation. As an auxiliary organization of Cal Poly Pomona, the primary mission of ASI is the enrichment of all students, faculty and staff. ASI is the recognized, fully representative, self-government for the entire student body. It is within this context that ASI strives to establish cultural awareness and an appreciation of the diversity within the campus community. ASI exists to encourage and be an official channel for the free exchange of ideas among the student body. ASI promotes and funds programs, services and facilities to motivate students to succeed at their educational endeavors and further personal and interpersonal growth. Programs and services provided by ASI include Student Government, the Intramural Sports Program, the Children's Center (which is a partnership between ASI and the Student Affairs Division), the ASI Business Office and the University Union.

The University Union (35) and Union Plaza (26) provide a number of recreational, programmatic and service facilities to foster out-of-classroom education for students. Through an intensive study and survey, it was found that the University Union facilities were not adequately supporting the growing needs of Cal Poly Pomona's enrolled students. Thus, an \$18.5 million University Union Improvement Project (UIIP), was developed. Phase I of the UIIP was completed in the summer of 1997, which consists of the renovation and upgrade of the Union Plaza and the University Union. During Phase II of the UIIP, slated to begin in 1998, the University Union will double in size. This phase will include a variety of food venues, a fitness center, a 24-hour study area, a movie theater, increased meeting room space, and student club/organization offices. Phase II of the UIIP project is projected to be completed in the year 2000.

The University Union houses the Information Desk/Candy Corral, the Games Room which includes video games, pool tables, ping pong, a



music and television listening lounge, ticket sales (which includes discount amusement park and movie tickets, the campus Lost & Found as well as sign and banner making supplies for campus organizations). In addition, the Union facility includes an Exhibit Gallery, the ASI Business Office (which provides financial and accounting services for student clubs and organizations, meeting rooms, a 400 seat Multipurpose Room, Bank of America and Cal Poly Federal Credit Union ATM's, a Cal Poly Pomona self service student support center, and a copy/postal center. Currently the University Union has several food venues including Oscar's (coffee house) and the Soundstage International Food Court.

The Union Plaza houses the offices for the ASI Student Government, Intramurals Sports Program, the Office of Judicial Affairs and Student Life, Rose Float, Latter Day Saints Student Association, American Marketing Association, the Interfaith Center and the Wellness Center.

The Union Plaza Annex houses Student Orientation Services which is a part of the Student Affairs Division of the University.

### UNIVERSITY OFFICE BUILDING (94)

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

### STUDENT RESIDENCE AREAS

Six residence halls (20, 21, 22, 23, 57, 58) accommodating 1184 students line University Drive. Behind the halls is a 600-seat dining hall for resident students, Los Olivos Commons (70). Overlooking the pond is La Cienega Center (59) which includes lounges and facilities for social events, plus a University Housing Services Office.

The University Village is located directly adjacent to the campus on Temple Avenue and accommodates 814 students in 27 two-story, garden-style buildings with eight apartments in each. In the center of the complex is the Village Community Center, which includes lounges and facilities for social events and quiet study, plus a Foundation Housing Services office.

### STUDENT HEALTH SERVICES

Student Health Services (46) provides ambulatory student care by qualified physicians and nurse practitioners for acute and subacute conditions by appointment and on an urgent care basis. It is open Monday and Thursday between 8 a.m. and 6 p.m., Tuesday and Wednesday 8 a.m. - 7 p.m., and Friday from 8 a.m. to 5 p.m. Services include X-ray, pharmacy, laboratory, immunizations, family planning, and health education. Most of the services are cost-free; there may be a minor charge in some cases.

Outside and after hours medical care, whether referred by Student Health Services or not, is at the student's expense. Students are strongly encouraged to have comprehensive medical insurance coverage. As a minimum, insurance available through the Associated Students, Inc. should be purchased.

The Student Health Center is accredited by the California Cooperative Ambulatory Survey Program, jointly sponsored by the Accreditation Association for Ambulatory Care and the California Medical Association.

### OFFICIAL RESIDENCE/KELLOGG HOUSE POMONA

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

### KELLOGG WEST CONFERENCE CENTER AND LODGE

The Kellogg West Conference Center and Lodge provides conference facilities for groups from ten to 350. Its location on the campus enables conferees to make use of the resources and teaching staff of the University through the College of the Extended University. The Center's facilities include air-conditioned lodges with 84 double or single occupancy rooms, a large auditorium and dining rooms accommodating 350 people. Through our professional staff of conference coordinators, businesses and organizations are offered assistance in conference planning, professional program evaluation and with locating educational resources for their training programs.

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

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

Businesses, organizations or groups interested in developing or holding a conference, institute or meeting at Kellogg West may contact the sales office at Kellogg West, California State Polytechnic University, Pomona. (909) 869-3767 or [www.theguide.com](http://www.theguide.com)

### COLLEGE OF THE EXTENDED UNIVERSITY

Cal Poly Pomona recognizes an important community need by providing access to higher education beyond the typical established patterns of regular on-campus instruction and full-time student enrollment. Through the College of the Extended University, assistance is given to organizations and individuals who seek to improve and update their career goals and competencies as well as enhance their personal and cultural enrichment through flexible educational programming.

Extended University opportunities at Cal Poly Pomona cover several broad areas including both credit and noncredit activities, external degrees, certificate programs, workshops, conferences, and on-site corporate and organizational training, as well as the familiar extension classes and the Open University Program. Admission into an Extended University program does not constitute admission to the regular sessions of the university. All programs sponsored by the College of the Extended University are self-supporting.

To receive a College of the Extended University Bulletin or further information on other educational opportunities, contact the College of the Extended University at (909) 869-2288.

### CAL POLY POMONA FOUNDATION, INC.

The Cal Poly Pomona Foundation, Inc., was organized on February 28, 1966 to provide the University with services and facilities which are an integral part of the educational program of the University but which cannot by law be financially supported by the state government. Services include: financial and administrative support to the College of the Extended University, Agriculture's Aid-To-Instruction Programs, Publications, Public Relations, International Center, Minority Engineering Program, Multifunctional Resource Center and the English Language Institute. The Foundation also manages the Bronco Bookstore, Campus Books, Food Services, Kellogg West Conference Center and Lodge and the University Village student apartment complex. Contracts and grants from private and public agencies awarded the University are also administered by the Foundation.



The Foundation operates as a public-benefit, charitable-educational organization under the provisions of the California Revenue and Taxation Code, Section 23701(d) and the United States Internal Revenue Code, Section 501(c)(3). As a recognized auxiliary of the California State University, the Foundation conforms to the regulations established by the Board of Trustees of the California State University and approved by the California State Director of Finance as required by the California Education Code, Section 89900. The University administrative organization supervises the Foundation, as required by Title 5, California Code of Regulations, Section 42601(c).

## ALUMNI ASSOCIATION

The California State Polytechnic University, Pomona, Alumni Association, Inc. is an association of graduates, former students and friends of the university. The operations of the organization are carried out by a board of directors comprised of a president, a secretary, a treasurer, eight vice presidents representing the instructional colleges/ schools of the university, one vice president representing numerous alumni charter groups, nine directors, a student representative from the Associated Students, Inc., a university representative appointed by the president of the university, and the past president of the association. Its primary purpose is to enhance the image of and provide service to the university and its alumni. Operating as a non-profit organization, this board is the voice and representation of over 70,000 alumni. Board members are elected by dues-paying alumni yearly through a mail-in ballot election and serve two (2) years when elected.

Approximately 10% of Cal Poly Pomona alumni are yearly dues-paying members and are eligible to receive many benefits such as free use of any CSU library, discount at the Career Center, membership in the university credit union, low rate group health, dental, vision and life insurance, to name a few. Alumni who wish to affiliate with a special interest group may join one of 15 chartered groups such as the Accounting Alumni, Rose Float Alumni, Hispanic Alumni, etc. The newly formed Student Alumni Delegates group assists and represents the Alumni Association at various university and alumni functions. It enables alumni to interact and integrate with students by working with a core group of student leaders who are serving as the "voice" of the students.



In addition to maintaining contact with graduates, the association sponsors the yearbook program, is responsible for alumni publications, annually honors a distinguished alumnus(a) from each college and school, promotes the alumni brick walk of fame (located between CLA building and Rose Garden) as well as merchandise, programs and other select opportunities for alumni. Other service activities include representing the alumni on several university-wide committees, the Voorhis Alumni Association scholarship, the Alice Bost Johnstone scholarship, Brick Walk Endowment scholarship and Alumni Association scholarships.

Information about the association may be obtained by writing to the Alumni Affairs Office c/o the University or by calling (909) 869-2963.

## SUMMARY REPORT ON STUDENT GRADUATION RATES - 1996

Under the state master plan for Higher Education, California State Polytechnic University, Pomona, draws its first-time freshmen from the top one-third of California's high school graduates. Since 1957, Cal Poly Pomona has awarded more than 65,929 bachelor's degrees and 6,351 master's degrees.

The number of course credit units required to complete a major program varies. For example, the minimum number of quarter units for a bachelor of arts degree is 186 (which is equivalent to 124 semester units). A bachelor of science degree requires a minimum of 198 units (which is equivalent to 132 semester units). Most undergraduate programs could be completed in four years. However, few Cal Poly Pomona students actually graduate in four years (8%), because most are balancing work, education, family and other obligations.

Our undergraduate degree programs require between 186 and 202 quarter units. Students who wish to finish college in four years must attend school each fall, winter and spring quarter and complete an average of 15.5 to 17.5 units per quarter. Rules of thumb translate these unit loads into 46.5 to 52.5 study hours per week outside of class. In addition, students who wish to graduate in four years must plan a schedule of courses with academic advisers that will enable them to progress through course sequences in their major while interweaving appropriate breadth courses in general education.

Employment and other obligations cause an increasing number of students to enroll for 12 units per quarter or less. One recent study indicated that more than 84 percent of students enrolled at Cal Poly Pomona work some portion of the week. At the same time, the number of students carrying fewer than 12 units per quarter has increased. This pattern of work and school is also reflected in the number of students who enter and continue beyond their first year. Seventy-eight percent of the first-time full-time freshmen who entered in fall 1995 were enrolled for courses in fall 1996.

For regular full-time first-time, freshmen who will eventually receive a Cal Poly Pomona baccalaureate, most will have it conferred within six years after coming to Cal Poly Pomona. For example, by fall 1996, or six years after entering Cal Poly Pomona, 38.5 percent of the fall 1990 entering freshman class had earned the bachelor's degree. Two years later in fall 1992, the Cal Poly Pomona graduation rate climbed to 56.4 percent for the fall 1984 entering class of freshmen. The final graduation statistic for the entering class of 1984 is expected to eventually reach 61.7 percent. This graduation rate is equivalent to the rates of our nation's best state universities and colleges.



## ADMISSIONS

### Application Procedures

#### ADMISSIONS PROCEDURES AND POLICIES

Requirements for admission to California State Polytechnic University, Pomona, are in accordance with Title 5, Chapter 1, Subchapter 3, of the California Code of Regulations. If you are not sure of these requirements, you should consult a high school or community college counselor or the admissions office. Applications may be obtained from the admissions office at any of the campuses of The California State University (CSU) or at any California high school or community college. Electronic versions of the CSU undergraduate and graduate applications are accessible on the World Wide Web at <http://www.calstate.edu>.

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

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

California State Polytechnic University, Pomona, will not accept hand carried transcripts. All transcripts must be mailed directly to the Admissions Office from each institution attended.

#### MEASLES/RUBELLA IMMUNIZATION REQUIREMENTS

All new and readmitted students, born on or after December 31, 1956, must present proof of live measles and rubella immunizations to Student Health Services. Although this is not an admissions requirement, it is required of students by the time of registration for the second quarter of enrollment. Registration holds are placed on the records of all students at the time of enrollment.

Persons subject to measles/rubella immunization requirements include:

- New students enrolling fall 1986 or later;
- Readmitted students re-enrolling fall 1986 or later;
- Students who reside in campus residence halls;
- Students who obtained their primary and secondary schooling outside the United States;
- Students enrolled in dietetics, medical technology, physical therapy, and any practicum, student teaching, or field work involving preschool-age children, school-age children or taking place in a hospital or health care setting.

Students may meet this requirement in one of the following ways:

1. Have their physician complete an immunization history form and mail or fax, (909)869-4561, the form to the Student Health Center, or
2. Send a copy of the California High School Immunization Record which may be obtained from the high school, or
3. Send a copy of a childhood immunization record, or
4. Send a copy of a physician's statement certifying past infection with both measles and rubella (German measles), or
5. Be immunized for both measles and rubella. Student Health Services will provide immunizations without cost to any student who is unable to obtain acceptable proof of immunization. A schedule of measles clinics is available on the Measles Information Line at (909) 869-2759.

#### UNDERGRADUATE APPLICATION PROCEDURES

Prospective students, applying for part-time or full-time undergraduate programs of study, in day or evening classes, must file a complete undergraduate application as described in the undergraduate admission booklet. The \$55 nonrefundable application fee should be in the form of a check or money order payable to "The California State University" and may not be transferred or used to apply to another term. An alternate campus and major may be indicated on the application, but applicants should list as an alternate campus only a CSU campus that also offers the major. Generally, an alternate major will be considered at the first choice campus before an application is redirected to an alternate choice campus.

#### GRADUATE AND POSTBACCALAUREATE APPLICATION PROCEDURES

All graduate and postbaccalaureate applicants (e.g., master's degree applicants, those seeking credentials, and those interested in taking graduate level courses for personal or professional growth) must file a complete graduate application as described in the graduate and postbaccalaureate admission booklet. Prospective students, applying for part-time or full-time graduate programs of study, in day or evening classes, must file a complete graduate application as described in the graduate admission booklet. The \$55 nonrefundable application fee should be in the form of a check or money order payable to "The California State University" and may not be transferred or used to apply to another term. Applicants who completed undergraduate degree requirements and graduated the preceding term are also required to complete and submit an application and the \$55 nonrefundable application fee. Since applicants for postbaccalaureate programs may be limited to the choice of a single campus on each application, redirection to alternative campuses or later changes of campus choice will be minimal. To be assured of initial consideration by more than one campus, it will be necessary for any applicant to submit separate applications (including fees) to each. Applications may be obtained from the Graduate Studies Office of any California State University campus in addition to the sources noted for undergraduate applicants.

#### REDIRECTION

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

#### IMPACTED PROGRAMS

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

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

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

## Supplementary Admission Criteria

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

The supplementary admission criteria used by the individual campuses to screen applicants appear periodically in the "CSU Review" and are sent by the campuses to all applicants seeking admission to an impacted program.

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

## UNDECLARED MAJOR

A first-time freshman may be allowed the option of either declaring a major upon application to the university, or of entering the university without a major. First-time freshmen who do not choose to declare a major at the time of application, must declare a regular academic major by the end of the third quarter in attendance at the university. They will be placed on degree requirements in effect at the time they enter the major. All undeclared major students are advised to take a course in Career and Personal Exploration (CPU 100, 4 units). Individuals who transfer to the university must declare a major upon application to the university. The central office for non-EOP undeclared majors is the University Advising Center, Building 66, Room 121, (909) 869-3211.

## 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.

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

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

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

Students who have concerns about discrimination should contact the director of Judicial Affairs, Christine Rodriguez, Building 26, Room 118, Telephone (909) 869-3358. University employees may contact the office of the associate vice president for Faculty Affairs, Building 98, Room T7-7, Telephone (909) 869-3406.

## Sex

The California State University does not discriminate on the basis of sex in the educational programs or activities it conducts. Title IX of the Education Amendments of 1972, as amended, and the administrative regulations adopted thereunder prohibit discrimination on the basis of sex in education programs and activities operated by California State Polytechnic University, Pomona. Such programs and activities include admission of students and employment. Inquiries concerning the application of Title IX to programs and activities of California State Polytechnic University, Pomona, may be referred to the associate vice president for Faculty Affairs, Building 98, T7, (909) 869-3406, the campus officer assigned the administrative responsibility of reviewing such matters or to the Regional Director of the Office of Civil Rights, Region 9, 50 UN Plaza, Room 239, San Francisco, CA 94102.

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

## 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 Americans with Disabilities Act (1990) and the regulations adopted thereunder and the Americans with Disabilities Act prohibit such discrimination. Ms. Nancy Kropf, Director of Human Resources, has been designated to coordinate the efforts of California State Polytechnic University, Pomona, to comply with the Act in implementing its regulations. Inquiries concerning compliance may be addressed to Ms. Kropf at (909) 869-3016.

## Race, Color, or National Origin

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.

## APPLICATION FILING PERIODS FOR 1997-98

Student Terms in 1997-98	Applications First Accepted	Notification Begins
Summer Qtr. 1997	Feb. 1, 1997	March 1997
Fall Sem. or Qtr. 1997	Nov. 1, 1996	Dec. 1996
Winter Qtr. 1998	June 1, 1997	July 1997
Spring Sem. or Qtr. 1998	Aug. 1, 1997	Sept. 1997

## APPLICATION FILING PERIODS FOR 1998-99

Student Terms in 1998-99	Applications First Accepted	Notification Begins
Summer Qtr. 1998	Feb. 1, 1998	March 1998
Fall Sem. or Qtr. 1998	Nov. 1, 1997	Dec. 1997
Winter Qtr. 1999	June 1, 1998	July 1998
Spring Sem. or Qtr. 1999	Aug. 1, 1998	Sept. 1998

Filing Period Duration—Each campus accepts applications until capacities are reached. Many campuses limit undergraduate admissions in any enrollment category because of overall enrollment limits. If applying after the initial filing period, consult the campus admissions office for current information.



## Application Acknowledgment

You may expect to receive an acknowledgment of your application from your first choice campus within six weeks of filing the application. You may be assured of admission if the evaluation of your qualifications indicates that you meet CSU admission requirements, and campus requirements for admission to an impacted program. Such a notice is not transferable to another term or to another campus.

## Hardship Petitions

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

## UNDERGRADUATE ADMISSION REQUIREMENTS

### First-Time Freshman Applicants

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

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

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

that expected of students who complete two years of foreign language study. Consult with your high school counselor 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 you are judged unable to fulfill a specific course requirement because of your 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 your academic adviser or guidance counselor in consultation with the director of a CSU disabled student services program. You should be aware that failure to complete courses required for admission may limit your later enrollment in certain majors, particularly those involving mathematics. For further information and substitution forms, please call the director of disabled student services at your nearest CSU campus.

### Honors Courses

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

### Test Requirements

Freshman and transfer applicants who have fewer than 56 semester or 84 quarter units of transferable college work must submit scores, unless exempt (see "Eligibility Index" on page 48), from either the Scholastic Aptitude Test (SAT I of the College Board) or the American College Test 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 early December if applying for fall admission or no later than November if applying to San Diego, San Luis Obispo or Sonoma. Test scores are also used for advising and placement purposes. Registration forms and dates for the SAT I or ACT are available from school or college counselors or from a campus testing office. Or, you may write to:

The College Board  
(SAT I)  
Registration Unit, Box 592  
Princeton, NJ 08541  
(609) 771-7588

American College Testing  
Program (ACT)  
Registration Unit  
P.O. Box 168  
Iowa City, IA 52240  
(319) 337-1270

### TOEFL Requirement - Undergraduate

All undergraduate applicants, regardless of citizenship, who have not attended schools at the secondary level or above for at least 3 years full time where English is the principal language of instruction must present a score of 500 or above on the Test of English as a Foreign Language (TOEFL). Some campuses require a score higher than 500. At California State Polytechnic University, Pomona, the minimum undergraduate score is 525. The minimum graduate score begins at 550, and varies by program. The International Center's Institute for Languages and International Training provides intensive English courses for potential students with lower scores.

### 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 admission tests, but a way to determine whether you are prepared for college work and, if not, to counsel you on how to strengthen your preparation.



Students entering fall 1997 through summer 1998 are urged to take these tests after admission and before enrolling for classes. The EPT/ELM must be taken by the end of the first quarter in attendance. Regulations regarding assessment of competence in mathematics and writing skills and placement in remedial or developmental programs/activities will change effective fall 1998. Students entering fall 1998 and thereafter are required to take these tests after admission and before enrolling for classes. 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.
- A score on the CSU English Equivalency Examination that qualifies the student for "Pass for Credit" or "Exemption" prior to July 1993.
- A score of 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 note.)
- A score of 550 or above on the Verbal section of the College Board SAT I\* Reasoning Test taken on or after April 1, 1995. (See note)
- A score of 22 or above on the ACT English Usage Test taken before October 1989 or a score of 25 thereafter.
- A score of 600 or above on the College Board Achievement Test\* in English Composition with essay taken prior to January 1994.

- A score of 600 or above on the College Board SAT II\* Writing Test taken between January 1994 and March 1995. (If taken after March 1995, see note.)
- A score of 660 or above on the College Board SAT II\* Writing Test taken on or after April 1, 1995. (See note.)
- For transfer students, completion and transfer to the CSU of a college course that satisfies the General Education Breadth requirement or the Intersegmental General Education Transfer Curriculum requirement in English composition, provided such a course was completed with a grade of C or better.

\*NOTE: 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 have been scored on a new scale.

**Entry Level Mathematics (ELM) Test**—The ELM examination tests for entry level mathematics skills acquired through three years of rigorous college preparatory mathematics coursework (normally Algebra I, Algebra II, and Geometry). All new undergraduate students must take the test or be exempted from it prior to placement in appropriate university mathematics coursework. Exemptions from the test are given only to those students who can present proof of one of the following:

- A score of 3 or above on the College Board Advanced Placement Mathematics examination (AB or BC);
- A score of 560 or above on the mathematics section of the College Board SAT taken prior to March 1994.
- A score of 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. (See note below.)

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

3.00 and above qualifies with any score. Below 2.00 does not qualify for regular admission.

GPA	ACT Score	SAT I Score	GPA	ACT Score	SAT I Score	GPA	ACT Score	SAT I Score	GPA	ACT Score	SAT I Score	GPA	ACT Score	SAT I Score
2.99	10	510	2.79	14	670	2.59	18	830	2.39	22	990	2.19	26	1150
2.98	10	520	2.78	14	680	2.58	18	840	2.38	22	1000	2.18	26	1170
2.97	10	530	2.77	14	690	2.57	18	850	2.37	22	1010	2.17	26	1170
2.96	11	540	2.76	15	700	2.56	19	860	2.36	23	1020	2.16	27	1180
2.95	11	540	2.75	15	700	2.55	19	860	2.35	23	1020	2.15	27	1180
2.94	11	550	2.74	15	710	2.54	19	870	2.34	23	1030	2.14	27	1190
2.93	11	560	2.73	15	720	2.53	19	880	2.33	23	1040	2.13	27	1200
2.92	11	570	2.72	15	730	2.52	19	890	2.32	23	1050	2.12	27	1210
2.91	12	580	2.71	16	740	2.51	20	900	2.31	24	1060	2.11	28	1220
2.90	12	580	2.70	16	740	2.50	20	900	2.30	24	1060	2.10	28	1220
2.89	12	590	2.69	16	750	2.49	20	910	2.29	24	1070	2.09	28	1230
2.88	12	600	2.68	16	760	2.48	20	920	2.28	24	1080	2.08	28	1240
2.87	12	610	2.67	16	770	2.47	20	930	2.27	24	1090	2.07	28	1250
2.86	13	620	2.66	17	780	2.46	21	940	2.26	25	1100	2.06	29	1260
2.85	13	620	2.65	17	780	2.45	21	940	2.25	25	1100	2.05	29	1260
2.84	13	630	2.64	17	790	2.44	21	950	2.24	25	1110	2.04	29	1270
2.83	13	640	2.63	17	800	2.43	21	960	2.23	25	1120	2.03	29	1280
2.82	13	650	2.62	17	810	2.42	21	970	2.22	25	1130	2.02	29	1290
2.81	14	660	2.61	18	820	2.41	22	980	2.21	26	1140	2.01	30	1300
2.80	14	660	2.60	18	820	2.40	22	980	2.20	26	1140	2.00	30	1300



- A score of 560 or above on the College Board Mathematics Achievement Test\*\* Level I or Level II taken prior to March 1994.
- A score of 24 or above on the ACT Mathematics Test taken prior to October 1989.
- A score of 25 or above on the enhanced ACT Mathematics Test taken October 1989 and later.
- For transfer students, completion and transfer to the CSU of a college course that satisfies the General Education-Breadth requirement or the Intersegmental General Education Transfer Curriculum requirement in Quantitative Reasoning, provided such course was completed with a grade of C or better.

\*\*NOTE: 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.

Failure to take either of these tests, as required, before the end of the first semester or first quarter of enrollment may lead to administrative probation, which, according to Section 41300.1 of Title 5, California Code of Regulations, and CSU Executive Order 393, may lead to disqualification from future attendance. At Cal Poly Pomona, students who fail to satisfy requirements by the end of their first quarter of enrollment will have a hold placed on their records. While a student's records are on hold, registration may not be allowed nor transcripts of credits be released.

Students entering in or after fall 1998 come under the mandate of Executive Order 665 which states that all non-exempt students shall be required to take the EPT and ELM examinations after admission and before enrollment in classes at Cal Poly Pomona. A hold will be placed on the student's record and registration will not be permitted for any courses.

### Graduation Requirement in Writing Proficiency

All students must demonstrate competency in writing skills as a requirement for graduation. See the catalog section on the Graduation Writing Test (GWT) Requirement, or the Test Center, Building 98, Room P2-4, for additional information.

### High School Students

Students still enrolled in high school will be considered for enrollment in certain special programs if recommended by the principal and the appropriate campus department chair and if preparation is equivalent to that required of eligible California high school graduates. Such admission is only for a given program and does not constitute the right to continued enrollment.

### Adult Students

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

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

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

English language and mathematical computation.

### Grade Point Average and Test Score Requirement

**Eligibility Index**—The eligibility index is the combination of your high school grade point average and your score on either the American College Test (ACT) or the Scholastic Aptitude Test (SAT 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"). 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.

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 composite score from the ACT. If you are a California high school graduate (or a resident of California for tuition purposes), you need a minimum index of 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 legal resident of California for tuition purposes, you need a minimum 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.

### Provisional Admission

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

### Nonresidents

Applicants who are neither residents for tuition purposes nor graduates of a California high school, need a minimum eligibility index of 842 (ACT) or 3502 (SAT). If your high school GPA is above 3.60 you are exempt from the test requirement.

## UNDERGRADUATE TRANSFER ADMISSION REQUIREMENTS

### Transfer Requirements

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

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

- 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.
- You have completed at least 56 transferable semester (84 quarter) units and meet the requirements listed below based on high school graduation date. Nonresidents must have a 2.4 grade point average or better.

Applicants who graduated from high school 1988 or later:

- Have completed all subject requirements in effect when graduating from high school (can use both high school and college coursework)
- OR,
- 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 requirements 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 any CSU admissions office for further information about alternative ways to satisfy the subject requirements.

### 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 all of the UC college preparatory (a-f) requirements.

### Articulation

The Articulation office produces annual course articulation agreements in consultation with our top ten feeder community colleges and Cal Poly Pomona academic officials and faculty. The articulation information is also posted to the Cal Poly Pomona World Wide Web site for easy access both on and off campus. The address is <[www.csupomona.edu/artic/title.html](http://www.csupomona.edu/artic/title.html)>. The Articulation office also contributes information to Project ASSIST, an extensive statewide articulation database.

## 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 academic standing at the last college or university attended; (3) have attained a grade point average of at least 2.5 (A = 4.0) in the last 60 semester (90 quarter) units attempted; and (4) satisfactorily have met 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 you meet the minimum requirements for graduate and postbaccalaureate studies, you will be considered for admission in one of the four following categories:

- Postbaccalaureate Unclassified**—To enroll in graduate courses for professional or personal growth, you must be admitted as a postbaccalaureate unclassified student. By meeting the minimum requirements, you are 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; or
- Postbaccalaureate Classified**—If you wish to enroll in a credential or certificate program, you will be required to satisfy additional professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus; or
- Graduate Conditionally Classified**—You may be admitted to a graduate degree program in this category if, in the opinion of appropriate campus authority, you can remedy deficiencies by additional preparation; or
- Graduate Classified**—To pursue a graduate degree, you will be required to fulfill all of the professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.

### TOEFL Requirement - Graduate

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

### International (Foreign) Student Admission Requirements

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

The CSU uses separate requirements in the admission of international (foreign) students. Verification of your English proficiency (see the section on TOEFL Requirement for undergraduate applicants), financial resources, and academic performance are all important considerations. Academic records from foreign institutions must be on file at least eight weeks prior to the beginning of the term applied for, and, if not in English, must be accompanied by a certified English translation.





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

1. Application forms can be obtained from the Admissions Office.  
Note: All documents and test scores must be submitted at least eight weeks prior to the beginning of the term applied for.
2. All undergraduate visa student applicants must earn a score of at least 525 on the Test of English as a Foreign Language (TOEFL). Graduate applicants must earn a score of at least 550 and certain academic departments may require higher scores. All students are required to pass the Graduation Writing Test in order to be granted their degree. Certain academic departments may be closed to visa students when it is determined that the departments have inadequate space to meet the needs of California residents.
3. Applicants who have not completed any schooling beyond the twelfth year must submit transcripts for all studies or examinations completed in the tenth through twelfth years of schooling.
4. Applicants who have completed university or college work beyond the twelfth year, whether completed in the U.S. or not, must submit transcripts of all college level work in addition to the documents required of freshmen.
5. Visa students who were granted F or J visas on the basis of their admission to another college or university are expected to complete at least one quarter or semester at that institution. Visa students who are transferring from another U.S. college or university will not be considered for admission unless they have earned at least a 2.5 GPA.
6. Permission to transfer from one school to another must be obtained in accordance with the regulations of the United States Immigration Service.
7. The U.S. Immigration Service requires undergraduate F or J visa students to carry a minimum study load of 12 quarter units. Visa students in graduate programs must carry not less than 8 units. Students are also subject to disqualification for failing to make satisfactory progress.
8. All F or J visa students are required to carry health insurance.

Prospective students who wish further information should contact the International Student Advisor in the International Center.

### Insurance Requirement

Effective August 1, 1995, as a condition of receiving an I-20 or IAP-66 form, all F-1 and J-1 visa applicants must agree to obtain and maintain health insurance as a condition of registration and continued enrollment in the California State University. Such insurance must be in amounts as specified by the United States Information Agency (USIA) and NAFSA: Association of International Educators. The campus President or designee shall determine which insurance policies meet these criteria. Further information may be obtained from the International Center, Building 1, Room 104.

### International Baccalaureate

International Baccalaureate courses designated as honors courses on the UC "a-f" list are awarded extra grade points for computation of the high

school grade point average. In addition, advanced placement may be awarded for Higher Level Diploma subjects with a score of five or higher.

### Other Applicants

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

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

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

### Reapplication After Failure to Enroll

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

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

### Returning Students

Students who have been absent without prior approval for more than two quarters during a calendar year (including Summer) prior to the quarter of reapplication must apply for readmission. An application fee is charged before re-entry in such cases. An application with fee also must be filed by any student who enrolls elsewhere during an absence, with the following exceptions: (1) a summer session or extension program; (2) dual registration, with prior approval; (3) concurrent or visitor enrollment in another California State University. A student who was disqualified following the last term of attendance and has not been enrolled for more than two quarters during a calendar year (including summer) must file an application for re-admission as a returning disqualified student.

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

### Returning Veterans (Military or Alternative Service)

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

### Transfer Within State Universities or Colleges

Students enrolled in a California State University are eligible for

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

### Visitors Within CSU

Students enrolled at any California State University may transfer temporarily to another CSU campus in visitor status, if they have completed 12 units with a 2.0 grade point average at the home campus, are in good standing, and are eligible to register in continuing status. Visitor transfers are approved for one term only and are subject to space availability and enrollment priority policies at the host campus. Enrollment as visitor transfers may be repeated after re-enrollment at the home campus. This opportunity may be particularly valuable to students whose educational progress can be enhanced by attending a full summer quarter at Cal Poly Pomona. Concurrent enrollment (see below) is not permitted during visitor status. Current Cal Poly Pomona students wishing to transfer temporarily to another CSU campus should obtain the appropriate form from the Records Office. Visitor forms are to be approved at the home campus.

### Concurrent Enrollment Within CSU

Students enrolled in any California State University may enroll concurrently at another CSU campus if they have completed 12 units at the home campus with a 2.0 grade point average and are in good standing. Concurrent enrollment is approved for a specific term, subject to space availability and registration priority policies at the host campus. Because of overlap in academic terms of campuses on semester and quarter calendars, concurrent enrollment is subject to combinations and conditions described in the concurrent enrollment application forms available from the Records Office, (909) 869-3000. Concurrent enrollment applications are to be approved at the home campus.

### Cross Enrollment at University of California or California Community Colleges

Undergraduate students enrolled in the California State University may enroll, without formal admission and without payment of additional State University Fees, in a maximum of one course per academic term at a campus of either of the other systems on a space available basis and at the discretion of the appropriate campus authorities on both campuses. Enrollment in pre-collegiate courses is excluded.

A student is qualified to cross enroll if the student has met all of the following requirements.

- 1) completed at least one term at the home campus as a matriculated student
- 2) enrolled for a minimum of six units for the current term
- 3) earned at grade point average of 2.0 (grade of C) for work completed
- 4) paid appropriate tuition and fees at home campus for the current term
- 5) completed appropriate academic preparation as determined by host campus
- 6) is a California resident

Details on cross enrollment conditions and procedures are available from the Admissions and/or Registrar's Office.

### Provisional Admission

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

### Determination of Residence for Nonresident Tuition Purposes

The campus Admissions Office determines the residence status of all new and returning students for nonresident tuition purposes. Responses to the Application for Admission, 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 California Education Code Sections 68000-68090, 68121, 68123, 68124, and 89705-89707.5, and in Title 5 of the California Code of Regulations, Sections 41900-41912. A copy of the statutes and regulations is available for inspection at the campus Admissions Office.

Legal residence may be established by an adult who is physically present in the state and who, at the same time, intends to make California his or her permanent home. Steps must be taken at least one year prior to the residence determination date to show an intent to make California the permanent home with concurrent relinquishment of the prior legal residence. The steps necessary to show California residency intent will vary from case to case. Included among the steps may be registering to vote and voting in elections in California; filing resident California state income tax forms on total income; ownership of residential property or continuous occupancy or renting of an apartment on a lease basis where one's permanent belongings are kept; maintaining active resident memberships in California professional or social organizations; maintaining California vehicle plates and operator's license; maintaining active savings and checking accounts in California banks; maintaining permanent military address and home of record in California if one is in the military service.

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

In general, an 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 an unmarried minor who has a parent living cannot be changed by the minor's own act, by the appointment of a legal guardian, or by the relinquishment of a parent's right of control.

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

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

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

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

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

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

There are several exceptions from nonresident tuition, including:

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Certain credentialed, full-time employees of California school districts.
- 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.
- Certain exchange students.
- 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 wishing to dispute a final campus decision on residence classification only, may appeal in writing to the Office of General Counsel (address below) within 120 calendar days of the campus decision.

The California State University  
Office of General Counsel  
400 Golden Shore  
Long Beach, CA 90802-4275

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

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

### Use of Social Security Number

Applicants are required to include their Social Security number in designated places on applications for admission pursuant to the authority contained in Section 41201 of Title 5, California Code of Regulations and Section 6109 of the Internal Revenue Code. The Social Security 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. Also, the Internal Revenue Service requires the University to file information returns that include the student's social security number and other information such as the amount paid for qualified tuition, related expenses, and interest on educational loans. That information is used to help determine whether a student, or a person claiming a student as a dependent, may take a credit or deduction to reduce federal income taxes.

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.

### TEACHER CREDENTIAL PROGRAMS

(See also School of Education and Integrative Studies section)

## General Information

The University is authorized by the California Commission on Teacher Credentialing (CCTC) to recommend qualified teacher candidates for the Multiple Subjects, Single Subject and Special Education (Mild/Moderate or Moderate/Severe) teaching credentials. All students seeking credentials must meet the Commission and University-approved program requirements.

To obtain a comprehensive overview of credential program requirements and admission materials, prospective candidates must attend one of the weekly program orientations hosted by the Department of Teacher Education each quarter. Please contact the Department of Teacher Education Admissions Office (909) 869-2324, Bldg. 5 -223A for place, dates, and times of the orientations. Candidates are urged to obtain early advisement for assistance in identifying acceptable alternatives for meeting the requirements and other pre-requisites to the program.

The prospective Multiple Subjects, Single Subject or Special Education teachers must choose a major, be accepted to the Teacher Education Program, meet Subject Matter Program requirements and successfully complete the professional education program (TED) and all other pertinent requirements to gain university recommendation for a credential.

Subject Matter Programs Approved for Multiple Subjects or Special Education Credentials:

Liberal Studies (pre-credential options) See department chair for further information, Building 94 - 321, (909) 869-3567.

Philosophy (pre-credential option) See department chair for further information, Building 1, 319B, (909) 869-4766.

Persons with majors other than pre-credential options in Liberal Studies or Philosophy who plan to earn a Multiple Subjects Credential must pass the Multiple Subjects Assessment Test (MSAT) prior to applying to the student teaching component of the TED program or complete a Liberal Studies or Philosophy subject matter program prior to student teaching. The chairs of these departments can also provide pre-program advice to students even though they plan to major in other disciplines.

Subject Matter Programs approved for Single Subject or Special Education Credentials

See the respective department chair for further information about pre-credential programs in:

Agricultural Education  
Business Education  
Food, Nutrition and Consumer Science (Home Economics)  
English  
History  
Science: Biology, Chemistry, Earth Science, Physics  
Mathematics  
Music  
Physical Education

The pre-credential Subject Matter Program is listed in the catalog under the appropriate department.

Persons with majors other than pre-credential options in the appropriate Single Subject discipline must pass the appropriate Single Subject Assessment Test (SSAT) and/or PRAXIS Exam prior to applying to the student teaching component of the TED program or complete the appropriate Subject Matter Program prior to student teaching.

Students seeking a Special Education (Mild/Moderate or Moderate/Severe) may use any pre-credential option major to meet the Subject Matter Requirements for the Special Education Credentials. Likewise, passage of either the MSAT or Single Subject SSAT/PRAXIS exams in any approved Single Subject area will meet the Subject Matter Requirements for Special Education.

## Courses Required for Credential Programs

(Subject to change)

In addition to courses required for the major, students must take units of professional education courses (TED) to gain university recommendation for the appropriate teaching credential. Please consult the designated Multiple/Single Subject or Special Education credential advisor for complete information, Building 5, Room 223A, (909) 869-2303.

Normally, students begin the professional education course series (TED) when they are beginning juniors. A list of the required professional education courses in the series is available in the Department of Teacher Education.

## Admission to Candidacy for a Teaching Credential

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

- 1) Admission to Cal Poly Pomona;
- 2) Formal admission to the program;
- 3) Formal admission to student teaching; and
- 4) Application for the credential.

Students must apply for program admission during the open admission period established by the School of Education and Integrative Studies for the Multiple, Single Subject, and Special Education Credential programs. Information regarding application deadlines can be obtained from the School of Education and Integrative Studies.

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

1. BACHELOR'S DEGREE: Possession of a bachelor's degree substantially equivalent to, or received from California State Polytechnic University, Pomona, in the discipline that he or she wishes to enter.
2. PREREQUISITE COURSES AND FIELD EXPERIENCE: Evidence of satisfactory completion of prerequisite courses and early field experience.
3. PERSONAL ADJUSTMENT: Evidence of satisfactory personal adjustment, habits, interests, and attitudes as shown by evaluation instruments, observations, interviews, and faculty ratings.
4. SCHOLARSHIP: Satisfactory scholarship on all work accepted by the University toward curriculum requirements must be evident. Undergraduates applying for the program will have an overall grade point average based on their major. Check with the Department of Teacher Education Admissions Office for specific information. In all courses taken during the fifth year, an overall grade point average of 3.00 must be maintained.





5. **PHYSICAL FITNESS:** Evidence of good physical health, to be shown before the time of student teaching.
  6. **GENERAL EDUCATION REQUIREMENTS:** Satisfactory grades and progress toward completing degree requirements in general education and the selected major.
  7. **PROFESSIONAL ATTITUDE:** Evidence of ability and willingness to work with pupils, parents and school officials through experience in working with youth activities.
  8. **PE 441/442—SCHOOL AND COMMUNITY HEALTH, TED 501—INTRODUCTION TO EXCEPTIONALITY, or TED551/551A SPECIAL POPULATIONS and GED 505—EDUCATIONAL COMPUTER TECHNOLOGY:** Must be completed before issuance of the clear credential.
  9. **CALIFORNIA BASIC EDUCATION SKILLS TEST (CBEST):** All candidates (undergraduate and graduate) will be required to pass the CBEST prior to application to the program.
  10. **GRADUATION WRITING TEST (GWT):** The GWT is required by the University for all baccalaureate and master's degrees. However, graduate students seeking a credential only are not required to take the GWT.
  11. **U.S. CONSTITUTION:** Verification of knowledge of the United States Constitution by passing a college-level examination or taking a college-level course (PLS 201—Introduction to American Government) in this subject.
  12. **Effective October 1, 1998 Multiple Subjects Credential candidates** will be required to pass the Reading Instruction Competence Assessment (RICA) before being recommended for a credential . Contact the Department of Teacher Education for details.
- NOTE:** Changes in the State and California State University requirements for teacher preparation occur from time to time. These changes can have



a major impact on the course requirement, GPA, etc. needed to enter Cal Poly Pomona's Teacher Education program for both Single, Multiple Subject, and Special Education credentials subsequent to the publication of this catalog. For up-to-date information, please contact the School of Education and Integrative Studies (909) 869-2312.



## REGISTRATION

### General Procedures

This university employs an early registration plan whereby students schedule classes and pay fees approximately six to eight weeks before the beginning of a quarter. Those students who preschedule their classes will receive fee bills in the mail. Registration fees **MUST** be received in the university Cashier's Office not later than the deadline date indicated on the fee statement. Postmarked dates are not acceptable.

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

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

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

### Placement Examinations (English Placement Test, Entry Level Math)

All students entering fall 1997 through summer 1998 must take the EPT/ELM. Exceptions to this rule are listed in the catalog section "Requirements for Bachelor's Degree." Students who do not take the EPT/ELM, and who are not excused from taking the examinations, will not be able to enroll in any English or mathematics course at the University. Students who do not take the examination within the first two quarters of their enrollment will receive a hold. While the student's records are on hold, registration may not be allowed, nor will transcripts of credits be released.

Students entering in or after fall 1998 come under the mandate of Executive Order 665. The new regulations state that all non-exempt students shall be required to take the EPT/ELM examinations after admission and before enrollment in classes at Cal Poly Pomona. Any student who is required to take the EPT/ELM exam, and does not do so between admission and before enrollment, will have a hold placed on their record and registration will not be permitted for any courses.

Those students who do not demonstrate the requisite competence in English and mathematics must enroll in appropriate remedial or developmental courses. These courses must be taken during the student's first term of enrollment and each subsequent term until such time as they demonstrate competence.

### Math Diagnostic Placement Test (MDPT)

See Mathematics Department for MDPT test and placement information.

### Concurrent Enrollment

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

### Maximum Unit Load

The maximum number of units an undergraduate student normally takes in any one quarter is 16, including audited courses and concurrent or dual work at other colleges or universities. Students may pre-register through the BANNER telephone registration system for up

to 16 units, additional units may added with individual instructors once the quarter begins. The normal maximum course load for graduate students is 12 units.

### Adding or Dropping Courses

Students who register by phone and pay fees on time are mailed a study list shortly before classes begin each quarter. Any changes to the schedule during the first eight days of the quarter must be made by filing a properly completed program change form with the Records Office on or before the appropriate deadline published in the academic calendar and the Schedule of Classes. Pre-registered students who do not appear in class the first day of the quarter (no-shows) are ordinarily dropped from the class roll by the instructor. However, the responsibility for properly dropping classes ultimately rests with each student. Students who do not drop a scheduled class which they are not attending are subject to receiving a failing grade. Change of program forms are available from the student's major department office. See also the section regarding refund of fees.

Courses may be added or sections changed through the eighth class day. Students may drop a class without penalty (no entry on student's record) through the fifth calendar day of the quarter, with the signature of the instructor. After the 15th day of instruction, students may petition to drop a class only for serious and compelling reasons. Permission to drop during this time period will be granted only with the approval of the professor and the student's major department chair and college dean. All requests for permission to drop under these circumstances and all approvals will be made in writing on a petition to drop. A statement of the reason(s) for dropping is required. For a course dropped during this period, a "W" grade will automatically be recorded.

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

Failure in a course is not an acceptable reason for withdrawing from class during the last 15 days of instruction. Ordinarily dropping of courses during this time period will involve total withdrawal from the university. If a student does not have a validated withdrawal petition on file in the Records Office, the "W" grade will not appear on the final grade report. The administrative grade of "U" will be shown. For explanation of these grading symbols, see catalog section "Grading System." A student may improve the GPA, as a consequence of his or her receiving an F, by formally repeating the course. See "Repeated Course Policy."

### Auditing Courses

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

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



## Holding of Records

Student records may be placed on a hold status because of financial or other obligations to the university. Depending on the severity of the hold, registration, grades, graduation, transcripts, and accounts receivable may be affected. Students are notified of their registration-related holds when they are issued a registration ticket for touchtone registration. It is the responsibility of the student to clear a registration hold prior to attempting to register. Other types of holds will be noted in the student record file and it is the responsibility of the student to fulfill hold obligations prior to receiving certain services within the university. All holds are cleared by the department that issued the hold. Legal authority for these actions is cited in Sections 42380 and 42381 of Title V of the California Code of Regulations.

## Transfer to Other Institutions

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

## Leave of Absence (Planned Educational Leave)

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

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

The reason for requesting a leave must be stated completely and clearly. Students may petition for a leave of absence for such reasons as: professional or academic opportunities, like travel or study abroad, employment related to educational goals and major fields of study, or participation in field study or research projects; medical reasons, including pregnancy, major surgery, or other health-related circumstances; and financial reasons, such as the necessity to work for a specified period in order to resume study with adequate resources. Approval will depend upon the significance of the leave in furthering the student's educational objective. It is the student's responsibility to demonstrate the significant relationship between the leave of absence and the progress toward the educational objective. Leaves may be granted for a maximum of two years or eight consecutive quarters. A request for leave of absence must be filed prior to the period of absence. Retroactive leave requests will not be approved.

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

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

## Withdrawal from the University

Students who desire to withdraw from the university for the quarter because of personal, academic or other problems should consult with, and obtain forms from the University Advising Center, Rooms 119 and 124. After official clearances are received by the student, the withdrawal application is submitted to the Records Office. Students leaving the university who do not officially withdraw are subject to failing grades in their classes. Students who withdraw from the quarter after the fifth day of classes will receive a "W" on their permanent records.

## Return to University

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

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

Students must have no more than a total of 36 units to take under this policy; 24 (or less) from the major curriculum plus 12 upper division units for Area 2D and Area 5 in General Education, if not already completed.

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

If a student wishes to complete requirements at another institution, that work must be completed within one (1) semester or two (2) quarters of last enrollment at Cal Poly Pomona.

## Refunds

Any student who withdraws from the university or drops to 6.0 units or less before the end of the 15th calendar day of the quarter is entitled to a refund of a portion of registration fees paid. A nonresident or foreign student who withdraws from the university or who drops units during the first four weeks of a quarter is entitled to a refund of a portion of tuition paid. A student must file an application for a refund with the Records Office at the time of withdrawal or dropping of units to be eligible for a refund. Refunds may not be processed after the published deadline found in the academic calendar and in the schedule of classes each quarter.

## Enrollment Priorities

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



### Change of Major

Students have the opportunity, upon determining that they are pursuing a course of study in which they are not interested, to change to another major. However, students are not able to change to an Undeclared Major

status. In such cases, students should consult their advisors and the University Advising Center, Building 66, Rooms 119-124 for assistance in making the change. Students enrolled under certain laws must obtain approval by the Veterans Administration before a change of major can be



made.

Transfer from one major to another does not in any way change the student's scholastic standing, nor does it constitute a break in continuous enrollment. However, students who change major are subject to the core and support requirements in effect at the time of the change of major. Also see, the "General Education" section in this catalog regarding transfer and change of major students and GE certification.

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

### Curriculum Deviation

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

### Election of Regulations

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

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

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

All colleges/schools evaluate incoming students on the current curriculum for their major/core and support areas. Questions on this matter should be directed to the student's advisor or department chair.

For additional information on compliance see the Associate Vice President for Academic Programs, Building 98, (909) 869-3330.

### Full-Time Equivalent and Full-time Student

Enrollment in the California State University is measured in full-time equivalent (FTE) students. One FTE is the equivalent of 15 units of student course credit taken by one or more students. One FTE could represent one student carrying 15 course-units, three students each carrying five course-units, five students each carrying three course-units, or any other student/course-unit combinations the product of which equals 15 course-units. The university's FTE enrollment is the total course-units taken by all students divided by 15.

FTE is not related to full-time student status. An undergraduate student is considered full-time for such purposes as veterans' benefits, social security benefits, athletic eligibility and other financial aids when

enrolled for 12 units of credit. A full-time student is not necessarily a full-time equivalent (FTE) student. Graduate students and some, but not all, categories of postbaccalaureate students are considered full-time for many purposes when they are enrolled for eight units.

### Privacy Rights of Students in Education Records

The federal Family Educational Rights and Privacy Act of 1974 (20 U.S.C. 1232(g)) and regulations adopted thereunder (34 C.F.R. 99) and California Code of Regulations, Section 67100 et seq., set out requirements designed to protect the privacy of students concerning their records maintained by the campus. Specifically, the statute and regulations govern access to student records maintained by the campus, and the release of such records. In brief, the law provides that the campus must provide students access to records directly related to the student and provide the student with an opportunity for a hearing to challenge such records on the grounds that they are inaccurate, misleading or otherwise inappropriate. The right to a hearing under the law does not include any right to challenge the appropriateness of a grade as determined by the instructor. The law generally requires that written consent of the student be received before releasing personally identifiable data about the student from records to other than a specified list of exceptions. The institution has adopted a set of policies and procedures concerning implementation of the statutes and the regulations on the campus. Copies of these policies and procedures may be obtained from the Director of Enrollment Services. 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. Directory information at Cal Poly Pomona does not provide the student's address, telephone listing, or date and place of birth. 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 that the student does not want the information released. Written objections should be sent to the Registrar.

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.





## EXPENSES AND HOUSING

SCHEDULE OF FEES, 1996-97 (Up-to-date information available from Office of Recruitment Services).

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

### All Students

Application Fee (nonrefundable), payable by check or money order at time of application is: \$55

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

Units	Per Semester	Per Quarter	Per Academic Year
<b>All Students:</b>			
0.1 to 6.0	\$438	\$292	\$876
6.1 or more	\$753	\$502	\$1,506

Nonresident Students (U.S. and foreign)

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

	Quarter	Semester
Charge Per Unit	\$164	\$246

The total fee paid per term will be determined by the number of units taken, including those in excess of 15.

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.

### Credit Cards

Visa and Master Card bank credit cards may NOT be used for payment of student fees at Cal Poly Pomona.

### MISCELLANEOUS FEES (Subject to change)

Application to the university (charged of all applicants—payable by check or money order at time of applying—nonrefundable)	\$55.00
Check returned for any cause	30.00
Course credit by special examination (per unit)	5.00/unit, \$25 maximum
Failure to meet administratively required appointment or time limit	20.00
Commencement (not a state fee, mandatory, non-refundable)	
Bachelor's degree	10.00
Master's degree	10.00
Diploma fee	8.00
Health facility fee (per quarter)	2.00
Student Health fee (each quarter)	45.00
I.D. card (lost/replacement \$15)	5.00
Late registration	25.00
Late registration fee for adding courses beyond deadline (per class)	10.00
Library	See schedule in library
Lost book fees excessive use fee + replacement cost +	\$13.30

service charge	
Parking fee (per quarter)	
Automobiles	36.00
Motorcycles/Mopeds	9.00
Transcript of record	4.00
Associated Students, Inc. membership fee (not a state fee)	
Fall quarter	18.00
Winter, Spring quarter, each	12.00
Summer quarter	5.00
University Union fee (not a state fee)	
Fall, Winter, Spring quarter	42.00
Summer quarter	9.00
Instructionally Related Activities Fee:	
Fall quarter	16.00
Winter quarter	12.00
Spring quarter	12.00
American Dietetics Association Transcript Evaluation Fee	
Enrolled students	20.00
Non-Cal Poly Pomona students	25.00
Credential Evaluation (non-Cal Poly Pomona students)	25.00
Credential Processing Fee	25.00
Emergency Credential Processing Fee	15.00
Education Code, Section 23801	
Education Code, Section 23805	
Sponsored Program Fee per quarter (for certain foreign students only)	200.00

Dependent on the time of withdrawal from the university, a student may be entitled to a partial refund of fees if applied for at the time of withdrawal. (See section on Withdrawal from the University.) There may be specially related fees in selected courses. Such fees will be listed in the course description.

### Procedures for the Establishment or Abolishment of a Student Body Fee

The law governing The California State University provides that a student body fee may be established by student referendum with the approval of 2/3 of those students voting. The Student Body Fee was established at California State Polytechnic University, Pomona, by student referendum on May 9, 1952. The same fee can be abolished by a similar 2/3 approval of students voting on a referendum called for by a petition signed by 10 percent 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 the students voting. Student body fees support a variety of cultural and recreational programs, child care centers, and special student support programs.

### Refund of Fees

Details concerning fees which may be refunded, the circumstances under which fees may be refunded, and the appropriate procedure to be followed in seeking refunds may be obtained by consulting the Schedule of Classes for the applicable quarter. Refunds for students receiving financial aid will be determined according to federal state and University guidelines. Detailed information concerning financial aid policies for refunds may be obtained from the Office of Financial Aid. Students must apply for a refund, and in all cases it is important to apply quickly. Information concerning refund of fees and forms may be obtained at Student Accounts/Cashier Services. All refund requests are processed according to the deadlines posted each quarter.

### Nonresident Tuition Fee Waiver

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

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

### Expenses (Estimated)

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

The total cost for students living away from home will vary. However, typical costs will amount to approximately \$9,200 for a three-quarter school year, excluding personal and transportation expenses.

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

### Typical On-Campus Expenses for One Quarter

Associated Students, Inc. membership fee (not a state fee)	
Fall quarter	18.00
Winter, Spring quarter, each	12.00
Summer quarter	5.00
State University Fee	
Undergraduate	
0-6.0 units	306
6.1 and over	528
Graduate	
0-6.0 units	306
6.1 and over	528
Residence Halls (19 meals per week—	
1998-99 double occupancy)	5,550
University Village Apartments (1996-97 double occupancy)	2,340
Utilities (estimated)	600
Books and supplies (estimated)	250
Parking	36*
Health Facility Fee	2
Student Health Fee each quarter	35
Instructionally Related Fee—Fall	16
Winter/Spring	12

Provision should be made for personal expenses which average \$300 per quarter.

The student majoring in one of the environmental design disciplines should be prepared for expenditures that are somewhat greater than average. Experience has indicated that students spend from \$150 to

\$250 per quarter for materials, equipment, and supplies during their initial year as environmental design students.

### Debts Owed to the Institution

Should a student or former student fail to pay a debt owed to the institution, the institution may "withhold permission: to register, to use facilities for which a fee is authorized to be charged, to receive services, materials, food or merchandise or any combination of the above from any person owing a debt" until the debt is paid (see 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 Student Accounts/Cashier Services. The Office of Student Accounts/Cashier Services 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.

The university on-campus residential program emphasizes educational programs as part of the total living experience. Concern for the student's personal, social, and intellectual development has resulted in a vigorous housing program based on student interests and involving live-in student and full-time staff. Community governments, social events, cultural and recreational efforts, and community living complement the academic schedule to create a living and learning environment in the residence halls at Cal Poly Pomona.

### UNIVERSITY HOUSING SERVICES - Residence Halls

Each of the six air-conditioned, smoke-free halls accommodate approximately 200 students in comfortable double occupancy. In addition, two halls provide triple rooms at a substantial savings. Recreation and lounge facilities are provided for each hall, as are convenient laundry facilities, refreshment vending machines, kitchenettes, ironing, and study rooms. Each room is equipped with premium television service. Rooms in Palmitas and Cedritos Halls are equipped with a high speed ethernet connection for each student.

Theme interest floors are available including alcohol-free, first-year involvement, computer interests, health and fitness, and academic enhancement. All of the residence halls are "year round" for students who wish to stay on campus during academic break periods. Student rooms are fully furnished with beds, dressers, closets, bookcases, desks and chairs. Other benefits include a state-of-the-art fitness center, a swimming pool, volleyball and basketball courts, and reserved parking for residence hall students.

The centrally located Los Olivos Dining facility provides the convenience of complete meal service. Breakfast, lunch and dinner are offered weekdays with brunch and dinner on the weekends. Residents choose one of the following meal plans at Los Olivos: DAILY DINER – 19 meals per week plus \$50 in Bronco Bucks. The best value, a great plan if you live in the dorms. CASUAL DINER – You choose which 14 of



the 19 meals offered each week plus receive \$75 in Bronco Bucks. A good choice for those who leave campus on the weekends. **DROP-IN DINER** – Choose any 10 of the 19 meals offered each week plus get \$100 in Bronco Bucks. The bonus Bronco Bucks may be spent at other food service locations on campus, giving you flexibility with your meal plan. Meal Plans are also available to students who live off campus or at University Village Apartments.

Cedritos Hall is designated as the Graduate, Re-entry, and Upper Division Undergraduate Hall. This community is designed to meet the needs of full and part-time students looking for a private, quiet, convenient, and mature atmosphere. One of the following qualifications must be met to live in this hall:

- a full or part-time graduate student;
- a registered student with The CENTER.
- a minimum of 24 years of age as of move-in date;
- completed 70 or more undergraduate units as of move-in date.

The benefits of residence hall living include being free from the time-consuming tasks of cooking, grocery shopping, and commuting to and from campus. Students in the residence halls have additional time to spend studying, getting involved in campus activities, or pursuing other interests.

### To Apply to the Residence Halls

Interested undergraduate students may request a residence hall application at any time. Applications should be returned to the La Cienega office immediately. Students must be admitted to the university in order to receive a license (contract); therefore, early admission is of great importance. Contracts provide for both room and board. Payments may be made in periodic installments in accordance with the schedule available from the office. Costs and regulations are subject to change. Inquire about residence hall living with the Residence Hall Office at (909) 869-3307.

### CAL POLY POMONA FOUNDATION, INC. University Village Apartments

The Village is a two-phase 212-unit, air-conditioned student apartment complex. Phase I apartments have two 2-person bedrooms while Phase II has four 1-person bedrooms. Each apartment is fully furnished with wall-to-wall carpeting, living room furniture, beds, dressers, closets, desks, chairs, bookcases (Phase II only), refrigerator (ice maker in Phase II), stove, kitchen table and chairs, and a dishwasher (Phase II only). All apartments are provided with free cable, trash, and water service. Twelve units have been modified to accommodate persons with mobility disabilities. The complex has two laundry facilities, a Community Center, a swimming pool, a basketball and sand volleyball courts. The Community Center has meeting and study space available.

The Village is located within walking distance from the heart of campus. A shuttle runs to and from various campus locations throughout the day. All residents must have a Cal Poly Pomona parking permit and must purchase a Village gate card in order to park within the gated parking area. The staff includes 24-hour, live-in student advisors and professional staff that are able to assist students with their many needs.

### To Apply to the University Village Apartments

Applicants may begin applying for summer or fall quarter housing the first day of spring quarter. For winter quarter housing the first day of fall quarter and for spring quarter housing the first day of winter quarter. Assignments will be made depending on availability. Applicants must be admitted to Cal Poly Pomona and have completed at least thirty-six (36) quarter units (or equivalent) or be twenty-one (21) years of age or older. The license agreement period covers the academic year with an option

for summer housing. Payments are made in installments according to the terms of the license agreement. Costs and regulations are subject to change. To inquire about living at the University Village Apartments, visit our office at 3400 Poly Vista (at the corner of Temple and Valley) or call us at (909) 468-5000.

### 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 1997/98 (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 total cost of education in the CSU is defined as the expenditures for current operations, including payments made to the students in the form of financial aid, and all fully reimbursed programs contained in state appropriations, but excluding capital outlay appropriations. The average cost of education is determined by dividing the total cost by the total FTEs. The average cost is further differentiated into three categories: State Support (the State appropriation, excluding capital outlay), Student Fee Support, and Support from Other Sources (including Federal Funds).

Thus, excluding costs which relate to capital outlay (i.e., building amortization), the average cost of education per FTE student is \$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.)

1996/97	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	583,866,000	2,263	22.2
• Support from Other Sources*	162,593,000	630	6.2
Detail:			
Total State Support	\$2,037,557,000		
(including capital outlay)			
Total Support	\$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.

## SERVICES

### The Department of Public Safety

The Department of Public Safety is comprised of three divisions: the Police Department, Parking Services, and Emergency Management. The department is staffed by trained professional police officers, civilian parking officers, and auxiliary personnel and is operative 24 hours a day, year-round. Department of Public Safety police officers are vested with the same powers and responsibilities of other police officers within the state of California. Their authority is granted through legislative action defined in the California Education and Penal Codes. Their jurisdiction covers all property owned and operated by the university, including adjacent public streets and property. The officers meet the California Peace Officers' Standards and Training Commission requirements, which are mandated for all California law enforcement officers. All Department of Public Safety police officers are trained in the use of weapons and carry them on campus.

- 9-1-1: All campus telephones are connected to a 9-1-1 emergency system, which is located in the Department of Public Safety's 24-hour Communications Center. The Communications Center, which is staffed by trained dispatchers, provides telephone and two-way radio contact for emergency personnel and also serves as an after-hours contact for students, faculty and staff. Fire and building alarms are monitored in this center. For emergencies, call 9-1-1. For non-emergency calls, please call extension 3070 from on-campus phones.

- Emergency Preparedness: The University has a well-defined disaster plan with several hundred trained faculty and staff members. There are 19 mini Emergency Operation Centers (E.O.C.) spread across the campus. A list of the E.O.C.s appears in the campus information access directory.

- Escorts: After dark, Department of Public Safety escorts are available to walk or drive you to your car, your class, or your on-campus residence. Call extension 3070 from any campus phone to request an escort.

### Student Health Services

Students with illnesses, injuries or who need other health services may be seen free of charge for basic services in the Student Health Center, located in Building 46. Outpatient medical care is provided by a staff of licensed medical doctors and registered nurse practitioners by appointment or on the same day for urgent care. Services also include routine x-ray, laboratory, pharmacy, family planning, and health education services. There are very low charges for some lab tests. Prescription medications are charged at the cost of the medication plus a small packaging charge. Services are available Monday and Thursday from 8 a.m.-6 p.m., Tuesday and Wednesday from 8 a.m.-7 p.m., Friday and Quarter breaks 8 a.m.-5 p.m., closed holidays.

Student Health Services is accredited by the Accreditation Association for Ambulatory Health Care and the California Medical Association.

Outside and after hours medical care, whether referred by Student Health Services or not, is at the student's expense. Students are strongly encouraged to have comprehensive medical insurance coverage. As a minimum, insurance available through the Associated Students, Inc. should be purchased.

The Student Health Advisory Committee (SHAC) is appointed annually and advises Student Health Services about services and fees. Six student representatives are appointed by Associated Students, Inc. There are also single representatives from the Academic Senate, Staff Council, and administration.

The Wellness Center provides a broad range of information, health

assessments, and programs about health related issues. It is located in Union Plaza, Room 104.

All students pay a mandatory student health fee which is used to support medical services, public health efforts and health education and promotion. Contact Student Health Services for complete information on available services.

Additional information is available on the World Wide Web home page at: <<http://www.intranet.csupomona.edu/~health/>>.

### The Wellness Center

Student Health Services' satellite facility is located in Union Plaza, Building 26, Room 104, near the fountain. Hours of operation are Monday through Thursday, 11:00 a.m. to 6:00 p.m., and Friday, 11 a.m. to 2:00 p.m. It is closed during quarter breaks. The Wellness Centers offers free health education literature, body fat measurement, blood pressure screening, height and weight measurement, Health Risk appraisals, and a variety of health-enhancing assessments, related to stress management, weight control, nutrition, alcohol and other drug use. Students are encouraged to drop in or make individual appointments with health educators at The Wellness Center by calling (909) 869-5272.

### Counseling and Psychological Services

Counseling and Psychological Services (CAPS) offers free personal counseling to Cal Poly Pomona students. Because college life often involves personal changes and new life experiences, the student's emotional well-being, stress level, and relationships can be affected. The professional counselors at CAPS are aware of these issues and offer a variety of options for students in a confidential environment.

In addition to individual counseling sessions, students may partake in couples, family, and group therapy. Psychological testing, crisis intervention, outreach services and training programs are also offered throughout the year. Counseling services are designed to promote personal growth, the development of satisfying relationships, effective communication, successful decision-making, and the establishment of personal values and self esteem.

CAPS is open year-round, Monday through Friday from 8:00 am - 5:00 pm. (Summer hours may vary). Pre-scheduled intake appointments and walk-in hours are set aside for first-time students. For more information, call CAPS at (909) 869-3220. CAPS is conveniently located in the Bookstore Building (66-110) or visit our web site at: <<http://www.intranet.csupomona.edu/~caps>>.

### Office of Academic Testing

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

### Student Orientation Services (SOS)

Orientation programs for new first-year and transfer students are conducted prior to the start of each quarter, with an expanded series of programs during the summer for those students entering in the fall quarter. Family Orientations are also conducted during the summer. Depending on the date of admission, these orientation programs generally provide an opportunity for new students to priority register through Touch-Tone Registration. All of these programs also offer students an introduction to the campus, to student services, to



academic advising and programs related to their majors. Every effort is made to provide new students with information and advice in a welcoming atmosphere to facilitate a smooth and effective beginning at Cal Poly Pomona. A live-in supplemental orientation, Bronco Prep, is attended by students who desire to further enhance their college experience and academic success. Bronco Prep is offered prior to the fall quarter. For information about SOS call (909) 869-3604. Student Orientation Services is located in Building 26A adjacent to the University Plaza and across from the University Union and the Bronco Book Store.

### Academic Advising

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

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

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

Students may receive an "Advising Hold" on their registration for a given quarter. An "Advising Hold" indicates that the students must see their major department advisor to have the hold lifted prior to registering for classes. This is an opportunity for the student and advisor to discuss the student's academic progress, course selection, and to identify and resolve any difficulties the student may be experiencing.

### University Advising Center (UAC)

The University Advising Center is a convenient one-stop location for information, referrals, and advising services located in Building 66. The UAC provides backup advising services for the colleges/schools/departments. Articulation agreements with community colleges are available at the UAC as are curriculum sheets for all majors, and many essential forms and petitions.

The UAC is the academic home for freshman undeclared majors (major code 996). Comprehensive services are provided to empower students and assist with their successful transition from high school to college. Students receive quality advising related to the General Education (GE) requirements and preparation for major course work, acquire study strategies, and work through academic difficulties which may arise. Academic counselors advise and encourage students to explore major and career options through informational sessions and activities.

The UAC specializes in working with students who are in academic difficulty and in transition (students who are planning to withdraw from classes, from the University, or who are planning to change their major). Withdrawal Forms and Change of Major Petitions originate at this office and students may meet with an academic counselor to discuss their plans.

The University Advising Center's regular hours are Monday through Friday, 8:00 a.m. to 5:00 p.m. For information call (909) 869-3211. General recorded telephone advising information may be obtained 24

hours a day from the University Advising Center's InfoLine at (909) 869-4636.

### The CENTER

The CENTER, in the Division of Student Affairs and sponsored in part by ASI, has three main program areas: Re-entry Services, Women's Resources and Evening Programs. The office is located in Building 95 across from the Commuter Cafeteria as part of the Multicultural Center's complex. The CENTER's regular hours are Monday, Thursday, Friday 8:00 a.m. to 5:00 p.m. and Tuesday, Wednesday 8:00 a.m. to 7:00 p.m. during each academic quarter. Academic internships are available to CENTER volunteers. The CENTER offers a relaxing and comfortable atmosphere where students can stop by for a few minutes, talk, study, or simply relax. Community guests interested in returning to school are also welcomed. Call or stop by for a full calendar of activities and assistance at (909) 869-3206.

Re-entry Services includes a range of workshops, programs, and services focused on the needs of those students who are 25 years or older or are just beginning or continuing college work after being away from school for several years. Liaisons/referrals are available for every student service and support area as well as OASIS (Older Academics, Support, Insight and Services) peer advocates and volunteers to meet with interested and incoming students.

The Women's Resource component celebrates 21 years of providing workshops, advocacy, support groups, educational resources, materials, and a library to our visitors on a variety of topics and issues related to the changing roles of men and women in our diverse society.

### Evening Services and Programs (E.S.P.)

Evening administrative services are offered on Tuesday and Wednesday evenings from 5:00 p.m. until 7:00 p.m. during each academic quarter, through the week of final exams. Administrative services offered in the Records area of the CLA Building (98) include Admissions, Records, Cashier, and Financial Aid. Referrals are also initiated to other offices and services for next-day action. For Evening Services call (909) 869-6888.

The CENTER's Evening Programs complement the administrative services each Tuesday and Wednesday by coordinating and hosting a variety of workshops, groups and programs targeting the needs of our evening student population, throughout the quarter. Call The CENTER for each quarter's schedule at (909) 869-3206.

### Preprofessional Advising, Health Careers

Dr. David F. Steele, Health Professions Advisor, provides academic advising to students who are interested in veterinary medicine, medicine, dentistry, podiatry, and other health related areas. This service is available to all students, regardless of major.

The office is located in Building 8, Room 7. Call (909) 869-4092 for information.

### Preprofessional Advising, Veterinary Medicine

Students interested in pursuing careers in veterinary medicine can consult with the Department Chair of the Animal and Veterinary Sciences Department, Building 2, Room 123.

### Center for Science and Mathematics Education

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

classrooms.

The office of Dr. Judith Jacobs, Director, is located in Building 3, Room 220. Call (909) 869-3473 for information.

### Veterans Affairs

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

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

Students receiving veterans educational benefits should note the minimum scholarship requirements section under "Academic Regulations" in this catalog.

### Disabled Student Services

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

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

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

For further information regarding services for students with disabilities, contact Disabled Student Services in the Library, Building 15, Room 126, (909) 869-3333, Voice/TDD, or call the DSS INFO-Line (909) 869-6969.

### The Career Center

The Career Center assists students with career planning, major choice, student employment and with job search activities upon graduation. A wide variety of written support materials are available for students and alumni. The Center offers workshops each quarter, and Career Counselors are available to help students and alumni on an individual basis. The Center is located in Building 97, Room 100. For more information about services and hours of operation, call (909) 869-2344.

### Career Planning and Development

The Career Center has an extensive library of resources to assist students with research in different career areas. Additionally, the Center offers interest testing and a user-friendly computer-based aid to career decision making called SIGI+ (System of Interactive Guidance and Information—Plus). SIGI+ provides an interactive approach to assessing work-related interest and values, locates occupations that match those interests/values, provides information about the occupations identified, and helps users chart a course of action. Students who are unsure of their major or career plans are encouraged to take the Career and

Personal Exploration class. For a description of this course (CPU100), please see the catalog section "University Programs."

### Student Employment

The Student Employment Office of the Career Center assists students in finding part-time, temporary, summer, vacation, cooperative education, and internship experiences. Work opportunities are located both on and off the campus. Cooperative education and internship planning and placement are implemented in conjunction with faculty coordinators in the various university majors.

There is a variety of employment opportunities for students available at the Foundation's campus operations. The operations include: Foundation Administration, Accounting and Payroll, Human Resources, Bronco Bookstore, Campus Books, Campus Center Marketplace, Soundstage, Oscar's Coffee Shop, Los Olivos Dining Commons, Catering, Kellogg West Conference Center & Lodge, Kellogg West Restaurant, Facilities Management, University Village Apartments and Research and Sponsored Programs. The Foundation also provides opportunities for students seeking internship programs. Job listings are available through the Human Resources Department of the Foundation in building 55.

### Career Employment

The Career Center assists students and alumni in obtaining career positions. A comprehensive program of workshops relating to career choice and the job hunting process is offered each quarter. An extensive on-campus recruiting program is conducted, as industrial, business, and public-sector representatives visit the campus to interview graduating students. The career search library has a broad collection of directories, job listings, corporate information, and other materials for the job hunter. The Alumni Career Advisory Network enables individuals to contact Cal Poly Pomona graduates from different majors for the purpose of networking, and acquiring information and advice about career fields and job search strategies. Twice a year, in the Fall and Spring, the Career Center hosts "Career Day on the Quad" where employers visit campus to share information and recruit students for employment. After graduation, most services are provided without charge to alumni for a specified grace period. At the end of the grace period, a nominal annual fee is charged.

### Campus Dining

Los Olivos Dining Commons, Building 70 – Newly remodeled all-you-can-eat buffet with hot entrees, deli sandwiches, a 38-foot salad bar, soups, burgers and sandwiches, fresh baked goods, a waffle bar and a self-serve espresso coffee bar. Open to all campus guests with a special low price for students.

Sound Stage, Building 35 – Soundstage houses an international food court. Choose from the Mexican specialties, made-to-order Healthy Choice sandwiches, burgers, or quick serve Asian cuisine. You'll also find salads, pastas, soups and bakery items. University Union, lower level.

Oscar's Coffee House, Building 35 – Oscar's features cappuccino, espresso and mocha drinks, fruit drinks and iced coffee beverages. A selection of croissant sandwiches, pasta salads, fresh fruit, and bakery treats. Located upstairs in the University Union.

Campus Center Marketplace, Building 97 – Campus Center is new and colorful! Delight in the ambiance of the marketplace while enjoying the many cuisine choices. You'll find at the Marketplace...CARL'S JR./GREEN BURRITO, a salad, soup and potato bar, authentic Asian cuisine featuring three distinct regional styles, a convenience store, fruit juice, smoothie and frozen yogurt bar, bake shop and coffee bar.

Kellogg West, Building 76 – A full-service restaurant with beverage and bar service, breakfast and luncheon buffets, and elegantly served dinner





meals supervised by our master Executive Chef. Open to the public; special luncheon rates for students, faculty and staff. Reservations requested, call 909/869-2250. Hours subject to conference schedule.

Campus Catering, Building 55 – Excellent food for a casual BBQ to a full service gourmet dinner. Catering will assist in the planning and orchestration of any occasion held at one of the beautiful locations on the Cal Poly Pomona campus or at your selected venue. Call 909/869-2251 Monday-Friday, 8:00 a.m.-5:00 p.m.

Hot Dog Carts, Pretzel and Churro Carts and vending machines are available at various locations throughout the campus.

### Bookstore

The Bronco Bookstore is conveniently located in Building 66 and maintains over 22,000 square feet of bookstore space to serve the University. Its mission is to provide the students, faculty and staff with the complete and appropriate academic materials and resources for successful course study at Cal Poly Pomona. Students may call (909) 869-3274 for recorded information about Bookstore hours and days of operation, or to obtain mail order information for the University catalog or class schedule. Visit the Bronco Bookstore web page at [www.csupomona.edu/bookstore/](http://www.csupomona.edu/bookstore/) or call (909) 869-4693 for other bookstore information.

The Bronco Bookstore carries a complete array of course textbooks, study guides, computers, software, class laboratory supplies, Cal Poly Pomona emblematic clothing and gifts, sundries and snacks along with the University Catalog and quarterly Class Schedule. The Bookstore staff works closely with the faculty to insure that the correct textbooks and supplies are available for Cal Poly Pomona students at the beginning of each academic quarter. The Bookstore also provides many special services such as maintaining store charge accounts for scholarships, grants and parent prepaid accounts, the rental of graduation caps and gowns, the sale of personalized graduation announcements and class rings.

The Bronco Bookstore accepts personal checks for the amount of purchase with valid California driver's license, California DMV photo I.D. or Cal Poly Pomona I.D. card along with one of the following: Current Quarter's Study List, Check Guarantee Card, or display of a major credit card. The major credit cards accepted are Visa, MasterCard, American Express and Discover. The Bookstore is the main retail facility on campus and students interested in employment may contact the Bookstore directly.

### Bookstore's Computer Department

The computer department of the Bookstore sells software and sells and services several lines of personal computers for Cal Poly Pomona students at special educationally discounted prices. The Bookstore also has trained technicians to assist students with their computer related needs which include hardware diagnostics, repairs and services, software installation and equipment upgrades. Call the Bookstore's Computer Department at (909) 869-3280.

### FINANCIAL AID

Cal Poly Pomona offers a variety of financial aid programs to assist students with college costs. Grants, work opportunities, loans and scholarships totaling more than \$35 million are funded each year through federal, state, private and University sources. The following information describes three different types of resources: 1) aid programs for students with financial need; 2) academic or merit scholarships awarded without consideration of need; and 3) alternative financing options available to students and parents. Students may receive aid

through one or more of these options.

Although every effort is made to present the most accurate and up-to-date information, this information is subject to change due to alterations in federal, state, University or lender policy or procedures. For additional information, please contact the Office of Financial Aid. Staff members are available to assist both students and parents in obtaining the maximum resources available.

### Need-Based Programs

Qualifications: To receive aid through the need-based grant, loan and/or employment programs, students must 1) have financial need; 2) have a high school diploma or a GED; 3) be enrolled as a regular student working toward a degree or certificate in an eligible program; 4) be a U.S. citizen or eligible noncitizen; 5) have a social security number; 6) make satisfactory academic progress; and 7) register with the Selective Service, if required.

Financial need is determined by comparing the student's total educational costs with the amount the student's family can reasonably be expected to contribute. Total educational costs include fees, room and board, books, transportation and personal expenses.

Costs vary depending on the student's residency status, number of credits, room and board arrangements, as well as the choices they make concerning personal and transportation expenses.

Each student's family contribution is based on the student's income and assets, parents' income and assets (if applicable), family size, number of family members attending college, etc. This information is provided by the student on the Free Application for Federal Student Aid (FAFSA) and is used in a formula, established by the U.S. Congress to determine the student's financial need, as follows:

$$\begin{aligned} &\text{Total cost of education} \\ &\quad - \text{Expected family contribution} \\ &= \text{Amount of financial need} \end{aligned}$$

**APPLICATION PROCESS.** Students applying for need-based financial aid must complete the following steps:

#### Step 1 (The Application)

Students must complete the Free Application for Federal Student Aid (FAFSA) and include Cal Poly Pomona's school code number, 001144. California residents who wish to apply for a Cal Grant must also complete a GPA Verification Form. The FAFSA and GPA Verification Form are available December 1 at all high schools and colleges in California.

New students should not wait to be admitted to the University to apply for financial aid. The earlier the application, the better the chance that funds will be available. Students must reapply for aid each year. Students should complete this application as early as possible after January 1, but no later than the priority filing deadline of March 1.

#### Step 2 (Request for Documents)

Approximately four weeks after the FAFSA is mailed, the central processing agency will send a Student Aid Report (SAR) to the student and the application information to the Office of Financial Aid. Upon review of the information included on the FAFSA, the Office of Financial Aid will notify applicants if any additional information is needed (i.e., copies of federal tax returns, etc.).

#### Step 3 (Application Review and Awarding)

As application files are completed and reviewed by the Financial Aid staff,



students are notified by mail of their eligibility for financial aid. Students who qualify will receive a Financial Aid Offer letter outlining the types and amounts of awarded financial aid. Information is also provided at that time giving details about maintaining eligibility and the disbursement of aid. Typically, aid is disbursed at the beginning of each quarter.

New applicants for Cal Grants will be notified by the California Student Aid Commission of their eligibility for Cal Grants; renewal recipients will be notified by the Cal Poly Pomona Office of Financial Aid.

### AVAILABLE AID PROGRAMS

Eligible students are offered a "package" which may consist of a combination of grants, work opportunities, and loans. Awards are based on each student's eligibility and the availability of funds at the time the aid application is received and completed.

The following programs are available to students who qualify for need-based assistance:

#### Grants (Aid that does not have to be repaid.)

Federal Pell Grant is a grant for students who have not earned a bachelor's or professional degree. Award amounts range from \$400 to \$2,470 per year.

Federal Supplemental Educational Opportunity Grant (SEOG) is a federal grant for students with exceptional financial need. Recipients must be eligible for the Pell Grant. Award amounts range from \$200 to \$600 per year.

Cal Grants A and B are state grants awarded to California residents on the basis of financial need and grade point average. Initial awards are determined by the California Student Aid Commission. Renewal awards are determined by Cal Poly Pomona based on state criteria.

Recipients of Cal Grant A awards may not have completed more than nine quarters of full-time study prior to applying. The award is for fees.

Recipients of Cal Grant B awards may not have completed more than one quarter of full-time study or 16 quarter units prior to applying. Freshman recipients receive a subsistence award; beginning with the sophomore year, recipients receive funds for both fees and subsistence.

Educational Opportunity Grant (EOP) is a state grant for undergraduate students who meet specified need criteria and are admitted to the University through EOP. Award amounts range from \$150 to \$1000.

State University Grant (SUG) is a state grant for fees for California resident undergraduate and graduate students with financial need. Cal Grant recipients are not eligible for SUG.

State Graduate Fellowship is a state grant for partial fees for graduate students with financial need. Recipients must be California residents. Initial awards are determined by the California Student Aid Commission.

#### Loans (Aid that has to be repaid)

Federal Perkins Loan is a federal loan for undergraduate and graduate students. The interest rate is 5 percent and repayment begins six months after the student ceases to be enrolled at least half-time. Award amounts may range from \$150 to \$2,400 per year.

Federal Stafford Loan is a federal loan for undergraduate and graduate students. The award ranges from \$150 to the maximum shown below.

Freshman	\$ 2,625
Sophomore	3,500
Other Undergraduate	5,500
Graduate	8,500

Independent undergraduate students and graduate/professional degree students may qualify for additional unsubsidized loan eligibility as follows:

Freshman/Sophomore	\$ 4,000
Other Undergraduate	5,000
Graduate	10,000

The interest rate is variable with a cap of 8.25 percent. Repayment of principal begins six months after the student ceases to be enrolled at least half-time. For students who have financial need, the loan is subsidized, and the government pays the interest while the student is in school. For students who do not have financial need, the loan is unsubsidized and students make interest only payments while in school or defer payment of the interest until repayment of the principal begins.

#### Employment (Aid that has to be earned)

Federal Work Study is a federally subsidized program through which students earn funds for educational expenses. Work opportunities are both on and off campus and include positions in research, tutoring, community service, administration and office operations, computing and library services and more. Awards range from \$1,500 to \$2,400.

#### Academic and Merit Scholarships

Scholarships are offered by various organizations, businesses and community groups. These awards are often based on merit, talent, community service or organizational affiliation. Financial need is a criterion for some, but not all of these awards.

Scholarships are administered through the individual colleges, the Office of Financial Aid, and various private agencies and organizations. To be considered for the awards administered through each of these sources, students must:

- 1) complete the Cal Poly Pomona Scholarship Application and submit it to the Office of Financial Aid by February 15. Applications are available in the Office of Financial Aid.
- 2) contact the college and/or department of their major field of study for information concerning awards in their specific major.
- 3) carefully review the private scholarship information available through the high schools and the Cal Poly Pomona Office of Financial Aid. Reference material is located in the Financial Aid Lobby located on the third floor of the CLA Tower. Additional scholarship information is available on the Cal Poly Pomona's Financial Aid homepage on the World Wide Web.

The President's Council Scholars Program, established in 1983, recognizes the academic and extracurricular excellence of selected Cal Poly Pomona students. Funded by private contributions from members of the President's Council, this award provides \$1,500 in scholarship funding each year to eight students. President's Council Scholars are invited to participate in several special activities throughout the year. One student is selected from each of the University's six academic colleges, the School of Hotel and Restaurant Management, and the School of Education and Integrative Studies.

To be eligible, students must have an overall grade point average of at least 3.5, be either a junior or senior at the beginning of the academic year of the award, and must attend Cal Poly Pomona throughout the year of the award. Financial need is not a criterion for this award.

Applications are available through the Office of Financial Aid in February for the following academic year.

The Kellogg Scholars Program, established in 1995, is named in



recognition of the rich tradition of education and service characterized by W. K. Kellogg, one of the founding fathers of Cal Poly Pomona. The Kellogg Scholars Program recognizes and rewards the academic excellence and outstanding achievement of high school seniors graduating from one of the high schools selected for participation.

Kellogg Scholars receive a four-year, renewable scholarship valued at \$2,000 for the freshman year, and \$1,000 for each of the following three years. Recipients receive free preferential parking, a \$300 book stipend for the freshman year and a reduction in room charges for each year they choose to live on campus.

Applicants must complete the application for admission to Cal Poly Pomona by November 30, have earned a high school grade point average of 3.75 or better, and plan to enroll as a first-time freshman at Cal Poly Pomona on a full-time basis beginning the fall of the academic year of the award. Final selection is based on a review of grade point average, strength of academic program, rank in class, leadership, community and work experience. Financial need is not a criterion for this award.

A separate scholarship application is not required for initial consideration as a candidate. Cal Poly Pomona scholarship staff members review the information provided on the admission applications to identify all qualified candidates. These candidates are notified in January and asked to submit an application, counselor evaluation, and transcript at that time. Final award decision will be made by April 1.

Information about the program may be obtained by contacting the Office of Financial Aid.

### Alan Pattee Scholarships

Children of deceased public law enforcement or fire suppression employees who are California residents and who were killed in the course of law enforcement or fire suppression duties are not charged fees or tuition of any kind at any California State University campus, according to the Alan Pattee Scholarship Act, Education Code Section 68121. Students qualifying for these benefits are known as Alan Pattee scholars. For further information, contact the Registrar's Office which determines eligibility.

### Alternative Financing Programs

Funding is available which allows students and their families to finance their portion of educational costs over an extended period of time. Through long-term financing programs, families may finance up to their share of the total cost of education, including travel and personal expenses.

Unsubsidized Federal Stafford Loan (as described above) are available to students without consideration of financial need. Students must first complete the FAFSA but do not need to demonstrate financial need.

Federal Parent Loan for Undergraduate Students (PLUS) is a federal loan for parents of undergraduate students. Eligibility is not based on family income or financial need. Parents may not have an adverse credit history. The interest rate is variable up to a 9 percent cap.

Parents may borrow from \$500 to the total cost of education minus any financial aid received. Repayment extends up to 10 years and payment begins 60 days after the loan is received.

Short term loans are available through University Accounting Services to undergraduate and graduate students for books, supplies, fees or unexpected expenses. Amounts range from \$50 to \$250, or the amount of fees. Financial need is not a criterion. Applicants must have a 2.0 GPA (3.0 for graduates), not have any outstanding financial obligations to the University, and have a source of repayment.

### Financial Aid Services

The Office of Financial Aid is located on the third floor of the CLA Tower. The mailing address is Office of Financial Aid, Cal Poly Pomona, 3801 West Temple Avenue, Pomona, CA 91768. The phone number is (909) 869-3700; fax number is (909) 869-4757; E-mail address is FINAID@CSUPomona.Edu. The World Wide Web address is: <http://security.intranet.csupomona.edu>.

Students may also access the Cal Poly Pomona Voice Response System at (909) 468-5020 for general information as well as specific information concerning their individual application and financial aid award status.

Staff members are available Monday through Friday at the Financial Aid Service Counter. Walk-in Advising is also offered at specified times throughout the week. Specific hours are available by contacting the Office of Financial Aid.

### Institutional and Financial Assistance Information

The following information concerning student financial assistance may be obtained from the Office of Financial Aid:

1. Student financial assistance programs, including state grants, available to students who enroll at Cal Poly Pomona.
2. Application deadlines, procedures and requirements for additional documentation.
3. The method by which assistance is distributed; how distribution decisions are made and the basis for these decisions; how expenses are considered and how financial need is determined.
4. The direct and indirect costs of attending Cal Poly Pomona, including tuition and fees, estimated books and supplies, estimated on and off campus room and board costs, estimated personal and transportation expenses, and any costs specific to a program.
5. The resources (such as parental contribution, other financial aid, personal assets) considered in the calculation of need and the amount of a student's financial need has been met.
6. The portion of aid awarded as grants and the portion that must be repaid or earned. If loans, the terms of the loan and repayment information. If employment, the applicable terms and conditions.
7. The refund policy as it pertains to students' receipt of federal, state and University financial aid funding.
8. The rights and responsibilities of students receiving financial assistance; and
9. The standards students must maintain to be considered to be making satisfactory academic progress for the purpose of establishing and maintaining eligibility for financial assistance.

### STUDENT OUTREACH AND RECRUITMENT

Student Outreach and Recruitment activities are provided through Developmental Outreach and Special Programs, Recruitment Services, Transfer Student Services.

Developmental Outreach and Special Programs focus on college preparation for students and parents at the junior high and elementary school levels, as well as student mentoring and college counseling for students in grades 9-12 at selected high schools. Call (909) 869-4998.

Recruitment Services provides representatives to the wide variety of college fairs, transfer days, and informational presentations which assist prospective students learn more about the CSU system and Cal Poly Pomona. Responses to inquiries about enrollment at Cal Poly Pomona which are received through the mail and telephone are also handled by

Recruitment Services. Professional and student staff from both Recruitment and Transfer Student Services provide one-to-one admission counseling on both appointment and walk-in basis. Call (909) 869-3210 or 869-4998. The e-mail address is [cppapp@csupomona.edu](mailto:cppapp@csupomona.edu).

Consistent with the University's commitment to educational equity, special programs and services are available to serve the needs of students from disadvantaged backgrounds. These programs include the Summer Intensive Orientation Program, (SIOP), the Cal Poly Pomona Youth Gospel Choir, and Lottery programs at high schools and community colleges.

### Transfer Student Services

Transfer Student Services provides advocacy for transfer students, and assistance throughout the transfer process. Services include academic advising, peer mentoring, assistance in the admission process, and follow-up until the student begins coursework. Call (909) 869-4213. The e-mail address is [transfer@csupomona.edu](mailto:transfer@csupomona.edu).

Campus tours, led by current Cal Poly Pomona students, are offered through Visitor Services and may be arranged by contacting the Tour Hotline at (909) 869-3529.

### VISITOR SERVICES

The best way to get to know the Cal Poly Pomona community is to spend time on campus and experience the surroundings. Personal tours with a Poly Pathfinder are offered for small groups or for individuals. The tours consist of a 90-minute walk through the campus.

To schedule an appointment, please contact the Tour Hotline in the Visitor Services Office at (909) 869-3529 or by e-mail [JLSCHUFER@csupomona.edu](mailto:JLSCHUFER@csupomona.edu).

### STUDENT LIFE AND ACTIVITIES

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

#### Office of Student Life

The Office of Student Life, a department within the Student Affairs division, is concerned with the total development of students. Its primary purpose is to enhance the quality of campus life through co-curricular activities. The staff members of the Office of Student Life believe that people learn by doing. Through involvement in co-curricular activities, students have the opportunity to practice what they learn in the formal academic setting as well as develop effective communication and leadership skills. Venturing out beyond the classroom allows students to grow both personally and professionally, thus making their total educational experience complete.

The Office of Student Life offers the opportunity for such experiences to be gained through involvement in various co-curricular programs including institutional governance, clubs or organizations or special committees, recreational or cultural endeavors and the planning and production of programs of entertainment and enlightenment. You can find the Office of Student Life in the Union Plaza, Building 26, (909) 869-2841.

#### Student Government—ASI

Every Cal Poly Pomona student, is a member of the Associated Students Incorporated (ASI). ASI, the official voice of the students is a recognized auxiliary of the University and is involved in representing student interests on campus in addition to providing a variety of services to the

campus community.

ASI student government offices are located in the Union Plaza, Building 26. ASI is directly funded and operated by the students of Cal Poly Pomona. Legislative authority is vested in the Student Senate which is composed of elected student leaders, as well as representatives for staff, faculty, and alumni. Executive authority is vested in the ASI Cabinet which is composed of appointed student representatives who are responsible for coordinating student events on campus. The ASI Judiciary is responsible for the interpretation of ASI, council and club by-laws and handling of related violations.

ASI Programming provides entertainment and special interest programs to the student body and the general public. Through concerts, speakers, and special events, the students in ASI Programming seek to provide a well-rounded and complete schedule of activities. In a unique partnership with the University, the ASI Children's Center provides day care for children of Cal Poly Pomona students, faculty and staff. The Intramural Sports Program offer students the chance to compete in intense athletic competition. With over 2000 students participating in these sports, the Intramural Sports Program is one of the most popular programs on campus. Sports include basketball, softball, soccer, ultimate frisbee, flag football, and volleyball. ASI sponsors an insurance program which offers health and dental benefits for domestic and international students.

All ASI operations, with the exception of the Children's Center and Student Government, are housed in the University Union. The University Union, managed by ASI, serves as the home away from home for students. It gives the campus a place to meet, to dine, to study, and to socialize. Services include cellular phone services provided by C-Cellular, copy/mail services at Bronco Copy/Mail, graphic design services provided by the ASI Marketing Department, discount ticket services available in Games Room Etc., craft-making services available in Pastimes, and business support services available in the ASI Business Office.

Other ASI operations include Snack Safari, a self-service bulk candy store that sells candy, nuts, trail mixes, film, batteries, tobacco products and more. Games Room Etc., the most popular of all ASI operations which features 10 pool tables, over 30 top rated video games, and 4 ping-pong tables. Games Room Etc. offers special events throughout the quarter such as billiards and video game tournaments.

For the next three years, the Union will be under expansion to better accommodate students, faculty, and staff. Included in this expansion will be the addition of a fitness center, a new food court, additional retail lease space, a 1000 seat multi-purpose room, a 24-hour study lounge, as well as renovation of existing office and meeting space.

ASI operates within the provisions of the California Revenue and Taxation Code Section 23701(d) and the Internal Revenue Code Section 501(c)(3). ASI is also subject to the regulations established by the Trustees of the California State University (CSU) system and the accounting procedures approved by the California Department of Finance, as required by Section 89900 of the California Education Code. Advisement of ASI is provided by the Office of Student Life, which is located in the Union Plaza. For more information contact the Office of Student Life @ (909) 869-2841.

#### Children's Center

The Cal Poly Pomona University Children's Center is an on-campus facility which assists student parents to complete their educational goals. The Center provides a quality child care program to preschool children 2 1/2 through 5 years of age at a nominal fee. Spaces are also available to faculty and staff on a space available basis.



The Center's philosophy emphasizes a hands-on approach and is developmentally age-appropriate.

Hours of operation are (Monday through Friday, 7:30 a.m. to 6 p.m.) during the academic year. Applications and additional information regarding fees and space availability may be obtained by calling the Children's Center at (909) 869-2284.

### Cultural Centers

The Cultural Centers are committed to the recognition, promotion and support of the rich diversity in the campus community. They implement a variety of programs which enhance cross cultural communication and experiences and a network of support services which address the needs of traditionally underrepresented students. Each Center is dedicated to promoting the education, celebration and appreciation of a multi-ethnic, multicultural campus community.

The African American Student Center (AASC) provides outreach and retention programs; workshops; social and cultural events to enhance the educational experience of African American students. AASC is located in Building 95, (909) 869-5007.

The Asian and Pacific Islander Student Center (APISC) coordinates projects, resources and services designed to meet the needs of Cal Poly Pomona's Asian and Pacific Islander students. APISC is located in Building 95, (909) 869-5025.

The Cesar E. Chavez Center for Higher Education strives to increase the outreach, recruitment, retention, graduation, and cultural pride of Chicano, Latino and Hispanic students at Cal Poly Pomona. The Cesar E. Chavez Center for Higher Education is located in Building 95, (909) 869-5035.

The Pride Center (Gay, Lesbian, and Bisexual Student Center) provides resources, referrals, support, and programs about lesbian, gay, and bisexual issues, heterosexism, and homophobia. The Pride Center is located in Building 1-206, (909) 869-5259, website: <[http://www.csupomona.edu/pride\\_center/](http://www.csupomona.edu/pride_center/)>

### Student Clubs and Organizations

Cal Poly Pomona's co-curricular program is strengthened by some 250 charter clubs and organizations. Included are special interest clubs, honorary organizations, fraternities and sororities, multi-ethnic, religious, and international organizations, as well as departmental and sports clubs. New organizations are formed as student interests change and evolve. A current listing of clubs and organizations, including brief descriptions and current officers, is available from the Office of Student Life in the Union Plaza, Building 26. Students interested in joining a club are encouraged to complete a "Co-Curricular Interest Survey" available at their orientation program or at the Office of Student Life.

### Multicultural Programs

A variety of multicultural programs provide the Cal Poly Pomona community with an opportunity to celebrate the diversity that exists on campus and in society. Celebrate this diversity by participating in multicultural programs.

Multicultural Council (MCC) – MCC is the umbrella organization for the 30 cultural clubs on campus. We invite you to join one of the multicultural organizations. These programs include the annual Cross Cultural Retreat and the Unity Parade. The diversity of the programs sponsored by MCC provides Cal Poly Pomona with information and experience about other cultures—cultures with which we may have little familiarity.

Cross Cultural Retreat – This weekend get-away is held each year and is sponsored by the Multicultural Council and the Office of Student Life.

The goals of the retreat are to: expand awareness of multiculturalism among Cal Poly Pomona students, faculty, staff, and administrators; provide a safe and non-threatening atmosphere for sharing and exploring one another's cultural experiences; promote self-knowledge and self-worth of others; and identify strategies that would help promote multiculturalism. You may get involved by registering as a participant or serving on the planning committee.

Diversity Programs – Each year, the campus has the opportunity to highlight various cultures through Culture Weeks, coordinated by the ASI Cultural Affairs Commissioner. All students are invited to help plan one of the Culture Weeks: Jewish Culture Week, Arab Culture Week, Xicano Latino Heritage Month, Black History Month, and Asian-Pacific Heritage Week.

Reaffirming Ethnic Awareness and Community Harmony – REACH is sponsored by the Office of Student Life and Counseling and Psychological Services. Its goal is to promote a better understanding of diversity issues. Students in the REACH program are taught cultural history, facilitation skills, and group process skills. REACH consultants facilitate cultural awareness workshops and receive 2.0 units of credit each quarter for their participation in the class.

### Leadership Development Programs

Resource Materials – The Office of Student Life is the place to find resource files and videos dealing with all areas of organizational effectiveness and leadership. Along with workshops and discussion groups that are available to your group, a leadership library with books for checkout is available.

Leadership Skills Course – Develop your potential as a campus, community, and/or professional leader. This 2-unit course, CPU 109, deals with decision making, strategic planning, ethics, diversity, team building, delegation, meeting management, leadership styles, communication and time/stress management. Class members apply what they are learning in class through campus and community involvement.

Leadership Series – Each quarter the Office of Student Life sponsors free workshops addressing various aspects of leadership. The workshops present relevant information to enhance one's leadership effectiveness, to network with peers and discuss pertinent issues, and to meet different faculty presenters outside of the usual classroom setting.

Student Convocation (TLC) – The Office of Student Life serves as the primary coordinators for the University Fall Student Convocation. The Leadership Community (TLC) is a one day Fall Convocation event designed to educate, support, network, empower and prepare student leaders.

### Rose Float

Unlike any other project on this campus, (or for that matter at any other college or university), the Rose Float responsibility is jointly shared by the two Cal Poly campuses of Pomona and San Luis Obispo. Working together, the two campus committees select the design, pay for their share of the expenses, build their assigned parts of the float, grow selected flowers and spend the last three weeks of December finishing the float at the Pomona and Pasadena sites. Each year 20 to 25 students are chosen for the Executive Committee positions at each Cal Poly campus. Each person works in a specific field such as electronics, decorations, flower procurement, flower growing, donations, public relations, transportation, finance, construction, and administration. The purpose of the committee is to design, finance, build and decorate the Cal Poly Pomona and San Luis Obispo entry in the Tournament of Roses Parade. The Rose Float office is in Building 26, Room 131, (909) 869-3620.



## Greek Life

The Greek community includes 12 national fraternities and four national sororities with five associate organizations. The men and women of these organizations have the opportunities for leadership, scholarship, campus and community participation, social and athletic programs. Greek life provides an active social environment and the governance structure gives members the opportunity to develop leadership skills which aids in preparation for a successful future. For more information on getting involved in a Greek-letter organization, contact the Coordinator of Greek Affairs in the Office of Student Life or the Greek Affairs Office in the Union Plaza, Building 26, Room 130.

## Human Corps Volunteer Center (HCVC)

Working in cooperation with the Office of Student Life, the Human Corps Volunteer Center acts as the primary referral source for volunteer opportunities both on and off campus. Through HCVC, individuals and groups may obtain information about placement in various volunteer experiences. We are anxious to match student interest with community needs. Through volunteerism, students are able to obtain valuable hands-on experience, which is a plus when job searching, and at the same time contribute to their community in a positive manner. There are a multitude of diverse volunteer opportunities in which you may become involved.

## Music, Theatre, Dance

Opportunities are provided for students to participate in theatrical or dance productions, and in music organizations which include band, orchestra vocal choirs, and smaller vocal and instrumental ensembles. Drama productions include quarterly one-act and three-act plays; musical events include Christmas and Easter programs and a road show tour of California communities. The annual Student-Faculty dance production is presented each spring quarter.

## Intercollegiate Athletics

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

Intercollegiate Athletics is an integral part of university life and encourages student-athletes to excel academically as well as athletically. Intercollegiate competition is conducted under the policies and procedures of the National Collegiate Athletic Association (NCAA) and the California Collegiate Athletic Association (CCAA), which includes admission levels for participation, with either a minimum SAT score of 820 or an ACT score of 17. A 2.0 GPA in a core curriculum is also required. The intercollegiate program is guided by an athletic board which is composed of Cal Poly Pomona faculty and students. A program of intercollegiate competition for men and women is offered in a variety of sports which include (m) baseball, (m/w) basketball, (m/w) cross-country, (m/w) soccer, (m/w) tennis, (m/w) track and field, (w) volleyball. Information about intramurals can be found in the ASI office, located in Union Plaza.

## Club Sports and Intramurals

A club sports program permits students to compete against similar teams from other colleges and universities in a variety of sports, but at a somewhat more informal level than is found in the varsity sports program. Information about the club sports program may be obtained from the Office of Student Life in Union Plaza. An extensive intramural program is an integral part of the university and includes team sports, individual sports and recreational activities. Information regarding intramural sports may be obtained in the ASI Office, Building 26.

## Eligibility for Participation in Student Government and Organizations

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

- (1) Candidates and incumbents may not be on disciplinary probation.
- (2) Undergraduate candidates and incumbents must have an all-college and Cal Poly Pomona grade point average of at least 2.00 each quarter. Graduate candidates and incumbents must have a graduate grade point average of at least 3.0.
- (3) In order to perform the duties of a student body officer, the student must be enrolled in this university during each quarter in which he/she performs the duties of that office. Students may elect any one quarter during the academic year when they do not have to be enrolled and maintain eligibility.
- (4) Incumbents of all elected and appointed positions must successfully complete 27 units of academic credit per year. The minimum number of units to be successfully completed in any quarter is nine units.
- (5) These requirements are independent of any additional student government or student organization requirements.

Questions regarding eligibility for elective or appointive office should be addressed to the Senior Director of Student Development, or his designee in Building 15, Room 126.

## Eligibility for Intercollegiate Athletics

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National Collegiate Athletic Association (NCAA), the California Collegiate Athletic Association (CCAA), and the University Policies and Procedures Statement for the Conduct of Intercollegiate Athletics. A student-athlete must maintain a GPA of 2.0 and complete 36 units of work towards a specified major prior to the beginning of the next competitive season. In particular, prior written authorization from the faculty athletic representative is required for all student athletes who wish to take courses for academic credit at any time at institutions other than this University if the credit is required to become or remain eligible for athletic competition. In absence of the faculty athletic representative, the Registrar may provide the necessary authorization.

## Student Conduct and Discipline

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

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

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





of Judicial Affairs and Student Development, Building 26, (909) 869-3358.

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, placed on probation or given a lesser sanction for one or more of the following causes which must be campus related:

- (a) Cheating or plagiarism in connection with an academic program at a campus.
- (b) Forgery, alteration or misuse of campus documents, records, or identification or knowingly furnishing false information to a campus.
- (c) Misrepresentation of oneself or of an organization to be an agent of a campus.
- (d) Obstruction or disruption, on or off campus property, of the campus educational process, administrative process, or other campus function.
- (e) Physical abuse on or off campus property of the person or property of any member of the campus community or of members of his or her family or the threat of such physical abuse.
- (f) Theft, of, or nonaccidental damage to, campus property, or property in the possession of, or owned by, a member of the campus community.
- (g) Unauthorized entry into, unauthorized use of, or misuse of campus property.
- (h) On campus property, the sale or knowing possession of dangerous drugs, restricted dangerous drugs, or narcotics as those terms are used in California statutes, except when lawfully prescribed pursuant to medical or dental care, or when lawfully permitted for the purpose of research, instruction or analysis.
- (i) Knowing possession or use of explosives, dangerous chemicals or deadly weapons on campus property or at a campus function without prior authorization of the campus president.
- (j) Engaging in lewd, indecent, or obscene behavior on campus property or at a campus function.
- (k) Abusive behavior directed toward, or hazing of, a member of the campus community.
- (l) Violation of any order of a campus president, notice of which had been given prior to such violation and during the academic term in which the violation occurs, either by publication in the campus newspaper, or by posting on an official bulletin board designated for this purpose, and which order is not inconsistent with any of the other provisions of this Section.
- (m) Soliciting or assisting another to do any act which would subject a student to expulsion, suspension or probation pursuant to this Section.
- (n) For purposes of this Article, the following terms are defined:
  - (1) The term "member of the campus community" is defined as meaning The California State University Trustees, academic, nonacademic and administrative personnel, students, and other persons while such other persons are on campus property or at a campus function.
  - (2) The term "campus property" includes:
    - (A) real or personal property in the possession of, or under the control

of, the Board of Trustees of The California State University, and

- (B) all campus feeding, retail, or residence facilities whether operated by a campus or by a campus auxiliary organization.
- (3) The term "deadly weapons" includes any instrument or weapon of the kind commonly known as a blackjack, sling shot, billy, sandclub, sandbag, metal knuckles, any dirk, dagger, switchblade knife, pistol, revolver, or any other firearm, any knife having a blade longer than five inches, any razor with an unguarded blade, and any metal pipe or bar used or intended to be used as a club.
- (4) The term "behavior" includes conduct and expression.
- (5) The term "hazing" means any method of initiation into a student organization or any pastime or amusement engaged in with regard to such an organization which causes, or is likely to cause, bodily danger, or physical or emotional harm, to any member of the campus community; but the term "hazing" does not include customary athletic events or other similar contests or competitions.
- (o) This Section is not adopted pursuant to Education Code Section 89031.
- (p) Notwithstanding any amendment or repeal pursuant to the resolution by which any provision of this Article is amended, all acts and omissions occurring prior to that effective date shall be subject to the provisions of this Article as in effect immediately prior to such effective date.

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

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

The President may immediately impose an interim suspension in all cases in which there is reasonable cause to believe that such an immediate suspension is required in order to protect lives or property and to insure the maintenance of order. A student so placed on interim suspension shall be given prompt notice of charges and the opportunity for a hearing within 10 days of the imposition of interim suspension. During the period of interim suspension, the student shall not, without prior written permission of the President or designated representative, enter any campus of The California State University other than to attend the hearing. Violation of any condition of interim suspension shall be grounds for expulsion.

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

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

### Freedom of Information for Students

Students shall have the right to reasonable access to university, college, and departmental policies, procedures, standards, and regulations which affect the right of students to enroll, remain enrolled, or withdraw from any course or program of study.

The University Catalog and the Schedule of Classes shall be the principal means by which such academic information shall be transmitted to students.

The university, colleges, departments, and interdisciplinary groups shall not initiate and implement policies, procedures, standards, and regulations which affect the rights of students to enroll, remain enrolled, or withdraw from courses or programs of study except through established university procedures.

Students shall have the right to information from each professor as to the general requirements and goals of a course in which they are enrolled, and to know the general criteria upon which they will be evaluated in that course. At the beginning of the quarter, each student shall be provided with a class syllabus.

Just as it is the students' right to know policies, procedures, standards, and regulations which affect their rights, so shall it be their responsibility to obtain and act appropriately on such information, and their lack of knowledge of such information which has been made accessible to them shall not be cause to waive such policies, procedures, standards, and regulations.

### Student Rights and Responsibilities

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

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

Information regarding student rights and responsibilities and grievance procedures can be found in the "Statement of Student Rights, Responsibilities, and Student Grievance Procedures," copies of which are available in the Office of Judicial Affairs and Student Development, Building 26, (909) 869-3358.

### Academic Freedom

Academic freedom in a university is a fundamental condition necessary for education to flourish. The university is the primary social institution committed to the search for knowledge and the preservation of intellectual freedom. This commitment distinguishes the university from other institutions. Cal Poly Pomona is a community of learners—both teacher-scholars and students—who strive to promote, foster, and sustain academic freedom in its broadest context, with each individual free to pursue truth, knowledge, and meaning according to his or her own best judgment.

### Standard of Conduct

All members of the university community are expected to practice self-discipline, fair and independent judgment, and responsibility for their treatment of others. The relationship among faculty, administrators, staff and students should be free of exploitation, harassment, or discriminatory treatment. Particularly, intimate relationships between supervisors and employees, faculty and students, or between any individuals of unequal status are strongly discouraged because of the inherent power imbalance.

All members of the university community are expected to exercise reasonable judgment regarding the separation of their rights, obligations, and activities as private citizens from their responsibilities to the university. Specifically, when they speak or act as private persons, they should avoid creating the impression of speaking or acting for the university.

These statements are intended to preserve academic freedom, maintain professional conduct, and prevent potential discrimination, harassment, and conflict of interest.

### Academic Integrity

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

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

- a. **Plagiarism**—Plagiarism is intentionally or knowingly presenting words, ideas or work of others as one's own work. Plagiarism includes copying homework, copying lab reports, copying computer programs, using a work or portion of a work written or created by another but not crediting the source, using one's own work completed in a previous class for credit in another class without permission, paraphrasing another's work without giving credit, and borrowing or using ideas without giving credit.
- b. **Cheating During Exams**—Exam cheating includes unauthorized "crib sheets," copying from another, looking at another student's exam, opening books when not authorized, obtaining advance copies of exams, and having an exam regraded after making changes. Exam cheating includes exams given during classes, final exams and standardized tests such as the Graduating Writing Test and Math Diagnostic Test.
- c. **Use of Unauthorized Study Aids**—This includes utilization of others' computer programs or solutions, copying a copyrighted computer program without permission, using old lab reports, having others



perform one's share of lab work, and using any material prohibited by the instructor.

- d. Falsifying any University Document—This includes falsifying signatures on university forms, such as Add-Drop and Withdrawal forms, forging another student's signature and falsifying prerequisite requirements.

The responsibility of all students is to be informed of what constitutes academic dishonesty and to follow the policy. A student who is aware of another student's academic dishonesty is encouraged to report the instance to the instructor of the class, the test administrator, or the head of the department within which the course is offered. A student who is reported by the instructor to the Director of Judicial Affairs and Student Development will receive a letter with this accusation.

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

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

### Campus Violence

Threatening behaviors, acts of aggression, and instances of violence will result in appropriate responses, up to and including dismissal or expulsion, and the pursuit of civil and criminal penalties, as appropriate. Violence and threats of violence include, but are not limited to:

- any act which is physically assaultive;
- any substantial threat to harm or to endanger the safety of others;
- behaviors or actions interpreted by a reasonable person as carrying the potential for violence and/or acts of aggression;
- any substantial threat to destroy property;
- possession of a weapon (Penal Code 626.9 prohibits bringing a firearm, knife or dangerous weapon onto the campus of a public school including the California State University).

It is the responsibility of every administrator, faculty member, staff member and student to take any threats of violence seriously, and to report them to the appropriate resource. When confronted by an imminent or actual incident of violence, call 9-1-1 immediately. When presented with a threat of possible violence, action is recommended as follows:

- Threats by a student should be reported immediately to Public Safety and the Director of Judicial Affairs;

- Threats by a staff or student employee should be reported immediately to Public Safety and the reporting employee's supervisor who will contact the Personnel Program Administrator in Human Resources for assistance;
- Threats by a faculty member should be reported immediately to Public Safety and the appropriate Dean's Office for consultation with the Vice President for Academic Affairs;
- Threats from others not affiliated as a student or employee should be reported immediately to the Department of Public Safety on their non-emergency extension (ext. 3070).

Information concerning Cal Poly Pomona policies, procedures, and facilities for students and others to report criminal actions or other emergencies occurring on campus may be obtained from the Police Dispatcher at (909) 869-3070.

Information concerning Cal Poly Pomona annual campus security report may be obtained from Department of Public Safety, Building 81, (909) 869-3070.

Information concerning the prevention of drug and alcohol abuse may be obtained from Debbie Jackley at (909) 869-5309 or Jim Grizzell at (909) 869-4339, Student Health Center, Building 46.

### University Policy

Rape and sexual assault are criminal violations of California sexual assault laws and violations of the university code of conduct. Any one charged with a sexual assault violation which is campus-related may be subject to: a) a criminal charge filed against the individual, and/or b) an administrative proceeding initiated by the University. Proceedings may occur concurrently. Disciplinary actions may include suspension, expulsion, or termination from the university even if there is no criminal prosecution. Additional sanctions may be imposed, depending upon the nature of the offense and surrounding circumstances.

Established California State Polytechnic University, Pomona and California State University student and employee disciplinary, grievance or other complaint procedures, including those procedures found in collective bargaining agreements, Executive Order 419, or the current Statement of Student Rights, Responsibilities and Grievance Procedures, will be utilized as appropriate in resolving these matters.

The University will respect the confidentiality of the survivor and will disclose only under the following circumstances: a) with the permission of the survivor, and/or b) when it is necessary for the safety or in the best interest of the survivor.

### Prohibition of Sexual Harassment

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

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

- Submission to or toleration of the conduct is an explicit or implicit term or condition of appointment, employment, admission or academic evaluation;

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

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

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

Complaints of sexual harassment should be filed with the Associate Vice President for Faculty Affairs, Building 98 T7-17, (909) 869-3406.

### Definition of Sexual Harassment

California State Polytechnic University, Pomona, prohibits sexual harassment by and among administrators, faculty, staff and students, and such conduct is subject to disciplinary action, up to and including dismissal (for employees) or expulsion (for students).

The University strongly discourages intimate relationships between supervisors and employees, faculty and students, or between any other individuals of unequal status, because of the inherent power imbalance. Such relationships may involve conflict of interest and may constitute sexual harassment.

According to Federal Equal Employment Opportunity Commission guidelines and California State University Executive Order No. 345, sexual harassment includes such behavior as sexual advances, requests for sexual favors and other verbal or physical conduct of a sexual nature directed towards an employee, student or job applicant when one or more of the following circumstances are present:

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

In extreme cases, acts of harassment may constitute sexual assault, which is prohibited both by University policy and by criminal law. If there is possible criminal activity, contact public safety.

Sexual harassment can occur between individuals regardless of gender, employment status, work relationship or academic association and the harassment may be behavioral, verbal, graphic, written, or physical in nature; appropriate grounds for disciplinary action may exist in any of these circumstances.





The most common forms of sexual harassment include:

### Gender Harassment

Generalized sexist remarks and discriminatory behavior not necessarily designed to elicit sexual cooperation, but to convey insulting, degrading, intimidating and/or sexist attitudes. Examples include derogatory comments, jokes or epithets, display of sexually suggestive objects or pictures, cartoons or posters.

### Seductive Behavior

Unwanted, inappropriate and offensive physical or verbal sexual advances. Examples include unwanted attempts to discuss or comment on an individual's personal or sex life, suggestive or obscene letters, notes, or invitations, continuing to express sexual interest after being informed that the interest is unwelcome.

### Sexual Bribery

Solicitation of sexual activity or other sex-linked behavior (e.g., dating) by promise of rewards (e.g., good grades, preferential treatment, promotion, recommendations). Examples include offering employment benefits such as promotions, favorable performance evaluations, favorable assigned duties of shifts, recommendations, reclassifications, etc., in exchange for sexual favors.

### Sexual Coercion

Threats of punishment or retaliation if a person does not comply with requests for sexual or sex-linked activity. Examples include impliedly or actually withholding support for an appointment, promotion or change of assignment, suggesting a poor performance report will be prepared or suggesting probation will be failed due to a negative response to sexual behavior.

### Sexual Assault/Sexual Imposition

Gross sexual misconduct such as rape or assault. Examples include touching, fondling, kissing, grabbing, impeding or blocking movement. These are criminal acts when committed against the person's will and should be referred to the police agency having jurisdiction.

Further, though these examples are most directly applicable to employment, similar behavior in faculty-student, employee-student, or student-student relationships may also give rise to a valid sexual harassment complaint. For example, submission to sexual advances as a condition of receiving a good grade in a course, or as a condition of one student working with another on a joint project, would be examples of analogous situations in an academic setting.

In determining whether conduct constitutes sexual harassment, all circumstances surrounding the conduct are considered. The University recognizes that the perception of sexual harassment behavior is often subjective, and that the circumstances surrounding the conduct, as well as its pattern, frequency and severity need to be considered.

Furthermore, the University recognizes the need to protect the rights of both the accuser and the accused. Allegations of sexual harassment are serious and will be treated as such. At the same time, the making of knowingly false accusations of sexual harassment will be considered unprofessional/unethical conduct, and persons bringing such accusations will be subject to appropriate disciplinary action.

More detailed information, including the procedures for filing a complaint, may be obtained from the Office of the Associate Vice President for Faculty Affairs, Building 98, T7-17, (909) 869-3406.

### Sexual Assault Policy

Sexual assault, a felony under the law, will not be tolerated by California State Polytechnic University, Pomona. Sexual assault includes rape, acquaintance rape, and sexual battery. The University will promptly investigate all allegations of sexual assault and take appropriate action where required. The following information summarizes the University's Sexual Assault Policy Statement. The entire policy is published in the University Manual.

### Definitions of Sexual Assault

1. Rape is defined in Section 261 of the California Penal Code as non-consensual sexual intercourse. It may involve the use or threat of force, violence, retaliation, or immediate bodily injury. Rape also occurs when the victim is incapable of giving legal consent, for example, when: a) the victim has a mental disorder, or is developmentally or physically disabled; or b) the victim is prevented from resisting the assault due to intoxicating substances (e.g. alcohol or drugs); or c) the victim is unconscious of the nature of the act and is known to the accused. Consent is defined as positive cooperation in an act or attitude pursuant to an exercise of free will; the person must act freely and voluntarily and have knowledge of the nature of the act or transaction involved.
2. Acquaintance Rape follows the same definition but is committed by someone the victim knows.
3. Sexual Battery is defined in Section 243.4 of the California Penal Code as the touching of an intimate part of another person, if the touching is against the will of the person touched, for the purpose of sexual arousal, sexual gratification, or sexual assault. Assault with intent to commit a sexual battery is defined as an unlawful attempt, coupled with the present ability, to commit a violent injury (e.g. rape) on the person of another.

### Protection of Human Subjects Policy

Research involving human subjects must be administered in a manner consistent with requirements of the University Policies and Procedures for the Protection of Human Subjects, the University Manual, and the Federal Policy for the Protection of Human Subjects (Model Policy) which became effective August 19, 1991.

The University Committee for the Protection of Human Subjects (CPHS) has ultimate responsibility to determine risk with regard to human subject research and to approve or not approve such research conducted at and/or under the sponsorship of the University and its auxiliaries. (Cal Poly Pomona Policy for Protection of Human Subjects, [CPPPHS] Section 2.2).

Copies of the Policies and Procedures for the Protection of Human Subjects and the federal regulations are available in the Research Office, extension 2966, and should be followed when preparing for research which involves human subjects.

### 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.



## Computer Software Copyright and License Agreement Policy

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

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

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

## University Copyright Policy

In 1991 the Academic Senate recommended and the President approved a University Copyright Policy. The Policy is included in the University Manual and in the Handbook on External Funding. For more information call the Office of Research and Sponsored Programs at (909) 869-2954, or the Office of Academic Programs at (909) 869-3330.

## Conflict of Interest

Each individual member of the university community is responsible for acting in an ethical and professional manner. This responsibility includes avoiding conflict of interest, conducting research and instruction in an ethical manner, and protecting the rights of all individuals. All members of the community, including members of the faculty, administration, student body, and staff, should conduct themselves with the greatest professional objectivity.

## Smoking Policy

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

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

The residence halls are also completely smoke-free environments. This restriction applies to student rooms, lobbies, study areas, and the Los Olivos Dining Commons.

**Policy Administration and Enforcement.** Deans, directors, and department heads are responsible for the administration of this policy. The associate vice president for Faculty Affairs and the director of Human Resources are available to assist in policy interpretation and to ensure consistent application.

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

## Drug-Free Workplace Policy

Cal Poly Pomona recognizes its responsibility to help provide a safe and productive educational and work environment. The following summary

complies with the Drug-Free Workplace, and the Drug-Free Schools and Communities Acts. The university strongly endorses the Drug-Free legislation and wishes to inform all students and employees of:

- other health risks associated with alcohol and drug abuse;
- other standards of conduct required of university students and employees;
- other disciplinary action that will result when the policy is violated; and
- other help available when treatment is needed.

The following information summarizes the university's commitment to, and compliance with, Drug-Free legislation. The entire policy is published in the University Catalog and in the University Manual.

There is significant medical evidence demonstrating the health risks associated with the abuse of alcohol, drugs and other controlled substances. The unlawful manufacture, distribution, dispensation, possession or use of controlled substances is prohibited at the university. The abuse of alcohol is also prohibited.

University employees must perform in a safe and productive manner and students must pursue educational activities unimpaired by alcohol and other drugs. Violations of this policy will result in appropriate disciplinary action, up to and including termination or expulsion from the university.

The university recognizes that addiction is a treatable illness. Students and employees are encouraged to seek assistance and participate in appropriate treatment programs. Confidential assistance for students is available through the Counseling and Psychological Services. Employees may receive confidential assistance from the University Training Officer, who coordinates the Employee Assistance Program.

## Health Risks

Surveys of the major causes of death in the United States reveal that alcohol abuse is the fourth leading cause of death, and is a major contributor to the three leading causes—heart disease, cancer and stroke. The use of chemical substances during pregnancy has been linked to fetal death and to the permanent mental and physical impairment of infants. The use of other drugs and controlled substances has resulted in permanent impairment and death.

## Statement of Conduct on Controlled Substances

The unlawful manufacture, distribution, dispensation, possession or use of controlled substances is prohibited at the University. Illicit drug use and the abuse of alcohol are prohibited at the worksite and in connection with university activities and events.

University employees must perform in a safe and productive manner, and its students must pursue educational activities, unimpaired by alcohol and other drugs.

## Definition of Controlled Substances

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

## Disciplinary Action

Violations of the Standards of Conduct stated above will result in the following actions:

If an employee or student is suspected with good reason of the unlawful



manufacturing, distributing, dispensing, possessing or using of controlled substances, other drugs, or alcohol on university property, or in connection with university activities, the University will take appropriate investigatory action as provided for in applicable rules, regulations and memoranda of Understanding of the California State University (CSU).

If the investigation demonstrates that the suspected action did occur, appropriate personnel or student discipline action will take place up to and including termination or expulsion. In addition, the individual remains subject to legal sanctions imposed by local, State and Federal law and the university will cooperate as legally required in pertinent investigations. As a condition of continued employment or student enrollment, the university may require an employee or student to satisfactorily complete an appropriate substance abuse treatment program.

Individuals engaged directly in the performance of work pursuant to a federal grant must comply with the Drug-Free Workplace Act, which requires each employee to notify the University of his or her conviction for a drug offense occurring in the workplace. The notification must occur no later than five (5) days after such conviction. The University must notify the granting or contracting agency within 10 days after receiving such notice. Within thirty (30) days after receiving such notice the university will take appropriate personnel action as outlined above.

### **Medically Authorized Drugs**

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

### **Employee Assistance**

An employee may volunteer to participate in an appropriate treatment program or may be directed to do so by the University. As provided for under CSU procedures, employees may utilize available leave credits or may be placed on a leave of absence to participate in such programs. Approval for an employee to return to work will be granted upon certification that the employee has successfully completed an appropriate treatment program. Because such programs vary in length, the amount of time granted for treatment will be determined on an individual basis.

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

### **Student Assistance**

A student may volunteer to participate in an appropriate treatment program or may be directed to do so by the University. As provided for under CSU procedures, the student may be placed on a leave of absence for the purpose of treatment. Approval for the student to resume enrollment will be granted upon certification that the student has successfully completed an appropriate treatment program. Because such programs vary in length, the amount of time granted for treatment will be determined on an individual basis.

Student participation in treatment, whether voluntary or directed, will be confidential. Referral services are available from Counseling and

Psychological Services.

### **Policy Administration**

The University Director of Human Resources is responsible for the administration of the University's Drug-Free Policy for Employees. Managers and supervisors are responsible for reporting any incident of suspected abuse by employees to the Director of Human Resources who will apprise appropriate administrators.

The Director of Judicial Affairs is responsible for the administration of this policy for students.

This policy will be reviewed annually by the Director, Human Resources who will advise the Vice President for Academic Affairs as to the status of employee compliance with the Act; and by the Director of Judicial Affairs who will advise the Vice President for Student Affairs as to the status of student compliance.

The Vice President for Administrative Affairs and the Vice President for Student Affairs will affirm compliance and forward the annual certifications to the University President for signature and transmittal.

## SPECIAL PROGRAMS

### Early Admission

The early admission program allows academically talented high school students to enroll for up to eight units of university work per quarter while simultaneously completing requirements for graduation at their respective high schools. The university work thus completed is applicable only as university credit and may not be used to meet high school graduation requirements. Consideration for admission to this program is granted to students who are earning a 3.0 grade point average in college preparatory courses and who are recommended by the high school principal or counselor.

To be considered for admission a student must:

1. Complete and submit the CSU Application along with the \$55.00 nonrefundable application fee.
2. Forward a nomination letter from the high school principal or counselor.
3. Submit two copies of the high school transcript.

Additional information and applications are available in the Admissions Office.

### Four-year Graduation Pledge

Graduating in four years is a top priority for both prospective students and their parents, as they make decisions about a college education. The Cal Poly Pomona Four-year Graduation Pledge Program is designed to facilitate the graduation of freshmen within four years. The pledge program involves a two-way commitment, both on the part of the University and the student who elects to become a part of the program. The program is based on the philosophy that if both the University and the student uphold their commitment, graduation in four years should be easily attainable.

#### Student Commitment

1. Attend an orientation program prior to enrollment
2. Declare and remain in the same major elected upon admission to the University
3. Enter the University qualified to enroll in college-level math and English appropriate to your major
4. Enroll in at least 16 units per quarter and successfully complete at least 50 units per year
5. Maintain a minimum 2.0 cumulative grade point average, and earn a "C" or better in all coursework taken
6. Meet with an assigned advisor every quarter and participate in priority registration
7. Take and pass the Graduation Writing Test during your junior year
8. Balance school, work, and personal responsibilities so that your commitment to education is honored

#### University Commitment

At the core of the University's commitment is an effective and coordinated advising program. Each undergraduate academic department has designated a special faculty advisor for four-year graduation pledge students. Additionally, four-year graduation pledge participants are granted priority registration for the duration of their pledge agreement.

For more information about the Four-year Pledge program, please

contact Dr. Rochelle Kellner at (909) 869-4531.

### Army Reserve Officers' Training Corps (ROTC)

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

Army ROTC aids students by providing leadership and management experience found in few other college courses as well as an opportunity for a military career in the Active Army, Army National Guard, or the U.S. Army Reserve. It develops self-discipline, physical stamina and poise while enhancing development of management skills and qualities basic to success in any career. It also provides academic credit for classroom instruction and a living allowance of up to \$1,000.00 each year during the final two years of the program.

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

The Advanced Course provides further instruction in leadership development, organization and management, and tactics and administration. Attendance at all leadership laboratories and field trips (MS 179 Physical Training) is mandatory for all Advanced Course cadets. Advanced Course cadets attend a six-week advanced camp in the summer between their junior and senior years of college. This camp permits Cadets to put into practice the principles and theories they have acquired from classroom instruction. Cadets receive approximately \$880.00 in pay, plus travel expenses, room and board, medical care, and other benefits.

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

Army ROTC scholarships for full tuition, fees, books, and a \$100.00 monthly living allowance are offered to students who are enrolled or are preparing to enroll in Army ROTC. These scholarships are for three years. Three-year competitive scholarships are available to students attending college at the time of application; this includes students enrolled in the Cal Poly Pomona Army ROTC program. Applications and further information can be obtained by writing Army ROTC, California State Polytechnic University, Pomona, CA 91768, or by calling (909) 869-3266.

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

### U.S. Air Force Reserve Officers Training Corps (AFROTC)

Through arrangements with the University of Southern California (USC) in Los Angeles and Harvey Mudd College (HMC) in Claremont, students may participate in the Air Force Reserve Officer Training Corps (AFROTC) program. AFROTC offers a variety of two, three, and four year scholarships, many of which pay the full costs of tuition, books, and fees.



Successful completion of as little as four semesters of AFROTC academic classes and leadership laboratories can lead to a commission as a second lieutenant in the United States Air Force.

Classes consist of one hour of academics and two hours of laboratory for freshmen and sophomores and three hours of academics and two hours of laboratory for juniors and seniors. The academic hours earned can normally be counted as elective credit toward graduation. All AFROTC classes and laboratories are held on Tuesday evenings at Harvey Mudd College to better accommodate students commuting from other colleges and universities in the area. AFROTC cadets under scholarship and all juniors and seniors receive a \$150 per month tax-free stipend.

For more information, contact the University of Southern California Department of Aerospace Studies (AFROTC) at (310) 338-2770.

### CSU International Programs and Cal Poly Pomona Study Abroad

Cal Poly Pomona offers students an opportunity to study abroad both under the CSU International Programs and through Exchange Agreements it maintains with other universities.

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 11,000 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 36 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 Western Sydney

Brazil – Universidade de Sao Paulo

Canada – The universities of the Province of Quebec (13 institutions, including Universite de Montreal, Concordia University, Universite Laval, McGill University, Universite du Quebec 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 Francaises pour Etudiants Etrangers, Universite de Droit, D'Economie et des Sciences D'Aix-Marseille (Aix-en-Provence)

Germany – The institutions of higher education in the German Federal State of Baden-Württemberg, including: Ruprecht-Karls-Universität (Heidelberg), Musikhochschule Trossingen, Universität Hohenheim (Hohenheim), Fachhochschule Furtwangen (Furtwangen), Fachhochschule Mannhiem, Fachhochschule Nürtingen (Nurtingen), Fachhochschule Reutlingen (Reutlingen), Berufsakademie Stuttgart (Stuttgart), Universität Freiburg (Freiburg), Universität Karlsruhe, Universität Konstanz, Universität Mannhiem, Universität Stuttgart, Universität Ulm, Eberhard-Karls-Universität (Tübingen)

Israel – Tel Aviv University, and The Hebrew University of Jerusalem

Italy – CSU Study Center (Florence), Universita degli Studi di Firenze, and La Accademia di Belle Arti di Firenze

Japan – Waseda University (Tokyo)

Korea – Yonsei University (Seoul)

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

New Zealand – Lincoln University (Christchurch) and Massey University (Palmerston North)

Spain – Universidad Complutense de Madrid and Universidad de Granada

Sweden – Uppsala Universitet

Taiwan – National Chengchi University (Taipei)

United Kingdom- Bradford University, Bristol University, Kingston University, Sheffield University, and University of Swansea

Zimbabwe – University Of Zimbabwe (Harare)

The International Programs pays all tuition and administrative costs for participating 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 CSU International Programs or to the Cal Poly Pomona Exchange 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.

Active Cal Poly Pomona exchange programs offer students the opportunity to study at the following institutions:

China North China University of Technology

Germany Fachhochschule Darmstadt

Japan Kyushu Institute of Design

Mexico Centro de Enseñanza Técnica y Superior (Mexicali)

Other agreements are also under discussions in Argentina, Australia, Greece, Mexico, Korea, and Singapore.

Under Cal Poly Pomona exchange programs students receive tuition-free study abroad opportunities in return for the extension of reciprocal opportunities to the participating foreign university, credit earned abroad being transferred back to Cal Poly Pomona.

Additional information and application materials may be obtained on campus from the International Center or by writing to The California State University International Programs, 400 Golden Shore, Suite 122, Long Beach, California 90802-4275. Visit us on the World Wide Web at [www.gateway.calstate.edu/csuienet/](http://www.gateway.calstate.edu/csuienet/). Applications for the 1998-99 academic year overseas must be submitted by February 1, 1998 for the CSU programs, and by April 1, 1998 for Exchange Programs.

### National Student Exchange (N.S.E.)

Cal Poly Pomona belongs to the National Student Exchange consortium, which comprises 135 state universities and colleges in 46 states plus



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

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

The National Student Exchange program is administered through the Office of the Vice President for Student Affairs and University Advancement, Building 98, Tower-6. Applications are available in January, and placement is completed by the end of March for the next academic year.

### University Access and Equity Programs

As part of the University's efforts to expand educational opportunity, a number of access and equity programs have been developed. These programs include cooperative efforts between the offices of the Vice President for Academic Affairs and the Vice President for Student Affairs and University Advancement.

### Educational Opportunity Program

The Educational Opportunity Program (EOP) is the University's first and most comprehensive access and equity program. Established in 1969, the program serves California residents who do not meet the University's regular admission standards, as well as those who qualify for regular admission. Program participants must have a history of low income, need academic support and supplemental financial aid, and demonstrate the motivation and potential to succeed in Cal Poly Pomona's academically challenging environment. An array of support services is made available to EOP students to assist them in making the most of their educational opportunities.

The program's Counseling and Advising Services (CAS) component provides academic advising, registration assistance, counseling, and assistance in applying to graduate school. The professional staff places particular emphasis on advising EOP undeclared majors (major code 9060), special admits, and students who fail to maintain satisfactory academic progress. The staff is augmented by trained upper-division peer counselors who meet periodically with students to assist them in selecting courses, exploring and declaring majors, resolving difficulties, and successfully negotiating the university environment.

The professional staff of the program's Learning Assistance Center (LAC) offers support in most subject areas and in study strategies. Trained peer tutors provide individualized learning assistance as part of EOP's tutorial program, which is nationally certified by the College Reading and Learning Association. Special classes and study groups are offered in various subjects to assist students in adjusting to Cal Poly Pomona, and study skills workshops are presented regularly. The LAC helps students prepare for the Graduation Writing Test (GWT) by offering quarterly workshops and individualized follow-up tutoring. In addition to EOP

students, these services are made available to students in the Summer Bridge Program, College-Based Programs, Re-entry Services, Disabled Student Services, and Athletic Department.

The Admissions and Enrollment Services (AES) component oversees the EOP admissions process, maintains student data, and conducts research on enrollment patterns. The AES staff provides preadmission assistance to prospective students, coordinates the program's outreach and recruitment activities, processes application materials, arranges for testing and/or personal interviews with applicants, recommends applicants for acceptance, and notifies them of admission decisions.

Prospective first-time students apply for admission to the Educational Opportunity Program by completing all sections of item 12 on The California State University undergraduate application for admission. Applicants are required to submit the EOP supplementary forms (which include an applicant information form, a nomination form, an autobiographical statement, and a recommendation form) and an official copy of their high school transcript. In addition, applicants must submit a Free Application for Federal Student Aid (FAFSA) and documentation of household income. Please note that Cal Poly Pomona's EOP accepts applications from first-time students for fall quarter only. The deadline for receiving applications for the 1997-98 academic year is March 2, 1997; the deadline for receiving applications for the 1998-99 academic year is March 2, 1998.

Prospective transfer students apply for admission to the Educational Opportunity Program by completing all sections of item 12 on The California State University undergraduate application for admission. They must declare a major, indicate whether they are or have been enrolled in an EOP or EOP&S program, and submit the EOP supplementary forms and official transcripts of all college work. In addition, prospective transfer students must submit a Free Application for Federal Student Aid (FAFSA) and documentation of household income. Applicants seeking to transfer to Cal Poly Pomona's EOP are encouraged to apply as early as possible during the application filing period. The EOP application deadlines for prospective transfer students are:

Fall Quarter 1997	March 2, 1997
Winter Quarter 1998	October 31, 1997
Spring Quarter 1998	January 31, 1998
Fall Quarter 1998	March 2, 1998
Winter Quarter 1999	October 31, 1998
Spring Quarter 1999	January 31, 1999

After the EOP file of a prospective first-time or transfer student is complete, it will be carefully reviewed by the program's Admissions and Enrollment Committee. The committee will not consider the application of a prospective student until all forms and documents required by the University's Admissions Office have been received and EOP has been notified that the applicant's file is complete.

The Admissions and Enrollment Committee will consider such factors as the applicant's previous academic performance, co-curricular activities, work experience, motivation, and potential for success at Cal Poly Pomona. The committee may also look for any contributions that the applicant has made or intends to make to his or her community. To assist the committee, all applicants are encouraged to fill out all forms completely and accurately. Some applicants may be required to visit the campus to participate in personal interviews and/or skills assessment testing. The Coordinator of Admissions and Enrollment Services will notify applicants if a campus visit is required during the selection process.

After an applicant's file has been reviewed and a decision has been reached, the Director of the Educational Opportunity Program will notify the applicant of the decision in writing. When an offer of admission is



extended, an EOP Acceptance Agreement will accompany the offer. The EOP Acceptance Agreement must be signed by the prospective student and returned to the Coordinator of Admissions and Enrollment Services within two weeks. If it is not signed and returned on or before the specified date, the offer of admission to the Educational Opportunity Program will be canceled.

For additional information on the Educational Opportunity Program, please call Leticia Guzman, Coordinator of Admissions and Enrollment Services, at (909) 869-4672 or James M. Norfleet, Interim Director, at (909) 869-3365.

### Summer Bridge Program

Initiated at Cal Poly Pomona in the summer of 1985, the Summer Bridge Program assists students in making the transition from high school to the more challenging environment of the university. It is an intensive five-week residential summer session that seeks to orient incoming students

to the university and strengthen their basic academic skills. Currently, the program is coordinated by the Educational Opportunity Program.

Students participating in the Summer Bridge Program are selected from among those who have been admitted to the university for the fall quarter. They live in the residence halls and participate in orientation workshops, tutoring, study sessions, and various co-curricular activities. They enroll in five courses: Introduction to the University, Fundamental Principles of Learning Skills, English, Mathematics, and Cultural Awareness through Speech and Critical Thinking. Students are awarded six units of university credit upon successful completion of the program. All costs, including registration fees, room, board, and books, are covered by the university.

For more information on the Summer Bridge Program, please call James M. Norfleet, Interim Director of the Educational Opportunity Program, at (909) 869-3365.





## SPECIAL UNIVERSITY CENTERS

### W.K. KELLOGG ARABIAN HORSE CENTER ARABIAN HORSE PROGRAM

Calvin N. Kobluk, Director, Equine Sciences

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

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

### EQUINE RESEARCH CENTER

Steven J. Wickler, Associate Director, Equine Sciences

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

### APPAREL TECHNOLOGY AND RESEARCH CENTER

Jean Gipe, Director

The Apparel Technology and Research Center (ATRC) conducts research, outreach education, and demonstration activities for the apparel industry. The Center houses a model manufacturing plant featuring state-of-the-art equipment and advanced manufacturing systems. The ATRC is the only recipient on the West Coast of a research and demonstration contract from the Department of Defense—Defense Logistics Agency. These contracts provide over \$13 million in funding to expand the capabilities of the ATRC to work with industry. Students in the Apparel Merchandising and Management degree program, as well as various other engineering and business programs, benefit from the ATRC activities.

### INTERNATIONAL CENTER

Jean S. Aigner, Director

The International Center, located in Building 1, Room 104, is the focal point for international activities across the campus. These activities include international exchanges of both faculty and students, advising of international students, development and technical assistance projects abroad, short term technical workshops, promotion of international symposia and other international events on campus, and welcoming international visitors.

The International Center also works closely with the various colleges and departments in the university-wide effort to internationalize the curriculum and to bring international speakers and programs to the campus. Various student services are also available at the International Center including advising for international students,

international student identification, and passport information. The Institute for Regional and International Studies is an academic component of the Center.

In the area of technical assistance, the International Center develops proposals for and manages projects in a number of world regions. In the past, the university has implemented development projects in such diverse nations as the Yemen Arab Republic, Tanzania, Greece, Cameroon, and Costa Rica. Currently the Center is involved in development activities in Zimbabwe, Swaziland, Malaysia, and Armenia and in the training of government-sponsored students from Africa and Asia in both regular degree programs and specially designed workshops. Recently, we have enrolled a student from Rwanda as part of a humanitarian project with that country. The Center has designed special educational programs for Korea, China, Saudi Arabia, Cyprus, and other countries.

The Center is actively involved in the placement of Cal Poly Pomona students in the CSU International Programs in 17 different countries and in Cal Poly Pomona exchange programs in Germany, Japan, Mexico, France, China, and Australia.

The Center's lounge provides a place for international and American students to associate, and provides information on foreign countries through periodicals from various countries and daily foreign language television news from around the world.

### OCEAN STUDIES INSTITUTE

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

The Ocean Studies Institute provides an outlet for shipboard instruction to Institute members, as well as the community, aboard the fully equipped and crewed research vessel, R/V Yellowfin.

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

The five member campuses are located within a 50-mile radius of the Institute's office and the R/V Yellowfin slip in downtown Long Beach. The proximity of the schools allows for easy student accessibility and personal communication between faculty members involved in interdisciplinary projects. For information regarding Cal Poly Pomona's participation in the Institute please contact the Associate Vice President for Academic Programs, Building 98.

### DESERT STUDIES CONSORTIUM

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



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

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

Besides students and faculty from the seven sponsoring campuses, persons from other universities and groups interested in desert educational activities are welcome to use the Center facilities. For information on Cal Poly Pomona's participation in the Desert Studies Center, contact the Associate Vice President for Academic Programs, Building 98.

### **FACULTY CENTER FOR PROFESSIONAL DEVELOPMENT**

Carol R. Holder, Director

The Faculty Center for Professional Development, established in September 1990 and located in Building 1, Room 227, initiates, coordinates, and supports programs that assist faculty members in achieving their professional goals and improving their teaching abilities. An elected faculty Advisory Committee guides the Center in setting priorities and planning new programs.

The Faculty Center provides individual assistance and sponsors campus discussion groups and workshops on exploring alternative teaching strategies, learning uses of new technologies, improving classroom instruction, student outcomes assessment, and advancing research and scholarly activities. These workshops, offered throughout the year and conducted by Cal Poly Pomona faculty, enhance collegial relations and promote a multidisciplinary exchange of insights and support for efforts at improvement and innovation.

A Computing Support Lab in the Faculty Center provides a place for faculty to learn how new tools can enhance student learning in their courses. The lab offers workshops and tutorials. An Annual Faculty Forum provides an opportunity for faculty to present their research or creative work to colleagues. At the February Symposium on University Teaching, faculty share successful teaching strategies and discuss issues that affect student learning.

The Center also helps faculty prepare proposals and applications for campus and CSU programs and for extramurally supported fellowships and awards. Bulletins from the Center inform faculty of development opportunities—awards and fellowships, conferences and workshops, etc. The Center's resources include books, periodicals, and other publications with information for faculty on teaching, learning, research and writing, and development opportunities.

### **CENTER FOR COMMUNITY AFFAIRS**

Maria Harris, Director

The goals of the Center for Community Affairs are to support research in communities in the Cal Poly Pomona service area; to support opportunities for faculty and students to participate in community service; to provide work shops and training on leadership and diversity for local officials and community groups.

Community service projects directed by College of Letters, Arts, and Social Sciences faculty and affiliated with the Center include: the Motor Development Clinic, the Institute for California Women in Politics, the Mobile Clinic for Child and Family Services, and the Social Data Center.

### **INSTITUTE FOR ETHICS AND PUBLIC POLICY**

\_\_\_\_\_, Director

The mission of the Institute for Ethics and Public Policy is to sponsor events and activities that will encourage broad community discussion of pressing social problems and more issues; to encourage and support creative and effective ways to teach about diverse moral traditions; to foster a community of scholars and students who will critically examine the moral dimensions of our public policies.

### **REPRODUCTIVE PHYSIOLOGY CENTER**

The mission of the Reproductive Physiology Center is to provide an undergraduate teaching and graduate student research laboratory for the investigation of physiological events responsible for reproduction in domestic farm animals. The primary emphasis of the Center is to utilize new biotechnology procedures to manipulate and preserve male and female gametes collected from ruminant and non-ruminant animals. The Center is equipped to collect, analyze and freeze spermatozoa for improving the procedures associated with artificial insemination. In addition, the Center is capable of collecting, culturing and in vitro fertilization of oocytes for embryo manipulation and embryo freezing to improve the reproductive efficiency of the female.

### **INSTITUTE FOR CELLULAR AND MOLECULAR BIOLOGY**

Jill Adler, Director

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

- 1) regularly scheduling informal luncheon meetings and poster displays to familiarize one another with various research projects;
- 2) reviewing current literature by participation in a quarterly Journal Club;
- 3) financially supporting innovative pilot research projects and expansion of ongoing research programs in new directions;
- 4) sponsoring one yearly symposium for ICMB members to summarize the progress made on their research;
- 5) supporting graduate student research by creating a professional research environment.

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

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



## INSTITUTE FOR ADVANCED SYSTEMS STUDIES

Len Troncale, Director

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

The Institute is staffed by 20 to 25 faculty and associate fellows selected for their outstanding accomplishments in their home departments combined with their demonstrated ability for and interest in crossing disciplinary lines. The Fellows are authorized to offer a 32-unit Minor in Comparative Systems Analysis (see description in this catalog at the end of the College of Science entries) and a Certificate in Comparative Systems Analysis through the Office of Continuing Education. Also offered are interdisciplinary courses for on-campus credit such as those planned for the new Integrated Science General Education Program.

The Fellows of the Institute conduct both basic and applied research on both natural and social systems. Students are organized into research Task Forces under the supervision of one or more Fellows and can receive credit from their home department (at the 200 and 400 level) for working on Institute projects. This encourages and accomplishes significant cross-fertilization across the colleges and departments. Examples of ongoing projects in the domain of basic systems research include: (1) computer analysis of natural hierarchical levels using clustering analysis; (2) systems allometry across physical, biological, and sociological systems; (3) systems analysis of symmetry and duality across the natural sciences; (4) linkage propositions between 80 systems isomorphies; (5) design and testing of cooperation equations in ecology and economics. Examples of ongoing projects in the domain of applied systems research include: (1) fractal analysis of solid tumors for cancer diagnostics and prognosis; (2) ecohouse research for optimized interaction and cooperation among the sub-systems of American homes; (3) design of a knowledge-based computer system on general systems theory for education and design. Another function of the Institute is to attract funding to our university. Its Fellows have received grants from a diverse set of sources including the National Science Foundation, the U.S. Office of Education, the Chancellor's Office, the U.S. Department of Housing and Urban Development, and various Foundations.

Students interested in earning a Minor in Comparative Systems Analysis must declare their interest and intended start and completion dates by obtaining a form from Dr. Len Troncale, Building 3, Room 106 of the Biological Sciences Department, Phone: (909) 869-4040.

## INSTITUTE FOR REGIONAL AND INTERNATIONAL STUDIES

George Eisen, Director

The Institute for Regional and International Studies is the flagship of international education in the California State Polytechnic University, Pomona. It is a cluster of six regional study programs: African Studies, Asian Studies, European Studies, Latin American Studies, Middle Eastern Studies, and North American Studies. An all-university entity sponsored by the College of Letters, Arts, and Social Sciences the International Center, and the Office of Academic Affairs, the Institute is an academic component of the International Center.

The principal purposes and functions of the Institute are as follows:

- The Institute is the central mechanism through which Cal Poly Pomona organizes interdisciplinary teaching and research about different regions of the world, their complex interaction, economies, political systems, culture and people. The Institute serves as a conduit to the outside intellectual world by bringing internationally recognized scholars and scientists to campus. This will promote the

dissemination and discussion of important ideas and theories in a multi-ethnic and multicultural Cal Poly Pomona.

- The Institute is a scholarly forum through which Cal Poly Pomona faculty and students can pursue collaborative scientific and scholarly relationships and promote cooperation with institutions around the world.
- The Institute organizes international conferences dealing with cultural and social change, politics, religion, environment, peace, conflict-resolution, and other global issues.
- The Institute is the forefront in promoting foreign language acquisition at Cal Poly Pomona. In order to understand global diversity, our students and faculty are committed to the acquisition and practice of foreign languages.

**Institute Programs.** In addition to the six Regional Studies Programs, the Institute also sponsors the following Programs, Series, and Studies: International Scholar in Residence Program; International Conference Series; Foreign Languages Program; "X"change Programs; and The Center for Immigration and Refugee Studies.

## CENTER FOR SCIENCE AND MATHEMATICS EDUCATION

Judith E. Jacobs, Director

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

## CENTER FOR ECONOMIC EDUCATION AND RESEARCH

Robert T. Bray, Director

The mission of this center is to initiate programs which will increase the understanding of economics with an emphasis on incorporating economics in K-12 curricula; to encourage research in economics and economic education; to encourage interdisciplinary research involving economics.

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

Edwin A. Barnes III, Director

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

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





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

Planning and implementation of the Spadra Landfill and Resource Conservation Project are being carried out jointly. The Districts will continue managing the landfill operation until it is filled. As each portion of the landfill is completed, the Districts will finish grading it, prepare the soil as necessary, and assist in planting the finished surface according to an agreed upon planting plan. The Districts will also install an irrigation system and provide reclaimed water for landscape irrigation before turning the land over to the university.

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

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

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

## LEARNING RESOURCE CENTER

Frank Torres, Director

The Learning Resource Center, located in the University Library, provides a university-wide student service devoted to developing students' academic achievement through a variety of methods. It is a facility which provides students with dedicated personnel and individualized instruction. Programs at the Center emphasize developmental and critical reading (including speed reading), study skills, writing preparation, and basic math preparation. Tutoring in most areas is available by arrangement, and workshops in math and GWT preparation are provided each quarter.

The Center encourages students to refine their academic performance through the use of programs designed to meet individual needs. Students proceed at their own pace and receive periodic evaluation of their progress. The Center also provides an extension of academic programs by placing in the Center materials prepared by faculty: language guides, literature guides, advanced language cassettes. Test proctoring, another service provided by the Center, sometimes includes critical essays on articles prepared by faculty. For further information contact Dr. Frank Torres.

## Learning Resource Center Courses:

### LRC 090 College Reading Skills (1)

Beginning course in reading skills development for students in the College Reading Skills Program. Diagnosis of reading skills; individual placement in developmental reading materials; individual tutorial programs; workshops. 1 independent study/supervised activities. Does not count toward the bachelor's degree. Prerequisites: See the director of the College Reading Skills Program.

### LRC 091 College Reading Skills (1)

Continued work in developmental reading for students in the College Reading Skills Program. Evaluation of reading strengths and weaknesses; individual placement in developmental reading materials; individual tutorial programs; workshops. 1 independent study/supervised activities. Does not count toward the bachelor's degree. Prerequisite: See the director of the College Reading Skills Program.

### LRC 092 College Reading Skills (1)

Developmental reading for students in the College Reading Skills Program who wish to augment the reading skills developed in SA 091. Evaluation of reading strengths and weaknesses; individual placement in developmental reading materials; individual tutorial programs; workshops. 1 independent study/supervised activities. Does not count toward the bachelor's degree. Prerequisite: See the director of the College Reading Skills Program.

### LRC 093 College Reading Skills (1)

Developmental reading for students in the College Reading Skills Program who wish to augment the reading skills developed in SA 090, SA 091, and SA 092. Evaluation of reading strengths and weaknesses; individual placement in developmental reading materials; individual tutorial programs; workshops. 1 independent study/supervised activities. Does not count toward the bachelor's degree. Prerequisite: See the director of the College Reading Skills Program.

### LRC 229/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, activity, or a combination.

## Other Programs

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

## Motor Development Clinic

Priscilla Stromer, Director

The clinic serves children with disabilities between the ages of 3 and 13 by providing the children with a movement therapy program and assisting parents by enabling them to supplement the clinic's program at home. The clinic, staffed by undergraduate and graduate students, provides a valuable learning experience.



## ACADEMIC REGULATIONS AND PROGRAMS

### DEGREES AND TEACHING CREDENTIALS OFFERED

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

### COLLEGE OF AGRICULTURE

#### BACHELOR OF SCIENCE in:

Agricultural Biology	101
Agricultural Science	105
Agronomy	111
Animal Science	114
Apparel Merchandising and Management	121
Food Marketing and Agribusiness Management	124
Foods and Nutrition	128
Horticulture	134
Landscape Irrigation Science	140
Soil Science	142

#### MASTER OF SCIENCE in:

Agriculture	
Agricultural Science Option	431
Animal Science Option	433
Nutrition and Food Science Option	435
Sports Nutrition Option	438
Agribusiness Emphasis	440

### COLLEGE OF BUSINESS ADMINISTRATION

#### BACHELOR OF SCIENCE in BUSINESS ADMINISTRATION

##### with majors in:

Accounting	152
Computer Information Systems	157
Finance, Real Estate, and Law	162
International Business	168
Management and Human Resources	171
Marketing Management	175
Operations Management	180

#### MASTER OF BUSINESS ADMINISTRATION

#### MASTER OF SCIENCE in BUSINESS ADMINISTRATION

Entrepreneurship, Creativity, and Innovative Management Option	452
Information Systems Audit Option	451

### COLLEGE OF ENGINEERING

#### BACHELOR OF SCIENCE in:

Aerospace Engineering	193
Chemical Engineering	197
Civil Engineering	203
Construction Engineering Technology	215
Electrical Engineering	208
Electronics and Computer Engineering Technology	215
Engineering Technology	215
Industrial Engineering	223
Manufacturing Engineering	223
Materials Engineering	197
Mechanical Engineering	230

#### MASTER OF SCIENCE in:

Engineering	477
Electrical Engineering	477

### COLLEGE OF ENVIRONMENTAL DESIGN

#### BACHELOR OF ARCHITECTURE

#### BACHELOR OF ARTS in:

Art	246
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#### BACHELOR OF SCIENCE in:

Landscape Architecture	251
Urban and Regional Planning	254

MASTER OF ARCHITECTURE	441
MASTER OF LANDSCAPE ARCHITECTURE	492
MASTER OF URBAN AND REGIONAL PLANNING	501

### COLLEGE OF LETTERS, ARTS AND SOCIAL SCIENCES

#### BACHELOR OF ARTS in:

Behavioral Science	265
English	279
History	291
Humanities	298
Music	312
Philosophy	326
Political Science	331
Psychology	336
Sociology	341
Theatre	345

#### BACHELOR OF SCIENCE in:

Anthropology	262
Communication	268
Economics	274
Geography	288
Kinesiology	301
Social Sciences	339

#### MASTER OF ARTS in:

English	484
Literature Option	
Rhetoric and Composition Option	
Teaching ESL Option	

#### MASTER OF SCIENCE in:

Economics	462
Kinesiology	490
Psychology	498

### COLLEGE OF SCIENCE

#### BACHELOR OF SCIENCE in:

Biology	359
Biotechnology	360
Botany	361
Chemistry	372
Computer Science	377
Geology	381
Mathematics	386



Microbiology .....	363
Physics .....	394
Zoology .....	364

#### MASTER OF SCIENCE in:

Biological Sciences .....	444
Chemistry .....	458
Computer Science .....	460
Mathematics .....	495

#### SCHOOL OF HOTEL AND RESTAURANT MANAGEMENT

##### BACHELOR OF SCIENCE in:

Hotel and Restaurant Management .....	416
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#### SCHOOL OF EDUCATION AND INTEGRATIVE STUDIES

##### BACHELOR OF ARTS in:

Gender, Ethnicity, and Multicultural Studies .....	401
Liberal Studies .....	405

##### MASTER OF ARTS in:

Education .....	466
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#### CREDENTIALS/CERTIFICATES:

Multiple Subjects .....	410
Multiple Subjects with a Crosscultural, Language and Academic Development (CLAD) Emphasis .....	411
Multiple Subjects with a Bilingual (Spanish) Crosscultural, Language and Academic Development (BCLAD) Emphasis .....	411
Single Subject with a Crosscultural, Language and Academic Development (CLAD) Emphasis .....	412
Single Subject with a Bilingual (Spanish) Crosscultural, Language and Academic Development (BCLAD) Emphasis .....	412
Special Education - Learning Handicapped (LH) .....	412
Special Education - Severely Handicapped (SH) .....	412
Adapted Physical Education Specialist Credential .....	488
Resource Specialist Certificate .....	412
CLAD Certificate .....	412
Designated Subjects Adult Education Teaching Credential .....	133
Educational Technology: Computers in Education Certificate .....	469
Educational Technology: Educational Multimedia Studies Certificate .....	469

#### APPROVED MINOR PROGRAMS (By College and Department)

##### University Interdisciplinary Minors

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Environmental Health Specialist .....	91
Physiology .....	91
Quantitative Research .....	92
Total Quality Management .....	93

#### COLLEGE OF AGRICULTURE

##### Agricultural Engineering Department

Landscape Irrigation Design .....	109
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##### Animal Science Department

Animal Science .....	116
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##### Food Marketing and Agribusiness Management/Agricultural Education Department

Agricultural Business Management .....	124
International Agricultural Business Management .....	125

##### Horticulture/Plant and Soil Science Department

Agricultural Biology .....	102
Agronomy .....	112
Ornamental Horticulture .....	135
Soil Science .....	143
Pest Management .....	102

##### Nutrition and Consumer Sciences Department

Fashion Merchandising .....	122
Foods and Nutrition .....	129

#### COLLEGE OF BUSINESS ADMINISTRATION

Business .....	150
International Business .....	150

##### Accounting Department

Accounting .....	153
Financial Analysis .....	153

##### Computer Information Systems Department

Business Computer Programming .....	158
Managerial Computing .....	159

##### Finance, Real Estate and Law Department

Business Law .....	164
Financial Management of Private and Public Contracts .....	164
Real Estate .....	163

##### Management and Human Resources Department

General Management .....	172
Human Resources Management .....	172
Entrepreneurship and Small Business Management .....	172

##### International Business and Marketing Department

Fashion Merchandising .....	176
International Business .....	150
Logistics .....	176
Marketing Management .....	175

##### Operations Management Department

Operations Management .....	181
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#### COLLEGE OF ENGINEERING

Energy Engineering .....	190
Illumination Engineering .....	190
Materials Science and Engineering .....	190
Ocean Engineering .....	191



**COLLEGE OF ENVIRONMENTAL DESIGN**

Art Department	
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**COLLEGE OF LETTERS, ARTS AND SOCIAL SCIENCES****Behavioral Sciences Department**

Criminal Justice and Corrections	265
Psychology	236
Sociology	342

**Communication Department**

Communications	269
Newspaper Journalism	269
Public Relations	269
Speech Communication	269

**Economics Department**

Economics	275
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**English & Foreign Languages Department**

English	281
Spanish	281

**Geography and Anthropology Department**

Anthropology	262
Geography	260

**History Department**

History	292
Latin American Studies	292

**Music Department**

Music	312
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**Philosophy Department**

Philosophy	327
Religious Studies	328

**Political Science Department**

Political Science	332
Public Administration	332

**Theatre and Dance Department**

Theatre	347
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**COLLEGE OF SCIENCE****Biological Sciences Department**

Botany	362
Comparative Systems Analysis	398
Microbiology	364
Plant Biotechnology	362
Plant Pathology	363
Zoology	364

**Chemistry Department**

Chemistry	373
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**Computer Science Department**

Artificial Intelligence	377
Computer Systems Organization	378
Scientific Computer Programming	378

**Geological Sciences Department**

Geology	382
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**Mathematics Department**

Mathematics	387
Statistics	387

**Physics Department**

Physics	394
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**CENTER FOR REGENERATIVE STUDIES**

Regenerative Studies	420
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**SCHOOL OF EDUCATION AND INTEGRATIVE STUDIES****Ethnic and Women Studies Department**

African American Studies	401
Native American Studies	401
Asian American Studies	402
Chicano/Latino Studies	402
Women's Studies	402

**COURSE NUMBERING SYSTEM**

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

- 1-99** Courses carrying no credit toward degree requirements.
- 100-299** Courses taught primarily in the freshman and sophomore years and generally introductory in nature. Graduate credit is not allowed.
- 300-399** Courses primarily for advanced undergraduate students, usually having prerequisites, bearing graduate degree credit upon the approval of the advisor.
- 400-499** Courses for advanced undergraduates, and graduate, and post-baccalaureate students; courses 461, 462 and 463 shall not apply to master's degree requirements.
- 500-599** Courses open only to graduate and post-baccalaureate students, or seniors with prior approval.
- 600-699** Courses open only to unconditionally classified graduate students.
- 900-999** Courses including specialized workshops, seminars, and institutes designed to provide professional and occupational improvement. Not acceptable for credit towards a master's degree.



# ACADEMIC REGULATIONS

## Requirements for Bachelor's Degree

### General Requirements

A candidate for the bachelor's degree shall have

- 1) completed the courses in one of the listed baccalaureate curricula with a minimum "C" grade average (GPA of 2.0) for all units in the major (core courses and designated option courses);
- 2) completed the required general education courses;
- 3) completed the required courses in American history and government, including state and local government. This requirement is met by completing PLS 201 and HST 202;
- 4) spent not less than three quarters in residence, two of these quarters immediately preceding graduation;
- 5) earned not fewer than 50 quarter units in residence applicable to the bachelor's degree; of which 36 units must be in upper division courses, 18 units must be in the major core, and 12 units in general education courses;
- 6) earned a total number of grade points at least equal to twice the number of units attempted (achieve a "C" grade average e.g. GPA of 2.0) in all courses taken at Cal Poly Pomona and overall coursework;
- 7) completed for a Bachelor of Arts degree a minimum of 186 quarter units with a minimum of 60 of those units being of 300- or 400-level courses, 18 of which must be in the major core; completed a Bachelor of Science degree with a minimum of 198 quarter units with at least 27 of these units being in 300- or 400-level courses in the major core.

No major will contain less than 54 quarter units of courses required in the core for the major. Within these 54 units must be at least 15 units of 100 and 200-level courses. The courses in the major must be exclusive of those courses taken to satisfy the general education requirements;

- 8) met the Graduation Writing Test requirement;
- 9) had a preliminary graduation check. A request for this records check can be made in the Evaluations Office when a senior has no more than 10 classes (40 units) left to take to complete degree requirements. Graduate students may request a graduation check at any time;
- 10) filed an application for graduation in the Evaluations Office prior to the deadline listed in the academic calendar.

### Determination of Graduation Requirements

In determining graduation requirements, students have three basic options open to them. They may decide to meet the degree requirements listed in the Cal Poly Pomona university catalog at the time they first entered the university, or they may decide to use the requirements listed in the university catalog at the time of their graduation, or they may elect to use the requirements in effect at the time they begin study at a CSU campus or a California community college.

At Cal Poly Pomona, all colleges/schools evaluate incoming students on the current curriculum for their major/core and support areas. Questions on this matter should be directed to the student's advisor or department chair.

Whenever a student changes major, while this action is not considered a break in enrollment status, he/she will come under either the major department degree graduation requirements published in the Cal Poly

Pomona university catalog at the time the major was changed or under the provisions of the catalog applicable to the period in which he/she wishes to graduate.

California community college students transferring to Cal Poly Pomona without a break in enrollment status will be evaluated on the graduation requirements listed in the Cal Poly Pomona university catalog at the time of entrance to Cal Poly Pomona. Students may elect in writing to the Evaluations Office to fulfill graduation requirements at the time students began attending a California community college or in effect at the time of graduation. After entry to Cal Poly Pomona, any change of status or major will cause them to come under the major degree catalog provisions valid at the time of the change. Also see "General Education" section in this catalog regarding transfer and change of major students and G.E. certification.

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

### Participation in Graduation Ceremonies

Students may participate in June commencement ceremonies if they have satisfied the Graduation Writing Test (GWT) requirement and have 8 or fewer units remaining to fulfill their graduation requirements. This policy will apply for graduation ceremonies in June 1997. Students should consult their advisors for further information.

### Requirement in Mathematics Proficiency

All students must demonstrate a base level math competency. This may be done by taking an approved course in mathematics or statistics. The following courses have been judged to meet this requirement: MAT 105, MAT 106, MAT 114, MAT 115, MAT 116, MAT 125, MAT 130, MAT 131, MAT 135, MAT 191 or STA 120, STA 220. Transfer students will satisfy this requirement by taking an equivalent course which may also be used to meet the CSU General Education quantitative reasoning requirement. Intermediate Algebra taken at a Community College will not meet this requirement, nor will it be considered acceptable to meet the quantitative reasoning requirement.

### Graduation Requirement in Writing Proficiency

All students must demonstrate competency in writing skills as a requirement for graduation. See the catalog section on the "Graduation Writing Test" (GWT) Requirement, or the Test Center, Building 98, Room P2-4, for additional information.

### ENTRY-LEVEL MATHEMATICS (ELM) REQUIREMENT

The CSU Entry Level Mathematics test must be completed by all new undergraduates with the exception of those who present proof of one of the following:

- A score of 3 or above on the College Board Advanced Placement Mathematics examination (AB or BC).
- A score of 560 or above on the mathematics section of the College Board SAT taken prior to March 1994.
- A score of 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.
- A score of 560 or above on the College Board Mathematics Test\* Level I or Level II taken prior to March 1994.
- A score of 24 or above on the ACT Mathematics Test taken prior to October 1989.

- A score of 25 or above on the enhanced ACT Mathematics Test taken October 1989 and later.

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

Failure to take either of these tests, as required, before the end of the first semester or second quarter of enrollment may lead to administrative probation, which, according to Section 41300.1 of Title 5, California Code of Regulations, and CSU Executive Order 393, may lead to disqualification from future attendance. At Cal Poly Pomona, students who fail to satisfy requirements by the end of their first two quarters of enrollment will have a hold placed on their records. While a student's records are on hold, registration may not be allowed nor transcripts of credits be released.

Students entering fall 1997 through summer 1998 are urged to take these tests after admission and before enrolling for classes. The EPT/ELM must be taken by the end of the first quarter in attendance. Regulations regarding assessment of competence in mathematics and writing skills and placement in remedial or developmental programs/activities will change effective fall quarter 1998. Students entering fall 1998 and thereafter are required to take these tests after admission and before enrolling for classes.

Information and registration materials for the ELM will be mailed to all students subject to requirements. Further information regarding these examinations and possible exemptions may be obtained from the Test Center, Building 98, Room P2-4.

### ENGLISH PLACEMENT TEST (EPT) REQUIREMENT

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

- A score of 3, 4, or 5 on either the Language and Composition or the Composition and Literature examination of the College Board Advanced Placement Program.
- A score on the CSU English Equivalency Examination that qualifies the student for "Pass for Credit" or "Exemption."
- A score of 470 or above on the Verbal section of the College Board Scholastic Aptitude Test (SAT) taken prior to March 1994.
- A score of 470 or above on the Verbal section of the College Board SAT I\* Reasoning Test taken between March 1994 and March 1995.
- A score of 550 or above on the Verbal section of the College Board SAT I\* Reasoning Test taken on or after April 1, 1995.
- A score of 22 or above on the ACT English Usage Test taken before October 1989 or a score of 25 thereafter.
- A score of 600 or above on the College Board Achievement Test\* in English Composition with essay taken prior to January 1994.
- A score of 600 or above on the College Board SAT II\* Writing Test taken between January 1994 and March 1995.
- A score of 660 or above on the College Board SAT II\* Writing Test taken on or after April 1, 1995.
- For transfer students, completion and transfer to the CSU of a college course that satisfies the General Education Breadth requirement or the Intersegmental General Education Transfer Curriculum requirement in English composition, provided such a course was completed with a grade of C or better.

\*The College Board SAT and Achievement Tests were replaced by SAT I and SAT II, respectively, beginning March 1994. Beginning April 1, 1995,

SAT I and SAT II exams are scored on a new scale; however, the SAT scores qualifying for exemption from the ELM remains the same.

Failure to take the English Placement Test at the earliest opportunity after admission may lead to administrative probation which, according to Section 41300.1 of Title 5, California Code of Regulations, and CSU Executive Order 186, may lead to disqualification from further attendance. At Cal Poly Pomona "earliest opportunity after admission" is defined as by the end of the student's first two quarters of enrollment and students who fail to do so will receive a hold. While the student's records are on hold, registration may not be allowed, nor will transcripts of credits be released. The results of the EPT will not affect admissions eligibility but will be used to identify students who need special help in reading and writing in order to do college-level work.

Information bulletins and registration materials for the EPT will be mailed to all students. Materials, further information regarding the examination and possible exemptions may be obtained from the Test Center, Building 98, Room P2-4.

### GRADUATION WRITING TEST (GWT) REQUIREMENT

All students subject to degree requirements listed in the 1977-78 and later general catalogs must demonstrate competency in writing skills as a requirement for graduation. Based on action taken by the Cal Poly Pomona Academic Senate in 1978, writing competence at Cal Poly Pomona is assessed by means of a written test. All persons who receive undergraduate, graduate, or external degrees from Cal Poly Pomona must pass the Graduation Writing Test (GWT). Foreign students, immigrants, and permanent residents must also pass the GWT test to receive a degree. The test is available to undergraduates at the completion of 90 units and for graduates upon admission.

A mandatory GWT registration policy requires that the test be taken by the quarter following the completion of 120 units (for undergraduates) or by the completion of 8 units (for graduate students). If the GWT is not taken by this time, a hold will be placed on a student's records. While the student's records are on hold, registration may not be allowed, nor will transcripts of credits be released.

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

Important information about specific exemptions from the test, and the appeals process for the test are contained in GWT Study Guide and Information Bulletin, which are available to all students. They may be obtained from the Test Center, Building 98, Room P2-4.

### GENERAL EDUCATION REQUIREMENTS

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

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

1. Develop the ability to express themselves effectively in both written and oral communication and in critical thinking which includes consideration of common fallacies in reasoning;

2. Understand nature and are able to relate themselves to their biological and physical environment;
3. Are familiar with their cultural heritage and have developed the capacity to be creative and to appreciate the creativity of others;
4. Understand the economic, political, technological, and social problems of contemporary society and responsibilities and procedures of modern citizenship;
5. Have a basic understanding of the requirements of good health and are able to maintain their own physical well-being;
6. Have developed an understanding of themselves and their relationships to others.

To be eligible for graduation with a bachelor's degree from California State Polytechnic University, Pomona, a student must complete a minimum of 72 quarter units of general education of which 12 quarter units must be upper division and shall be taken no sooner than the quarter in which the student achieves upper division status. No course in a student's major core may be used to satisfy the general education requirements.

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

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

Questions related to general education requirements should be directed to the Office of Academic Programs, Building 98.

### General Education—Approved Coursework and Unit Distribution

Courses approved and unit distributions to meet the general education requirements are listed in the catalog section "General Education." Since the general education requirements, as implemented at Cal Poly Pomona, and the courses approved to meet these requirements may be modified or changed subsequent to the publication of this catalog, students are advised to contact the Office of Academic Programs, Building 98, for the most current list of approved general education courses and requirements.

### Limited Enrollment—Courses Open to Majors Only

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

### Exclusion of Students from Classes

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

- d. The student's major college dean
- e. The student
- f. The Office of Judicial Affairs

The student has three university academic days from the date of exclusion during which a formal protest may be lodged with the instructor's college dean concerning the instructor's decision. If the student desires to make such a protest, the college dean and department chairman will interview both the faculty member and the student(s) involved and the dean will make a final decision within three university academic days as to whether or not the student is to be allowed to return to class.

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

### Scholastic Requirements

Each student is expected to meet the academic standards required by the state, the university and by the instructors. Every student is expected to attend classes regularly.

The instructor of a class may excuse student absences from the class.

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

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

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

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

### Minimum Scholarship Requirements

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

1. A student will be placed on academic probation if the cumulative grade point average falls below 2.0 (C) either for all college-level work attempted or for all work attempted at this university. The student will be advised of probation status on the grade report which is mailed to each student at the end of each quarter.
2. A student will be removed from probation and restored to good standing when a cumulative grade point average of 2.0 (C) for all university level work attempted and for all such work attempted at this university is earned.
3. Full-time undergraduate students are considered to be maintaining satisfactory academic progress toward their degree goal when they



have completed a minimum of 36 units per academic year of which a minimum of 24 units directly apply to satisfying the core and/or support and directed course requirements of their major curriculum according to their Degree Requirement Evaluation sheet (or until such time as all core and support course requirements are satisfied). Good standing is defined as 2.0 GPA.

Half-time students are considered to be maintaining satisfactory academic progress toward their degree goals when they have completed a minimum of 18 units per academic year of which a minimum of 12 units directly apply to satisfying the core and/or support and directed course requirements of their major curriculum according to their Degree Requirement Evaluation sheet (or until such time as all core and support course requirements are satisfied). Good standing is defined as maintaining at least a 2.0 GPA.

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

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

If a student's GPA remains below 2.0 for more than three consecutive quarters, the student will not be certified for veterans educational benefits until his/her academic status is restored to good standing.

5. Students on probation will be automatically disqualified at the end of any quarter if: a) a freshman or sophomore (less than 90 quarter units of university work completed) is 22.5 or more grade points below a 2.0 (C average); b) a junior (90 to 134 quarter units of university work completed) is 13.5 or more grade points below a 2.0 (C average); c) a senior (135 or more quarter units of university work completed) is 9 or more grade points below a 2.0 (C average). Notices are sent as soon as possible following the end of the quarter.
6. Students who are subject to disqualification will have advising holds placed on their record the following quarter. These students may not be able to register for subsequent quarters unless they have cleared this hold with their major department and have been properly counseled as to how to regain good standing. An advising contract may be required by the major department.
7. Exceptions may be made in the case of an error or in the case of a student who has been admitted or reinstated on probation and who has earned at least a 2.0 each quarter after such admission or reinstatement.
8. A student who is disqualified for scholastic reasons will not be reinstated until at least one quarter has elapsed. The following disqualification policy became effective fall quarter 1991:
  - Students disqualified on the basis of their grade point balance deficiency at the conclusion of fall quarter will not be allowed to attend spring quarter.
  - Students disqualified on the basis of their grade point balance

deficiency at the conclusion of winter quarter will not be allowed to attend summer quarter.

- Students disqualified on the basis of their grade point balance deficiency at the conclusion of spring quarter will not be allowed to attend fall quarter.
- Students disqualified on the basis of their grade point balance deficiency at the conclusion of summer quarter will not be allowed to attend winter quarter.

Upon disqualification, students may be reinstated only after presentation to the university of satisfactory evidence that they have improved their chances of scholastic success. The Petition for Academic Reinstatement must be filed in the Records Office after approval by the student's major department chair and the dean of the school in which the student wishes to enroll.

Students have the right to appeal disqualification according to the Guidelines and Instructions shown below:

- Students wishing to appeal disqualification must complete the Disqualification Appeal Student Information Sheet available in the Registrar's Office. Except in extraordinary circumstances, appeals may be considered only if the student's grade point average, during the quarter subsequent to disqualification, has improved enough to remove the student from disqualification status.
- Students will be notified of their College's Appeals Committee decision no later than the last day to register for the quarter in question.

9. Administrative-Academic Probation: An undergraduate or graduate student may be placed on administrative-academic probation by action of appropriate campus officials for any of the following reasons:

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

When such action is taken, the student shall be notified in writing and shall be provided with the conditions for removal from probation and the circumstances which would lead to disqualification, should probation not be removed.

10. Administrative-Academic Disqualification: A student who has been placed on administrative-academic probation may be disqualified from further attendance if:

- a. The conditions for removal of administrative-academic probation are not met within the period specified.
- b. The student becomes subject to academic disqualification while on administrative-academic probation.
- c. The student becomes subject to administrative-academic disqualification for the same or similar reason for which he has



been placed on administrative-academic probation previously, although not currently in such status. When such action is taken, the student shall receive written notification including an explanation of the basis for the action.

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

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

Regardless of purpose, a student may not repeat a course in the major (core) in which he or she has been assigned more than a C grade (2.0). A student may not substitute a support course or any other course as a major (core) course after the major (core) course has been taken. Further, this university has the right to prescribe that any particular graduation requirement be met within seven (7) years. For further details on this prescription please see the Associate Vice President for Academic Programs, Building 98.

The University Advising Center, Building 66, Room 124, offers "academic survival" workshops for those students whose grade point averages have fallen below 2.0. Call 869-INFO for details.

## ACADEMIC POLICIES

### MAJOR (CORE) COURSES

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

### MINORS

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

## SECOND BACCALAUREATE DEGREE

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

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

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

## DOUBLE MAJORS

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

Any major completed by the student leading to the single degree being awarded will be listed on the diploma as long as only a single degree is considered. If the student has completed the requirements for both a BA and BS, he/she will be required to distinguish only one as the degree in order to determine the appropriate diploma to be awarded, and the notation on the diploma. No more than one diploma will be granted to a student at the close of a given quarter. This is distinguished from the two majors leading to a single degree. However, all majors completed by a student will be listed on the official transcript of record.

Students who wish to receive a double major are required to meet all degree requirements in both majors. Students should be aware that the curriculum for the second major will be the one in effect when they add the second major.

## TRANSFER CREDIT

A student who has attended accredited two-year or four-year colleges will be given full credit for college level courses successfully completed. Credit for courses taken at other institutions counts toward fulfillment of major curriculum requirements when applicable; other courses count as elective credit. Cal Poly Pomona does not accept credit for courses in religious practices.

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

A maximum of 36 quarter units of extended university course credit may be applied toward the bachelor's degree. Units students take over the 36 college level transferable limit—through Cal Poly Pomona or other Continuing Education or Extended Education programs or Open University coursework—may satisfy a specific course requirement, but only 36 units may be considered by the university as transferable college level work that may be counted toward satisfying the minimum units required for a degree.

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

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

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

#### GRADING SYSTEM (See also Graduate Studies section)

Grades have the following functions:

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

The following grading system is in effect for undergraduates:

- |    |  |
|----|--|
| A  | Superior Work<br>Indicates originality and independent work and a thorough mastery of the subject matter/skill; achievement so outstanding that it is normally attained only by students doing truly exemplary work. |
| B  | Very Good Work<br>Indicates clearly better than adequate competence in the subject matter/skill; achievement of quality higher than adequate, but not of exemplary quality.  |
| C  | Adequate Work<br>Indicates that classroom work, outside assignments, and examinations have been completed at a level indicating adequate competence in the subject matter/skill.                                     |
| D  | Minimally Acceptable Work<br>Indicates achievement which meets the minimum requirements of the course, but at a level indicating less than adequate competence in the subject matter/skill.                          |
| F  | Unacceptable Work<br>Indicates achievement that fails to meet the minimum requirements of the course and is clearly below university quality; not a passing grade.   |
| I  | Incomplete (Units attempted charged after a maximum of 1 year)   |
| SP | Satisfactory Progress (Units attempted are charged after 1 year)   |
| W  | Official Withdrawal (Units attempted are not charged)  |
| AU | Audit (no credit)  |
| U  | Unofficial Withdrawal (Units attempted are charged)  |

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

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

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

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

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

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

Although the one-year maximum for incomplete grades will be the general university policy, Executive Order 171 specifies that exceptions can be made in special cases, such as military service and serious health problems. An extension of an "I" grade in any one course by General Academic Petition shall be allowed only one time, for a maximum total extension of one year.

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

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

The "SP" symbol is used in connection with courses that extend beyond one academic quarter. The symbol indicates that work in progress has been evaluated as satisfactory to date but that the assignment of a precise grade must await the completion of additional coursework. Cumulative enrollment in units attempted may not exceed the total



number applicable to the student's educational objective. All work is to be completed within one calendar year of the date of first assignment of SP and a final grade will be assigned to all segments of the course on the basis of overall quality. Any extension of this time period must receive prior authorization by the advisor, department chair and college dean on a General Academic Petition. For master's degree thesis or projects (695, 696), the time limit is two years. The "SP" symbol is authorized for such courses numbered as 461, 462, 690-698, and English 095, 096, 097, 098 and 099. The "SP" grade is not used in calculating the grade point average.

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

The symbol "U" indicates that an enrolled student did not withdraw from the course but failed to complete course requirements. It is used when, in the opinion of the instructor, completed assignments or course activities or both were insufficient to make normal evaluation of academic performance possible. For purposes of grade point average and progress point computation this symbol is equivalent to an "F". The "U" is also assigned when a student does not drop a course properly. Instructors cannot grant the grade of "U." This is done administratively when a student withdraws from a course without authorization (e.g. no approved withdrawal form is on file in the Records Office). If a student stops attending class and the instructor does not feel there are adequate completed assignments or course activities upon which to base a letter grade (A-F), the instructor shall assign a "W" on the final grade report. If the appropriate withdrawal form is not on file, this "W" will become a "U" in the Records Office and a "U" will appear on the final grade sheet returned to the instructor and on the student's grade report.

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

Assignment of grades and change of grades are the prerogative of the instructor of record. However, when circumstances necessitate that a grade change occur without the signature of the instructor of record, the change of grade form must be accompanied by a memo to the Records Office. This memo shall be signed by the College Dean, the Department Chair, and at least one department faculty member and shall state the reason for the absence of the instructor of record's signature.

Grades will be mailed from the Records Office as soon as possible after the close of a quarter to the most recent address on file in the Records Office.

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

should contact the Associate Vice President for Academic Programs, Building 98.

### CREDIT/NO CREDIT (CR/NC) GRADING POLICY

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

- I. Mandatory CR/NC Grading
  - A. Some courses, as indicated by their catalog descriptions are offered for CR/NC grading only. Such courses are designated by the sponsoring department. Enrollment in these courses is not counted in the 24-unit limit or the 2-course/8 unit limit described in IIA below.
  - B. All challenge examination credit will be awarded on CR/NC basis only. Credit for courses in student's major (core) will be given letter grades only.

#### II. Optional CR/NC Grading

A student may elect to be graded on a CR/NC basis in those courses which are designated by the University as being approved for optional grading. Courses designated for CR/NC grading will be shown in the catalog with the bold faced dagger symbol (+). When a student elects CR/NC grading, the following conditions apply.

- A. A student may take up to two courses per quarter, not to exceed eight units, on a CR/NC basis. The total number of units which are graded CR/NC may not exceed 24 units for all college level work to be counted towards a bachelor's degree, including all transfer work, and eight units for a master's degree including all transfer work.
- B. A student who opts for CR/NC must already be regularly enrolled in the course. Before the end of the third week of classes, the student must file the CR/NC request form in the Records Office. A student may not change from one grading option to the other after the end of the third week of classes.
- C. A course may not be repeated as CR/NC if the student has previously been enrolled in that course for the traditional grading option. A course may be repeated for CR/NC only if a grade of NC has been earned previously.
- D. Undergraduate and post-baccalaureate students seeking a second degree will be given a grade of CR for coursework equivalent to a grade C or better in any course for which CR/NC grading is approved and in which the student is properly enrolled. NC will be assigned for coursework equivalent to "C-", "D," or "F" grades.

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

- E. Courses in the student's major ("Core Courses in Major" on the student's curriculum sheet) may not be taken as CR/NC unless designated as mandatory CR/NC grading.
- F. To be eligible to opt for CR/NC grading, an undergraduate student must have earned at least a 2.0 GPA in all Cal Poly Pomona work attempted. A graduate student must have earned at least a 3.0 GPA. New students enrolling at Cal Poly Pomona for the first time are eligible if they were admitted on a "clear" basis.

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



## College Board Advanced Placement (AP) Examination Credit

EXAMINATION	Score	Cal Poly Pomona Course Equivalencies	Units Toward Degree	Credit Toward Degree
Art History	3,4,5	ART 110 (non-Art majors) ART 212, 213, or 214 (for Art or non-Art majors)	4 units 4 units	Area 3-A Area 3-A
Art Studio: General Portfolio Drawing	3,4,5 3,4 5	ART 120 or ART 150 ART 140 ART 140 and ART 141	3 units 3 units 6 units	No GE credit No GE credit No GE credit
Biology	3 4,5	BIO 110, 111L (for non-Bio Sci Majors) BIO 115, 115L	4 units 5 units	Area 2-C and Lab Area 2-C and Lab
Chemistry	3 4,5	CHM 121/121L CHM 121/121L and 122/122L	4 units 8 units	Area 2-B and Lab Area 2-B and Lab
Computer Science	4,5	CS 140	4 units	No GE credit
Economics, Micro	4,5	EC 201	4 units	Area 3-D
Economics, Macro	4,5	EC 202	4 units	Area 3-D
English Language & Composition	3, 4, 5	ENG 104	4 units	Area 1-A (EPT exemption)
English Literature & Composition	3, 4, 5	ENG 104, ENG 201 and elective	9 units	Area 1-A and Area 3-C (EPT exemption)
French, German, or Spanish Language	3,4,5	Credit in elementary sequence; satisfies the prerequisite for intermediate-level foreign language.	9 units	Area 3-C
Latin Language	3, 4, 5	FL 131	4 units	Area 3-C
French or Spanish Literature	3, 4, 5	??? or ??? and electives	9 units	Area 3-C
American History	3,4,5	HST 201 or HST 202	4 units	Area 3-F or Area 4
European History	3,4,5	HST103	4 units	Area 3-F
Mathematics Calculus AB	3,4,5	MAT 114 and electives	6 units	Area 2-A (ELM exemption)
Calculus BC	3 4,5	MAT 114 and 115; or MAT 130 and electives MAT 114, MAT 115, and MAT 116 or MAT 120 and electives or MAT 125 and electives or MAT 130, MAT 131, and electives	8 units 12 units 12 units 12 units 12 units	Area 2-A (ELM exemption) Area 2-A (ELM exemption) Area 2-A (ELM exemption) Area 2-A (ELM exemption) Area 2-A (ELM exemption)
Statistics	3, 4, 5	STA 120	4 units	Area 2-A (ELM exemption)
Music	3, 4, 5	MU 101	4 units	Area 3-A
Physics B	4, 5	PHY 121, 122, 123	9 units	Area 2-B (no lab credit)
Physics C, (mechanics)	4, 5	PHY 131	4 units	Area 2-B (no lab credit)
Physics C, (electricity and magnetism)	4, 5	PHY 133	4 units	No GE credit (no lab credit)
American Government and Politics	3, 4, 5 and pass Calif. govt. test	PLS 201	4 units	Area 4
Comparative Government and Politics	3, 4, 5	PLS 202	4 units	Area 3-F
Psychology	3,4,5	PSY 201	4 units	Area 3-G

If any of the above AP courses is listed in the core or support area of your Degree Evaluation, it cannot be used to satisfy GE.  
 Note: Students may not take a course for which they already have received AP credit.





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

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

#### REPETITION OF COURSES AND LIMIT ON REPLACEMENT OF GRADES

Course work at this university may be repeated via subsequent enrollments without limit. However, a currently enrolled undergraduate student may attempt to improve his or her grade point average by replacing a grade of C, C-, D+, D, D-, F, or U by repeating a maximum of 16 units of course work at this university. An incomplete grade (I) may not be replaced under this policy. (See section of GRADES for more information.) Work to be replaced can include courses previously taken at other institutions, prior challenge attempts and Extended University courses. The maximum of 16 units may be met, for example, by a student repeating four different four unit courses, four different three unit courses and one four unit course, or one four unit course repeated four times, etc.

1. Regular or Extended University enrollment at this university may be used as repetition of a course which was: challenged, taken at Cal Poly Pomona, or taken at another institution.
2. Grades may be replaced through course repetition only until the maximum limit of 16 units is reached.
3. A challenge cannot be used as a repetition of a course in which one was enrolled.
4. In instances in which a Cal Poly Pomona catalog course number has been changed, the chairperson of the department offering the course must verify that the two courses are equivalent.
5. This policy includes courses taken at other institutions and repeated at this university if the two courses are determined to be equivalent by the chairperson of the department offering the course.
6. For purposes of grade replacement, the course work repeated must be taken at Cal Poly Pomona. The grade point average at this university cannot be improved by repeating a Cal Poly Pomona equivalent course at another institution.

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

It is the responsibility of the student to complete and file in the Records Office a Repeated Course Notification Form after the course repeat has been completed. Repeated Course Notification forms will only be accepted from students currently enrolled.

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

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

#### ACADEMIC RENEWAL

It is permissible for an undergraduate student to request the removal of up to three quarters or two semesters of previous academic work from

baccalaureate degree consideration. The following three conditions must prevail before such a request may be made:

1. Five years have elapsed since the most recent work to be disregarded was completed and the student's GPA is too low to qualify for graduation.
2. Since the completion of the work to be disregarded, the applicant has completed, at this university, 22 quarter units with at least a 3.0 GPA, 45 quarter units with at least a 2.5 GPA, or 67 quarter units with at least a 2.0 GPA. Work completed at any other institution shall not be used to satisfy this requirement.
3. Application for Academic Renewal is made during the quarter in which the applicant plans to graduate.

Having met the above conditions, the student may apply for removal of work from degree consideration in a letter to the Committee on Academic Renewal through the Associate Vice President for Academic Programs, Building 98. The letter shall specify which semester(s) or quarter(s) of previous work are to be removed from consideration with supporting statements providing evidence that:

1. The work is substandard and not representative of the student's present scholastic ability and level of performance.
2. The level of performance represented by the work under consideration was due to extenuating circumstances, which are described.
3. The applicant would need to complete additional units of work and enroll for one or more additional quarters to qualify for the baccalaureate degree if the request is not approved. Qualification for graduation in terms of Grade Point Average (GPA) is 2.0 in major and 2.00 overall GPA.

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

#### RETROACTIVE WITHDRAWAL

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

A student may petition to have these grades retroactively changed to the administrative grade of "W" if he/she can demonstrate and document that serious and compelling reasons compelled the unofficial withdrawal from the university during the quarter in question and that the grades received were not earned (e.g. letter grades A-F). However, it is the sole responsibility of the student to formally drop courses by filing the appropriate forms with the Records Office in a timely manner. Therefore, Petitions for Retroactive Withdrawal will not be approved for students who do not report for a class on the first meeting because they assume they will be dropped.

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

Petitions are available from the Office of Academic Programs, Building 98-T7-8.

**COURSES TAKEN BY UNDERGRADUATES FOR GRADUATE CREDIT**

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

1. none of the courses to be taken for graduate credit is required for the bachelor's degree;
2. the student has senior standing (has completed 135 quarter units) and an upper-division grade point average of 2.75 or better; some departments may specify a higher GPA;
3. the petition is submitted before the end of the third week of the quarter in which the work is performed; retroactive credit will not be granted;
4. the petition is endorsed by the course instructor, and approved by the Office of Academic Programs;
5. applies only to 300, 400, and 500 level coursework.

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

When an undergraduate student takes a graduate course, there will be no differential evaluation procedure. All students in the class will be considered graduate students and evaluated according to standards established by the graduate college. Further grades earned will be considered in the cumulative graduate GPA.

Contact Office of Academic Programs for further information (909-869-3330). See also section on grading symbols.

**GRADUATE COURSES TAKEN BY UNDERGRADUATES FOR UNDERGRADUATE CREDIT**

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

1. The student has senior standing (has completed 135 quarter units) and has an upper-division GPA of 2.75 or better.
2. The petition is submitted prior to the end of the third week of the quarter in which the work is performed. Retroactive credit will not be granted.
3. The petition is endorsed by the student's instructor and advisor, and approved by the Office of Academic Programs.
4. Applies only to 500-level coursework.

Contact Office of Academic Programs for further information (909-869-3330). See also section on grading symbols.

**ADVANCED PLACEMENT**

California State Polytechnic University, Pomona, grants credit toward its undergraduate degrees for successful completion of examinations of the Advanced Placement Program of the College Board. Students who present scores of three or better will be granted up to six semester units (nine quarter units) of college credit. (Scores must be four or better for Biology, Computer Science, Economics and Physics.) For specific information on Advanced Placement credit contact the Office of Academic Programs, Building 98-T7-8 or the campus Evaluations Office, Building 98, Room 2-20. Students may challenge courses by taking examinations developed at the campus. Credit shall be awarded to those who pass them successfully.

**CREDIT BY EXAMINATION**

California State Polytechnic University, Pomona grants credit to those students who pass examinations that have been approved for credit systemwide. These include the Advanced Placement Examinations, and some CLEP examinations. (Note: This information is subject to change. Contact the Office of Academic Programs for further information.)

Exam	Score	Credit	Units
CLEP General Chemistry	48	Chemistry 103	4
CLEP College Algebra Trigonometry	49	Math 105 or Math 106, but not both	4
American Chemistry Society Cooperative General Chemistry	50th %tile	Chemistry 103	4
CLEP Calculus with Elementary Functions	51	Math 112	4

**CREDIT BY CHALLENGE EXAMINATION**

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

An approved Petition for Credit by Examination permits regularly enrolled students to obtain university credit for subject matter in which they are especially qualified through nontraditional education or experience. Students must not have previously received credit for any course containing similar or advanced material from the same subject matter field. Students are not permitted to obtain credit by examination unless all prerequisites for the course as specified in the University Catalog have been satisfied. Credit by examination will not be allowed for a course that is a prerequisite of a course which the student has already completed or in which the student is currently enrolled.

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

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

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

A \$5 fee per unit is charged for each challenge examination (\$25 maximum). The length of the examination will be consistent with the unit value of the course. It may include written, oral, or skills tests, or a combination of all three types and will be sufficiently comprehensive to determine that the student has essentially the same knowledge and skills as those students who successfully complete the course are required to possess. The credit received is entered on the student's permanent record. Credit is awarded on a CR/NC basis; however, courses challenged in a student's major core are only awarded letter grades.

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



## CREDIT FOR NONCOLLEGIATE INSTRUCTION

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

## SERVICEMEMBERS OPPORTUNITY COLLEGES

California State Polytechnic University has been designated as an institutional member of Servicemembers Opportunity Colleges (SOC), a group of over 400 colleges and universities providing voluntary postsecondary education to members of the military throughout the world. As a SOC member, California State Polytechnic University recognizes the unique nature of the military lifestyle and has committed itself to easing the transfer of relevant course credits, providing flexible academic residency requirements, and crediting learning from appropriate military training and experiences. SOC has been developed jointly by educational representatives of each of the Armed Services, the Office of the Secretary of Defense and a consortium of 13 leading national higher education associations; it is sponsored by the American Association of State Colleges and Universities (AASCU) and the American Association of Community and Junior Colleges (AACJC).

## CREDIT FOR MILITARY SERVICE

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

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

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

## CREDIT FOR CONTINUING EDUCATION COURSE WORK

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

## HONORS AND HONORARY SOCIETIES

### Honors At Entrance

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

### Honor Lists

The "Academic Honors List," announced at the end of each quarter, honors undergraduate students who have completed at the University 12 or more units during the quarter with a 3.5 or better grade point average.

The "President's Honor List," announced at the end of the spring quarter, honors undergraduate students who have a grade point average of 3.5 or better for completion at the University of 12 or more units during any three of the four quarters of a university year.

### Honors at Graduation

The University grants honors at graduation to students who have demonstrated academic excellence during their career in higher education. The grade point average for the determination of honors is calculated on all grades earned at this institution as well as any other institution of higher education attended.

This policy will apply to students who complete graduation requirements during summer quarter 1994 and thereafter. The honors designations with the grade point averages required are summa cum laude—3.80-4.00; magna cum laude—3.65-3.79; cum laude—3.50-3.64. Students who complete their graduation requirements in the summer, fall or winter quarters will have their GPAs determined before the commencement program is printed and their designated honors will be identified in the program.

Students who complete their graduation requirements in the spring quarter will not have their final GPAs determined until after the commencement program printing. In order to identify these students in the commencement program, their GPA as of the last winter quarter should be used as the determining GPA for graduation honors recognition. If the GPA status (as to Graduation Honors) changes for spring quarter graduates as a result of grades earned during the spring quarter, this will be recorded on their transcripts and on their diplomas. This status change will not occur in the commencement program. The number of status changes is expected to be minimal. Only students who have completed all of their graduation requirements before spring quarter or students who are registered and complete the balance of their graduation requirements in the spring quarter (as of the census day) will be eligible for honors at graduation.

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

## UNIVERSITYWIDE HONORARY SOCIETIES

### Sigma Xi

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

### Golden Key National Honor Society

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



presentation of scholarships to outstanding members, and the involvement of members in educational programs that the society promotes excellence in academics.

#### **Phi Beta Delta**

Phi Beta Delta is an honor society formed to recognize and encourage professional, intellectual, and personal achievements in international education. The Cal Poly Pomona chapter was founded in 1986 and at present primarily consists of students who have spent a year of study abroad in one of the 34 California State University overseas study programs in 16 different countries. Other students and also faculty and administrators may be invited to become members. The society fosters community and dialogue within an international perspective.

#### **Phi Kappa Phi**

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



## GENERAL EDUCATION

TWO-TRACK GENERAL EDUCATION PROGRAM TRACK A		TWO-TRACK GENERAL EDUCATION PROGRAM TRACK B	
AREA	UNIT TOTAL (72 units)	AREA	UNIT TOTAL (72 units)
<b>1. Communication &amp; Critical Thinking</b> 3 courses combining methods of inquiry, written communication, and oral communication These courses are sequential and are prerequisites for Areas 3,4,5. 12 units	12	<b>1. Communication in the English Language</b> Patterns 1 & 2 3 courses, 12 units	12
<b>2. Science &amp; Mathematics</b> (Must include one lab) Options: (1) Same as Track B (2) ISGE or similar, as approved 4 courses, 16 units; 1 course each from Subareas A, B, C, D; Subarea D course must be upper division	16	<b>2. Science &amp; Mathematics</b> 4 courses: 1 each from Subareas A, B, C, D; D must be upper division. 4 courses, 16 units	16
<b>3. Humanities &amp; Social Sciences</b> World Cultures: Literary, Historical and Philosophical Perspectives--3 courses, nonsequential. 12 units; (1) The Human Conscience & Spirit; (2) Political Authority & Change; (3) Creativity, Technology, & Society; (4) Fine and Performing Arts--Intention, Process, and Product. Individual & Society--3 courses: 12 units, to include: 28 Lower or Upper Division: Consumers, Producers & Economic Institutions Upper Division: Readings in Human Behavior & Human Nature The Individual in a Diverse Society Recommend coordination of World Cultures and Fine and Performing Arts units; Individual in a Diverse Society must follow World Cultures 1,2,3	28	<b>3. Humanities &amp; Social Sciences</b> Arts, Literature, Philosophy & Foreign Languages 3 courses--1 per area, 12 units Social, Political & Economic Institutions and Their Historical Background 3 courses--1 per area, 12 units. Integrated Being 1 course, 4 units	28
<b>4. U.S. History, Constitution &amp; Ideals</b> 2 courses, 8 units:	8	<b>4. U.S. History, Constitution &amp; Ideals</b> 2 courses, 8 units.	8
<b>5. Breadth</b> (Upper Division) Options (1) G.E. Seminars XXX 491,492 2-course sequence in a college World Cultures and Readings in Human Behavior and Nature. (2) Foreign Language (upper or lower division); not open to foreign language majors. (3) International Experience.	8	<b>5. Breadth</b> 2 upper division courses, both elected outside student's major 2 courses, 8 units  *Provisions for IGE remain; IGE students will complete in Track A or Track B.	8



### General Education—Unit Distribution

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

1. Communication in the English Language. Three (3) courses, 12 units (one course in Area A, B, and C)
2. Science and Mathematics. Four (4) courses, one (1) each from subareas A, B, C, D; D must be upper-division. Sixteen (16) units.
3. Humanities & Social Sciences:
  - A. Arts, Literature, Philosophy & Foreign Languages, three (3) courses, one (1) per subarea.
  - B. Social, Political & Economic Institutions and their Historical Background, three (3) courses, one (1) per subarea. Twelve (12) units
  - C. Integrated Being. One (1) course, four (4) units.
4. U.S. History, Constitution & Ideals. Two (2) courses, eight (8) units.
5. Breadth. Two (2) upper-division courses, both elected outside student's major. Eight (8) units.

### General Education—Approved Coursework

Courses are approved by the Campus Academic Senate by area to meet the university general education program requirements. Coursework in general education should not be taken without a specific curricular goal. Students should consult with their departmental degree advisors or with the staff of the University Advising Centers. Many degree programs specify which university approved courses meet their more specific degree requirements. Such departments will list approved courses in their degree curriculum layouts and in their catalog section.

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

### Interdisciplinary General Education (IGE)

The Interdisciplinary General Education Program addresses the need for an integrated approach to curriculum, teaching, and scholarship and the creation of an extended learning community. As of July, 1994, the IGE Program is a part of the new School of Education and Integrative Studies, which shares these goals.

Students should also consult the coursework list for the Interdisciplinary General Education (IGE) Program. This program is open to any department wishing to adopt it as an option, and provides an integrative-thematic approach to the Humanities and Social Sciences components of General Education (areas 1, 3, and 4) for a total 32 units of the 48 lower-division units required. This program is designed as a two and one-half year program in which the participant studies both major coursework as well as courses designed to partially meet the University General Education requirement. Applicants for this program must take the EPT (score of 147 or better) or have this test waived because of other test scores (e.g., SAT, ACT, etc).

This is the preferred pattern for students in engineering and architecture. It is also recommended to all other students in the Colleges of Agriculture, Business Administration, Environmental Design, and Science. See departmental advisors or Program Director.

### Transfer and Change of Major Students and General Education Certification

Community college transfer students and Cal Poly Pomona change of

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

### General Education—Course Lists

Note: Certain professional programs include GE course patterns not listed here. Students should consult the curriculum of the specific major to identify the exact GE requirement for the major. The symbol (t) indicates that a course may be taken on a credit/no credit basis. Please refer to corresponding major section in this catalog for prerequisites and detailed description of general education courses listed below.

### Track A

This general education program provides an interdisciplinary and integrated approach to general education in Areas 1, 3, and 5. Track A incorporates the interdisciplinary, integrated core model of general education. The goals of these courses are to be interdisciplinary, to provide students with a broad liberal arts background to enhance students' computer literacy and provide substantial instruction in basic writing, reading, speaking, and critical thinking skills. These courses also demonstrate an attempt to foster connections between the sciences, technology, social sciences and humanities. The Track A courses are also designed to enhance students' exposure to other cultures and to international issues and phenomena.

There are 12 courses in Track A, totaling 48 units. There are three courses in Area I (Communication and Critical Thinking), for a total of 12 units, 7 in Area 3 (Humanities and Social Sciences) for a total of 28 units and 2 courses in Area 5 (Breadth) consisting of Upper Division Seminars or Foreign Language or International Experience, for a total of 8 units.

### AREA 1—Communication and Critical Thinking

(Refer to University Programs section in this catalog for Track A course descriptions)

Communication and Critical Thinking I . . . . .	GEN	101	(4)
Communication and Critical Thinking II . . . . .	GEN	102	(4)
Communication and Critical Thinking III . . . . .	GEN	103	(4)

### AREA 2—Science and Mathematics

Same as Track B

### AREA 3—Humanities and Social Sciences

The Human Conscience and Spirit . . . . .	GEN	104	(4)
Political Authority and Change . . . . .	GEN	105	(4)
Creativity, Technology and Society . . . . .	GEN	106	(4)
Fine and Performing Arts –			
Intention, Process and Product . . . . .	GEN	107	(4)
Consumers, Producers and Economic Institutions . . . . .	GEN	108	(4)

Readings in Human Behavior and Nature	GEN	109	(4)
The Individual in a Diverse Society	GEN	110	(4)

#### AREA 4—U.S. History, Constitution and Ideals

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

#### AREA 5—Breadth (Choose one of the following)

Courses for this category will be listed on the Web as they are approved. Approved courses at the time of printing are as follows:

Option I – Upper Division Seminars	GEN	401	(8)
Public Schooling and Literacy	TED	410	(4)
Seminar in Community Tutoring	TED	411	(4)

Option II – Foreign Language	GEN	402	(8)
Option III – International Experience	GEN	403	(8)

#### Track B

#### AREA 1—Communication in the English Language (12 units)

Take one course in Area A, B, and C.

##### A. Written Communication

Freshman English I	ENG	104	(4)
(All speakers of English as a second language who have not achieved the minimum EPT score for ENG 104 must take ENG 102 and ENG 103 in place of ENG 104.)			

##### B. Oral Communication

Public Speaking	COM	100	(4)
Advocacy and Argument	COM	204	(4)

##### C. Critical Thinking

Freshman English II	ENG	105	(4)
Critical Thinking	PHL	202	(4)

#### AREA 2—Science and Mathematics (16 units)

Students are required to take at least one lower division (100 or 200-level) course from Sections A, B, and C. Students must take an upper division course in math or science to fulfill Section D. At least one laboratory course from Sections B or C is also required. Laboratory classes are marked with an "L" following the course number. Students must meet both ELM and MDT course prerequisites before enrolling in any mathematics or statistics course.

##### A. Mathematics

Students must meet both ELM and MDT course prerequisites before enrolling in any mathematics or statistics course.

MAT 105	College Algebra	(4)
MAT 106	Trigonometry	(4)
MAT 114	Analytic Geometry and Calculus I	(4)
MAT 115	Analytic Geometry and Calculus II	(4)
MAT 116	Analytic Geometry and Calculus II	(4)
MAT 120	Calculus for Life Sciences	(4)
MAT 125	Introductory Calculus for Business	(4)
MAT 130	Technical Calculus	(4)
MAT 137	Survey of Geometry	(4)
MAT 191	Survey of Mathematics	(4)
STA 120	Statistics with Applications	(4)

##### B. The Physical Sciences

CHM 101/101L	Consumer Chemistry	(4)
CHM 103/103A	Fundamentals of Chemistry	(4)
CHM 121/121L	General Chemistry	(4)

CHM 122/122L	General Chemistry	(4)
GEO 101	Physical Geography	(4)
GSC 101/A	The Earth Revealed	(4)
GSC 111	Principles of Geology	(4)
GSC 112	Earth, Time, and Life	(3)
GSC 116	Introduction to Astronomy	(4)
GSC 120	Introduction to Oceanography	(4)
GSC 141L	Principles of Geology Laboratory	(1)
GSC 151L	Earth, Time, and Life Laboratory	(1)
PHY 102	Fundamentals of Physics	(4)
PHY 104L	Conceptual Physics Laboratory	(4)
PHY 105/105L	Physics of Musical Sound	(4)
PHY 115/115L	Physics Concepts: A Hands-on Approach	(4)
PHY 121	College Physics	(3)
PHY 131	General Physics	(3)
PHY 141L	College Physics Laboratory	(1)
PHY 151L	General Physics Laboratory	(1)

#### C. The Life Sciences

BIO 110	Life Science	(3)
BIO 111L	Life Science Laboratory	(1)
BIO 115/115L	Basic Biology	(5)

#### D. Science, Technology and Civilization

Students must take an upper division course from the following list to fulfill Section D.

AGB 300	Insects and Civilization	(4)
AGR 311	Plants and Civilization	(4)
ANT 350	Environment, Technology, and Culture	(4)
AVS 300	Animal Issues in Science and Society	(4)
AVS 311	The Animal Industries and Society	(4)
CS 475	Computers and Society	(4)
EC 429	Seminar in Natural Resource Economics	(4)
EC 435	Seminar in Environmental Economics	(4)
FMA/LIS 350	Water and Civilization	(4)
FN 305	Nutrition, Science, and Health	(4)
GEO 303	Climatology	(4)
GEO 420	Digital Image Processing	(4)
GSC 320	Studies of a Blue Planet	(4)
GSC 350/350A	Geologic Catastrophes	(4)
HST 421	The Scientific Revolution	(4)
HST 432	Technology World History	(4)
FN 325	Current Issues in the Food Chain	(4)
IA/FN 445	Nutrition/International Development	(4)
KIN 301	Foundations of Sports Medicine	(4)
KIN 365	Growth, Aging, and Physical Activity	(4)
PHL 483	Philosophy of Science	(4)
PHY 301	Energy and Society	(4)
PHY 302	Physics of Everyday Experience	(4)
PHY 303	The Universe in Ten Weeks	(4)
RS 301	Life Support Processes	(4)

For Liberal Studies Major Pre-Credential Options only: Required for students who plan to meet state requirements for elementary school teachers and for precredential option in Liberal Studies. The following courses are to be taken in sequence. Students must take all courses listed in order to meet General Education requirements. See departmental advisor for more information.

MAT 191	Survey of Mathematics	(4)
SCI 211/211L	Chemical Sciences	(4)
BIO 110	Life Science	(4)
SCI 212/212L	Geological Sciences	(4)

SCI 210/210L Physics Concepts and Activities . . . . . (4)

### AREA 3—Humanities and Social Sciences (28 units)

Arts, Literature, Philosophy, and Foreign Languages (12 units)

Students are required to take at least one course from each section. A minimum of 12 units must be completed. See also the Interdisciplinary General Education Program (IGE) Section, which is the pattern recommended for students in Engineering and Architecture.

#### A. Fine and Performing Arts

ART 110	The Visual Arts . . . . .	(4)
ART 212	History of Western Art (Part I) . . . . .	(4)
ART 213	History of Western Art (Part II) . . . . .	(4)
ART 214	History of Western Art (Part III) . . . . .	(4)
ART 216	History of Asian Art . . . . .	(4)
DAN 202	Introduction to Dance . . . . .	(4)
ENV 112	Design and the Built Environment . . . . .	(4)
ENV 115/115A	History of Art and Design . . . . .	(4)
MU 100	Introduction to Music . . . . .	(4)
MU 101	Music Appreciation . . . . .	(4)
MU 103	World of Music. . . . .	(4)
HOR 214	History of Garden Art . . . . .	(4)
TH 125/125A	Introduction to Acting . . . . .	(4)
TH 203	Introduction to the Theater . . . . .	(4)
TH 204	Live Theater Appreciation . . . . .	(4)
TH 205	World Theatre A Cross-Cultural Perspective. . . . .	(4)
TH 208	Introduction to Film and American Culture . . . . .	(4)
TH 210	Introduction to the American Theater. . . . .	(4)
URP104	Evolution of Cities. . . . .	(4)

The General Education Committee recommends the changes noted:

DAN 202 Introduction to Dance to DAN202 World Dance and Cultures

#### B. Philosophy and History

HST 101	History of World Civilization: The Ancient Period. . . . .	(4)
HST 102	History of World Civilization: The Middle Period . . . . .	(4)
HUM 201	Introduction to the Humanities. . . . .	(4)
HUM 202	Humanism & the Humanities . . . . .	(4)
PHL 201	Introduction to Philosophy . . . . .	(4)
PHL 204	Ethical Problems of Contemporary Life . . . . .	(4)
PHL 205	Business and Professional Ethics. . . . .	(4)
PHL 220	Religions of the World . . . . .	(4)
PHL 221	Introduction to Religious Studies. . . . .	(4)

#### C. Literature and Foreign Languages

ENG 201	Introduction to Modern Fiction. . . . .	(4)
ENG 202	Introduction to Poetry or Modern Drama . . . . .	(4)
ENG 203	Introduction to Shakespeare . . . . .	(4)
ENG 204	Modern Fiction for Speakers of English as a Second Language. . . . .	(4)
ENG 205	Black Literature in America . . . . .	(4)
ENG 206	Introduction to Contemporary Literature. . . . .	(4)
ENG 207	Survey of British Literature I . . . . .	(4)
ENG 208	Survey of British Literature II. . . . .	(4)
ENG 211	Survey of American Literature I . . . . .	(4)
ENG 212	Survey of American Literature II. . . . .	(4)
ENG 213	Ethnic Literatures of the U.S. . . . .	(4)
ENG 215	Latino Literature in America. . . . .	(4)
ENG 216	The Bible as Literature . . . . .	(4)
ENG 217	World Literature I . . . . .	(4)
ENG 218	World Literature II . . . . .	(4)

ENG 222	The Literature of Science Fiction . . . . .	(4)
ENG 231	Introduction to Folklore . . . . .	(4)
ENG 240	Women Writers . . . . .	(4)
FL 101	Elementary French I. . . . .	(4)
FL 102	Elementary French II . . . . .	(4)
FL 103	Elementary French III . . . . .	(4)
FL 111	Elementary German I . . . . .	(4)
FL 112	Elementary German II. . . . .	(4)
FL 113	Elementary German III . . . . .	(4)
FL 131	Elementary Latin I . . . . .	(4)
FL 132	Elementary Latin II . . . . .	(4)
FL 133	Elementary Latin III . . . . .	(4)
FL 141	Elementary Russian I . . . . .	(4)
FL 142	Elementary Russian II . . . . .	(4)
FL 143	Elementary Russian III . . . . .	(4)
FL 151	Elementary Spanish I. . . . .	(4)
FL 152	Elementary Spanish II . . . . .	(4)
FL 153	Elementary Spanish III . . . . .	(4)
FL 154	Spanish for Spanish Speakers I. . . . .	(4)
FL 161	Elementary Japanese I. . . . .	(4)
FL 162	Elementary Japanese II . . . . .	(4)
FL 163	Elementary Japanese III. . . . .	(4)
FL 171	Elementary Chinese . . . . .	(4)
FL 172	Elementary Chinese II. . . . .	(4)
FL 173	Elementary Chinese III . . . . .	(4)
FL 201	Intermediate French. . . . .	(4)
FL 202	Intermediate French Reading. . . . .	(4)
FL 203	Intermediate French Composition and Conversation	(4)
FL 211	Intermediate German. . . . .	(4)
FL 212	Intermediate German Reading . . . . .	(4)
FL 213	Intermediate German Composition and Conversation . . . . .	(4)
FL 250	Spanish for Spanish Speakers II . . . . .	(4)
FL 251	Intermediate Spanish. . . . .	(4)
FL 252	Intermediate Spanish Reading. . . . .	(4)
FL 253	Intermediate Spanish Conversation . . . . .	(4)
FL 254	Intermediate Spanish Composition. . . . .	(4)
FL 261	Intermediate Japanese . . . . .	(4)
FL 262	Intermediate Japanese Reading . . . . .	(4)
FL 263	Intermediate Japanese Conversation . . . . .	(4)

Social, Political, and Economic Institutions and Their Historical Background

#### D. Economic Institutions

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

#### E. Social Institutions

AMM 108	Culture, People and Dress . . . . .	(4)
ANT 102	Introduction to Cultural Anthropology . . . . .	(4)
EWS 140	Introduction to Ethnic Studies . . . . .	(4)
EWS 145	Introduction to the Study of Women and Men in Society . . . . .	(4)
EWS 201	African American Experience . . . . .	(4)
EWS 202	Chicano/Latino Experience . . . . .	(4)
EWS 203	Native American Experience . . . . .	(4)
EWS 204	Asian American Experience . . . . .	(4)

FN 228	Food and Culture	(4)
FNC 101	Introduction to Family Issues	(4)
GEO 102	Cultural Geography	(4)
KIN 449	Play, Games, and Sport	(4)
SOC 201	Principles of Sociology	(4)
SOC 206	Family Relations	(4)
SSC 101	Introduction to Social Sciences	(4)
SW 201	Introduction to Social Welfare	(4)

#### F. Political and Historical Institutions

AG 101	Agriculture and the Modern World	(4)
HST 103	History of Civilization: The Modern World	(4)
HST 201	United States History	(4)
PLS 202	Comparative Political Systems	(4)
PLS 203	Introduction to International Relations	(4)

#### G. The Integrated Being (4 units)

ANT 201	Human Nature/Human Affairs: A Biocultural View	(4)
AVS 211	Drugs and Society	(4)
BIO 205	Biological Perspectives on Contemporary Life	(4)
HRT 255	The Healthy American Gastronome	(4)
KIN/FN 203	Health, Nutrition and the Integrated Being	(4)
KIN 207	Personal Health	(4)
PSY 201	General Psychology	(4)
PSY 210	Mind, Brain & Behavior: An Integrated View	(4)

#### AREA 4—U.S. History, Constitution, and American Ideals (8 units)

Students take two courses in this area. See also the Interdisciplinary General Education Program (IGE) section, which is the recommended pattern for most students in engineering and architecture.

PLS 201	Introduction to American Government	(4)
HST 202	United States History	(4)

#### AREA 5—Upper Division General Education (8 units)

Students must select two courses outside their major.

ANT 320	Indians of California	(4)
ANT 321	Indians of North America	(4)
ANT 354	Laws, Values and Culture	(4)
ANT 356	Cultures in Performance: Human Expression in Cross-Cultural Perspectives	(4)
ANT 355	Psychological Anthropology	(4)
ANT 358	Social Anthropology	(4)
ANT 399	Cultural Areas of the World: Africa	(4)
ANT 399	Cultural Areas of the World: Mesoamerica	(4)
ANT 399	Cultural Areas of the World: The Middle East	(4)
ANT 405	Women: An Anthropological View	(4)
ART 310	Art of the United States	(4)
ART 312	Foundations of Modern Art	(4)
ART 315	Art of the Ancient Near East	(4)
ART 316	Art of the Classical World	(4)
BHS 328	Women and Men: Changing Sex Roles	(4)
BIO 300	Human Heredity	(4)
BIO 301	Human Sexuality	(4)
BIO 302	Biology of Cancer	(4)
BOT 307	Plants and People	(4)
COM 314	Organizational Communication Theory	(4)
COM 321	Communications Problem Analysis	(4)
COM 327	Intercultural Communication	(4)
COM 337	Group Discussion	(4)
COM 413	Public Opinion, Propaganda and the Mass Media	(4)
DAN 466	Dance of the 20th Century	(4)
DAN 449	Dance in Contemporary Culture	(4)

FMA 313	Politics of Food and Agriculture	(3)
FMA 324	Accounting for Agribusiness	(4)
FMA 328	Agribusiness Enterprise Management	(4)
FMA 402	Agribusiness Personal Management	(4)
FMA/IA 450	Agricultural Water Resource Management	(4)
EC 411	Economic Development	(4)
EC 419	Land Economics	(4)
EC 429	Seminar in Natural Resource Economics	(4)
EC 432	Seminar in Urban Economics	(4)
EC 433	Economics of Transportation	(4)
EC 435	Seminar in Environmental Economics	(4)
EC 436	Seminar in Air Resources Economics	(4)
EC 437	Seminar in the Economics of Poverty and Discrimination	(4)
EC 438	Seminar in Waste Management Economics	(4)
EC 439	Seminar in Water Resource Economics	(4)
EC 440	Industrial Organization	(4)
EC 441	American Industry	(4)
EGR 402	Ethics and Engineering Decision-making	(4)
EGR 403	Capital Allocation Theory	(4)
ENG 403	Shakespeare	(4)
ENG 450	Twentieth-Century British Literature	(4)
ENG 456	Twentieth-Century American Literature	(4)
ENG 459	Literatures of the "Third World"	(4)
ENV 350	Diversity in Design	(4)
ENV 355	Community Exhibition and Performance Spaces	(4)
ENV 422	Designing for the Elderly and Disabled	(4)
ENV 423	Design for Children and Accessibility	(4)
ENV 450	Sustainable Communities	(4)
ENV 489	Community Design and Social Change	(4)
EWS 301	Ethnic Identity	(4)
EWS 304	Asian American Communities: Comparative Analysis	(4)
EWS 345	Gender, Ethnicity, and Employment	(4)
EWS 350	Ethnic Immigration	(4)
EWS 370	Women and Law	(4)
EWS 401	African American Contemporary Issues	(4)
EWS 402	Chicano/Latino Contemporary Issues	(4)
EWS 404	Asian American Contemporary Issues	(4)
EWS 407	Sexual Orientation and Diversity	(4)
EWS 420	Gender, Ethnicity, and Class	(4)
EWS 430	Ethnic Thought and Values	(4)
FMA 313	Food and Agricultural Policy	(4)
FMA 324	Management Accounting I	(4)
FMA 328	Agricultural Enterprise Management	(4)
FMA 402	Personnel Management	(4)
FMA/IA 450	Agricultural Water Resource Management	(4)
GEO 312	Economic Geography	(4)
GEO 315	Urban Geography	(4)
GEO 351	Geography of California	(4)
GEO 357	Geography of Asia	(4)
GEO 358	Geography of Africa	(4)
GSC 304	Meteorology	(4)
GSC 321/321L	Geotechnology	(4)
GSC 335	Descriptive Physical Oceanography	(4)
GSC 360/360L	Groundwater Geology	(4)
HST 306	Modern India	(4)
HST 307	South Asia	(4)
HST 309	Modern Southeast Asia	(4)
HST 313	Middle East: The Rise of Islam	(4)
HST 314	Islamic History in the Middle Ages	(4)
HST 315	Middle East: Problems of the 20th Century	(4)
HST 323	Enlightenment, Absolutism, and Constitutionalism 1648-1789	(4)



HST 324	Revolution and Reaction 1789-1850 . . . . .	(4)	PHL 320	American Philosophy. . . . .	(4)
HST 325	Nationalism, Imperialism, and Industrialization 1850-1914. . . . .	(4)	PHL 330	Ethics, Environment, and Society. . . . .	(4)
HST 326	Europe 1900-1945: World Wars and the Crisis of Liberalism(4)		PHL 401	Philosophy and Religion of Japan . . . . .	(4)
HST 327	Europe Since 1945: Cold War, Revival and New Era(4)		PHL 402	Philosophy and Religion of China . . . . .	(4)
HST 335	Latin America: The Colonial Period . . . . .	(4)	PHL 403	Philosophy and Religion of India. . . . .	(4)
HST 336	Latin America: The Era of Nation Building . . . . .	(4)	PHL 420	Philosophical Issues in the Law . . . . .	(4)
HST 337	Latin America: Problems of the 20th Century . . . . .	(4)	PHL 433	Bioethics. . . . .	(4)
HST 341	Colonial America. . . . .	(4)	PHL 459	Epistemology . . . . .	(4)
HST 342	American in the Federal Period. . . . .	(4)	PHL 465	Philosophy of Love and Sex . . . . .	(4)
HST 343	The Age of Jackson . . . . .	(4)	PHL 468/468a	Film Aesthetics. . . . .	(4)
HST 344	Civil War and Reconstruction . . . . .	(4)	PHL 483	Philosophy of Science. . . . .	(4)
HST 345	America Comes of Age 1890-1945 . . . . .	(4)	PHY 306	History of Physics . . . . .	(4)
HST 347	United States since 1945 . . . . .	(4)	PHY 340	Energy and the Environment . . . . .	(4)
HST 351	England to 1689. . . . .	(4)	PHY 344	Applied Optics . . . . .	(4)
HST 356	The Soviet Union . . . . .	(4)	PLS 315	Politics of Public Policy . . . . .	(4)
HST 362	Colonial Mexican History . . . . .	(4)	PLS 318	Business and Public Policy . . . . .	(4)
HST 363	Mexican History since 1810 . . . . .	(4)	PLS 328	American State and Local Politics . . . . .	(4)
HST 370	History of California. . . . .	(4)	PLS 323	American Ethnic Politics . . . . .	(4)
HST 406	Women in the United States . . . . .	(4)	PLS 342	Politics of Developing Areas . . . . .	(4)
HST 413	Religion in American History. . . . .	(4)	PLS 431	Ancient and Medieval Political Thought . . . . .	(4)
IA 362	Agricultural Policy in Developing Nations . . . . .	(4)	PLS 432	Modern Political Thought . . . . .	(4)
IBM 301	Principles of Marketing Management. . . . .	(4)	PLS 436	Twentieth-Century Political Thought. . . . .	(4)
KIN 363	Psychological Aspects of Physical Activity and Sport . . . . .	(4)	PLS 441	Comparative European Governments and Politics Comparative Latin American Governments and Politics. . . . .	(4)
KIN 370	Stress Management for Healthy Living. . . . .	(4)	PLS 446	Comparative Middle Eastern Governments and Politics. . . . .	(4)
KIN 450	Role of Sport in Contemporary Society . . . . .	(4)	PLS 447	Government and Politics of the Russian Republic . .	(4)
KIN 469	History of Women in Sport . . . . .	(4)	PLS 449	Comparative Southeast Asia Governments and Politics . . . . .	(4)
MAT 306	History of Mathematics . . . . .	(4)	PLS 451	International Conflict, War and Peace	
MHR 301	Principles of Management . . . . .	(4)	PSY 334	Cognitive Processes . . . . .	(4)
MHR 318	Multicultural Organizational Behavior . . . . .	(4)	PSY 455	Human Sexual Behavior: Relationships . . . . .	(4)
MHR 324	Communication for Management . . . . .	(4)	RS 301	Life Support Processes . . . . .	(4)
MHR 406	Strategies for Men and Women in Management . .	(4)	RS 302/302L	Global Regenerative Systems . . . . .	(3/1)
MHR 438	Advanced Organizational Behavior . . . . .	(4)	RS 303/303L	Shaping a Sustainable Future . . . . .	(2/2)
PHL 301	Philosophy of the Arts. . . . .	(4)	SOC 301	Contemporary Social Problems . . . . .	(4)
PHL 309	Moral Philosophy . . . . .	(4)			



## 1997–98 General Education Requirements College of Engineering

	Area 1	Area 2		Area 3		Area 4	Area 5
<b>ARO</b>	ENG 104 (4) COM 204 (4) ENG 105 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>MAT 317, 318 (3,3)</u>	3a. Elective* (4) 3b. <u>PHL 201 (4)</u> 3c. UD or LD Elective* (4)	3d. <u>EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. <u>PSY 201 (4)</u>	PLS 201 (4) HST 202 (4)	<u>ECF 353/355L (3/1)</u> <u>ECF 354/356L (3/1)</u>
<b>CME</b>	ENG 104 (4) COM 100 or COM 204 (4) ENG 105 or PHL 202(4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>CHM 121L, CHM 122L (1,1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>CHM 316 (3)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EGR 403 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>CHM 311, 312 (3,3)</u> <u>UD MTE Elect. (4)</u>
<b>CE</b>	ENG 104 (4) COM 204 (4) CE 361 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>PHY 152L, 153L (1,1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>IME 301 (3) or STA 309 (3)</u>	3a. Elective (4) 3b. Elective (4) 3c. UD or LD Elective (4)	3d. <u>CE 301 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. <u>PSY 201 (4)†</u>	PLS 201 (4) HST 202 (4)	<u>GSC 321 (4)</u> <u>MHR 318* (4)</u>
<b>ECE</b>	ENG 104 (4) COM 204 (4) ECE 311 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>PHY 152L (1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>ECE 302 (4)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC 201 or EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>EGR 402 (4)</u> <u>EGR 403 (4)</u>
<b>ET</b>	ENG 104 (4) COM 204 (4) ENG 105 or PHL 202 (4)	2a. <u>MAT 130 (4)</u> 2b. <u>PHY 121/141L (4)</u> <u>PHY 142L, 143L (1,1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>STA 309 (3)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC 201 or EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. <u>PSY 201 (4)†</u>	PLS 201 (4) HST 202 (4)	<u>ETI 305 or ETC 301 (4)</u> <u>EGR 402 or MHR 318* (4)</u>
<b>IE and MFE</b>	ENG 104 (4) COM 204 (4) ENG 105 or PHL 202 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>PHY 152L, 153L (1,1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>IME 301 (3) or STA 309 (3)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC 201 or EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>EGR 402 (4)</u> <u>EGR 403 (4)</u>
<b>ME</b>	ENG 104 (4) COM 204 (4) ME 231 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>CHM 121/121L (3/1)</u> <u>CHM 152L (1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>ME 330 (4)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC 201 or EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>EGR 403 (4)</u> <u>ECF 333/383L (4)</u>
<b>MTE</b>	ENG 104 (4) COM 100 or COM 204 (4) ENG 105 or PHL 202(4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>CHM 121L (1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>CHM 305 (3)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC201 or EC202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>EGR403 (4)</u> <u>UD BUS Elect. (4)</u>

• All programs in the College of Engineering are nationally accredited by the Accreditation Board for Engineering and Technology (ABET) and engineering curricula are required to satisfy both ABET national requirements and, concurrently, CSU general education requirements. In order to achieve this, underlined courses double-count in satisfying both major and general education requirements. All coursework can be satisfied through course substitution via a General Academic Petition, or via articulation as appropriate. All non-underlined coursework can, in addition, be satisfied via GE certification from a community college. • Because of ABET requirements in the life sciences, degree credit for any course other than BIO 110 (Area 2c) requires a General Academic Petition. • (\*) denotes a course that could be used to satisfy the Cal Poly Pomona requirement in American Cultural Perspectives. • (†) indicates that PSY 201 is a prerequisite for MHR 318 in Area 5.

SOC 302	Criminology . . . . .	(4)
SOC 321	Family as a Social Institution . . . . .	(4)
SOC 350	Collective Behavior and Social Movements . . . . .	(4)
SOC 360	Juvenile Delinquency . . . . .	(4)
SOC 430	Sociology of Mental Disorders . . . . .	(4)
SOC 433	Survey Research . . . . .	(4)
TH 301	Through the Artist's Eyes: Visions of World Artists . . . . .	(4)
TH 410	20th Century American Theater. . . . .	(4)
TH 481	History of Costume . . . . .	(4)
URP 301	Principles of Urban Planning. . . . .	(4)
URP 411	Evolution of American Cities and the Planning Movement . . . . .	(4)
URP 475	Planning in a Global Economy. . . . .	(4)

#### THE FOLLOWING MINOR PROGRAMS WILL SATISFY GENERAL EDUCATION UPPER DIVISION REQUIREMENT

Artificial Intelligence  
Computer Systems Organization  
Regenerative Studies  
Scientific Computer Programming

#### INTERDISCIPLINARY GENERAL EDUCATION (IGE) PROGRAM (32 units)

The Interdisciplinary General Education Program addressed the need for an integrated approach to curriculum, teaching, and scholarship and the creation of an extended learning community.

The IGE program is open to any department wishing to adopt it as an option and is the preferred pattern for students in engineering and architecture. It is recommended to all other students in the Colleges of Agriculture, Business Administration, Environmental Design, and Science. It is also available to Humanities majors in the English and Foreign Languages Department, to Liberal Studies students in the Liberal Studies Option and to philosophy majors, College of Letters, Arts, and Social Sciences. See departmental advisors or the Program Director.

The eight course sequence has the following common goals:

##### Learning Outcomes

1. Communication skills and critical thinking.
2. Development of historical social consciousness.
3. Multicultural understanding.
4. Understanding and appreciation of aesthetic experiences.
5. Understanding and articulation of values.
6. Independent integration of knowledge and experience through active student learning.

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

#### FIRST YEAR

IGE 120	Consciousness and Community: Origins and Development of Human Societies . . . . .	(4)
IGE 121	Rationalism and Revelation: The Ancient World . . . . .	(4)
IGE 122	Authority and Faith: Medieval and Renaissance Worlds . . . . .	(4)

#### SECOND YEAR

IGE 220	Ways of Knowing: Culture and Contact. . . . .	(4)
IGE 221	Ways of Coexisting: Reform and Revolution . . . . .	(4)

IGE 222	Ways of Doing: The Industrial Age. . . . .	(4)
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#### THIRD YEAR

IGE 223	Ways of Living: The Contemporary World. . . . .	(4)
IGE 224	Connections Seminar: Exploration and Personal Expression . . . . .	(4)

#### HOW INTERDISCIPLINARY GE PROGRAM MEETS UNIVERSITY REQUIREMENTS

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

#### AREA 1 COMMUNICATION IN THE ENGLISH LANGUAGE

ENG 104 ("a") satisfied at the end of the first year (after taking IGE 120, IGE 121, IGE 122); "b" and "c" not satisfied. Select from regular GE list.

#### AREA 2 SCIENCE AND MATHEMATICS

Not satisfied. Select courses from regular GE list as specified by major.

#### AREA 3 ARTS, LITERATURE, PHILOSOPHY AND FOREIGN LANGUAGES

Any two courses (8 units) from "a" or "b" or "c" satisfied at the end of the first year with the completion of IGE 120, IGE 121, and IGE 122. Take the remaining four-unit course from the regular list. (Example: If "b" and "c" are replaced by IGE courses, then take "a" from the regular list, and so on.) The student may choose which two courses to replace by IGE courses.

"e" and "f" are satisfied (8 units) at the end of the second year with the completion of IGE 220, IGE 221, and IGE 222. Choose "d" from the regular GE list.

"g" is satisfied (4 units) at the end of the IGE sequence (IGE 224).

#### AREA 4 U.S. HISTORY, CONSTITUTION, AND AMERICAN IDEALS

Satisfied (8 units) at the end of the IGE sequence (IGE 224)

#### AREA 5 UPPER DIVISION GENERAL EDUCATION

Not included in IGE. Choose from regular upper division course list.

#### AMERICAN CULTURAL PERSPECTIVES REQUIREMENT

The American Cultural Perspectives Requirement is a graduation requirement. Courses satisfying this requirement may be part of either a student's General Education program, major, or minor. These courses may also be taken as electives. This requirement will not constitute an additional unit load on the degree requirements of students in any program. This requirement was implemented fall quarter, 1995.

To satisfy this requirement a student must take at least one four-unit course. Courses that meet the American Cultural Perspectives Requirement should satisfy all of the following criteria:

Introduce theoretical perspectives and nonwestern/nontraditional approaches for studying gender, ethnicity, and class.

Include the study of at least one other marker of social difference, such as sexual orientation, religious affiliation, national origin, etc.

Include substantive materials (books/films/lectures/articles/etc.) by and/or about members of at least two of the following socio-cultural groups: African Americans, Native Americans, Chicano/Latino Americans, Asian Americans, Pacific Islands Americans, Middle Eastern Americans, and European/white ethnic Americans.

Address intra-cultural differences as well as inter-cultural commonalities between groups that collectively represent the American population. The commonalities and differences may be examined by focusing on diverse cultural practices, environmental ethics, political histories, religious beliefs, or means of artistic expression.

The following courses have been approved to satisfy this requirement:

ANT 102	Introduction to Cultural Anthropology	4
ANT 333	Varieties of American Culture	4
ART 310	Art of the United States	4
ENG 212	Survey of American Literature II	4
ENG 213	Ethnic Literatures of the U.S.	4
ENG 459	Literatures of the Third World	4

ENV 355	Community Exhibition and Performance Spaces	4
ENV 422	Designing for the Elderly and Disabled	4
ENV 423	Design for Children and Accessibility	4
ENV 489	Community Design and Social Change	4
EWS 140	Introduction to Ethnic Studies	4
EWS 145	Introduction to the Study of Women and Men in Society	4
EWS 390	Ethnic Women	4
EWS 420	Gender, Ethnicity, and Class	4
EWS 430	Ethnic Thought and Values	4
FN 228	Food and Culture	4
FNC 101	Introduction to Family Issues	4
HST 202	United States History	4
HST 345	America Comes of Age, 1890-1945	4





HST 347	The U. S. Since 1945. . . . .	4
MHR 318	Organizational Behavior in a Multicultural Environment . .	4
KIN 450	Role of Sport in Contemporary Society . . . . .	4
KIN 469	History of Women in Sport . . . . .	4
PHL 307	American Indian Thought and Religion . . . . .	4
PLS 323	American Ethnic Politics . . . . .	4
SOC 323	Sociology of Minority Communities. . . . .	4
URP 332/332L	Applied Demography for Planning . . . . .	4
URP 411	Evolution of Cities and Planning in America . . . . .	4

Students should consult with their departments or academic advisors for any other courses that might be approved during the 1996-97 academic year to satisfy this requirement.



## UNIVERSITY PROGRAMS

### INTERDISCIPLINARY GENERAL EDUCATION (IGE)

James Manley, Director  
Dick Johnson, Associate Director  
Nancy Ware, Associate Director

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

The Interdisciplinary General Education Program addresses the need for an integrated approach to curriculum, teaching, and scholarship and the creation of an extended learning community.

#### FIRST YEAR (F,W,Sp)

##### IGE 120 Consciousness and Community (4)

First knowings, origin of consciousness, myth, symbol, performance, and ceremony; prehistory and patterns of living, making of meaning; university experience. 4 lecture discussions. Prerequisite: EPT score of 147 or better. Activity fee may be required.

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

The nature of tragedy; the ways of warriors, prophets, tyrants, philosophers, and citizens; ethics, convictions, and the sacred. 4 lecture discussions. Prerequisite: IGE 120. Activity fee may be required.

##### IGE 122 Authority and Faith: The Medieval and Renaissance Worlds (4)

Visions of hell, politics, social order, and redemption; constructions of the sacred and secular selves; journey of the soul; private lives and public spaces. 4 lecture discussions. Prerequisite: IGE 121. Activity fee may be required.

#### SECOND YEAR (F,W,Sp)

##### IGE 220 Ways of Knowing: Culture and Contact (4)

Explorations of the multiple ways of constructing knowledge (science, art, the sacred as ways of knowing); knowledge as historically grounded in the era of the New World colonial conquest (national artistic cultures, scientific revolution, indigenous sacred articulations of space and time, perceptions of Self and Other). 4 lecture discussions. Prerequisite: IGE 122. Activity fee may be required.

##### IGE 221 Ways of Coexisting: Reform and Revolution (4)

Explorations of urban and global issues (social space; domination, resistance, and revolution; traditional/transitional cultures). Inquiries are historically grounded in the Enlightenment era (rise of individual rights, spirit of revolution, restructuring social, conceptual, and scientific structures). 4 lecture discussions. Prerequisite: IGE 220. Activity fee may be required.

##### IGE 222 Ways of Doing: The Industrial Age (4)

Explorations of technology and human purpose; science and scientists; divergent thinking, gender, genius, and anomalies; emergent ethical frameworks; inquiries are historically grounded in the Industrial Age; individual and collective ideologies; romanticism and realism. 4 lecture discussions. Prerequisite: IGE 221. Activity fee may be required.

#### THIRD YEAR (F,W)

##### IGE 223 Ways of Living: The Contemporary World (4)

Explorations of environmental epistemology, ethics, aesthetics, and biographies; communities and cultures which offer life-enhancing practices; environmental education and responsibility; inquiries are historically grounded in the modern and postmodern worlds; global thinking and doing. 4 lecture discussions. Prerequisite: IGE 222. Activity fee may be required.

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

Research and presentation of an interdisciplinary project which extends and synthesizes themes from the IGE experience. 4 lecture discussions. Prerequisite: IGE 223

### INTERNATIONAL PROGRAMS

Dr. Jean Aigner, Director, International Programs

These course designations serve Cal Poly Pomona students participating in Cal Poly Pomona Exchange Programs or in CSU International Programs (IP) overseas as vehicles for residence credit and are administered by the International Center.

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

Study undertaken in a foreign university under the auspices of The California State University International Programs or Cal Poly Pomona Exchange Programs.

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

Study undertaken in a foreign university under the auspices of The California State University International Programs or Cal Poly Pomona Exchange Programs.

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

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

### GENERAL EDUCATION - TRACK A

Vinita Dhingra, Coordinator

##### GEN 101 Communication and Critical Thinking I (4)

Study and practice of methods of inquiry and forms of written and oral communication in the disciplines and fields of modern knowledge. Selected examples from the humanities, arts, natural sciences, social sciences, and professions. Introduction to the university as a place of cultural actions and knowledge. Frequent papers and oral presentations. Emphasis on self-reflection and exposition. 4 discussion/problem-solving.

##### GEN 102 Communication and Critical Thinking II (4)

This course should build on what students have explored in GEN 101 and continue the study and practice of forms of written and oral communication in the various disciplines. Students will explore the different methods of research, critical thinking, analysis and persuasion as they extend beyond the university and apply to issues of public importance and current events. 4 discussion/problem-solving. Prerequisite: GEN 101.

**GEN 103 Communication and Critical Thinking (4)**

Capstone for GEN 101 and 102, Communication and Critical Thinking. Frequent papers and oral presentations. Integrates content knowledge and process knowledge. 4 discussion/problem-solving. Prerequisites: GEN 101 and 102.

**GEN 104 The Human Conscience and Spirit (4)**

A cross-cultural, multidisciplinary examination of significant recurrent themes from a variety of historical, literary, philosophical, and religious sources that exemplify alternative human responses to common life experiences and ways of resolving fundamental spiritual and moral issues. 4 lectures/problem-solving.

**GEN 105 Political Authority and Change (4)**

The study of political authority and change in the context of world cultures. Emphasis is given to institutions, cultural perspectives, the individual in relation to authority, social movements, and political authority at the global level. 4 lectures/problem-solving. Prerequisites: GEN 101, 102, 103.

**GEN 106 Creativity, Technology, and Society (4)**

An examination of the moral, aesthetic, and social dimensions of human invention. Selected cultural and historical examples. Emphasis on historical, philosophical, and literary methods of inquiry and analysis. 4 lectures/problem-solving. Prerequisites: GEN 101, 102, and 103.

**GEN 107/107A World Cultures IV: Fine and Performing Arts - Intention, Process and Product (4)**

Multidisciplinary exploration, on a global scale, of the fine and performing arts drawn from the disciplines of architecture, art, dance, landscape architecture, music and theatre. Emphasis on interdisciplinary dialog on artistic intention, process and product. Instruction is by lecture, activity, or a combination of both.

**GEN 108 Consumers, Producers, and Economic Institutions (4)**

An interdisciplinary introduction to the concepts and the empirical and normative theories of economic practices, institutions, and outcomes. An analysis of economic and social problems from economic, historical, and philosophical points of view. 4 lectures/problem-solving. Prerequisites: GEN 101, 102, 103.

**GEN 109 Readings in Human Behavior and Nature (4)**

A multidisciplinary examination of the complex "nature" of the human animal. Guided exploration of the literature pertaining to the biological, social, and environmental factors underlying human behavior. An evolutionary, cross-cultural, and cross-species investigation into the uniqueness of humankind. 4 lectures/problem-solving. Prerequisites: GEN 101, 102, 103.

**GEN 110 The Individual in a Diverse Society (4)**

Introduces social theory relevant to the challenge and promise of diverse societies, identifies one disciplinary approach (varies from section to section) to contemporary issues of diversity, and engages students in experiential group activities designed to heighten awareness of individual diversity in society. 4 lectures/problem-solving.

**NATIONAL STUDENT EXCHANGE**

Laraine Turk, Coordinator

These course designations serve Cal Poly Pomona students participating

in the National Student Exchange Consortium at various universities and colleges in the United States as vehicles for Cal Poly Pomona residence maintenance.

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

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

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

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

**LIBRARY**

Harold B. Schleifer, Director

The Library's Bibliographic Instruction Program is designed to introduce students to the basic courses and library research strategies needed to a specific course or assignment. The presentations illustrate how to define information needs, investigate appropriate sources, and evaluate sources for relevance, reliability, and objectivity. For Library instruction: Call the Reference/Instruction/Collections Services office at extension 3076.

**MILITARY SCIENCE**

Lieutenant Colonel Kevin Arnold, Professor of Military Science  
 Captain Randall Millers                      Captain Albert Gordon  
 MSG Robin Harrison                      SFC Steven Stahlhuth

**MS 101/101L Introduction to ROTC (and to the university) (2/0)**

Make your first new peer group at college one committed to performing well and enjoying the experience. Increase self-confidence through team study and activities in basic drill, physical fitness, rappelling, leadership reaction course, first aid, making presentations and basic marksmanship. Learn fundamental concepts of leadership in a profession in both classroom and outdoor laboratory environments. One hour and a required leadership lab, MS101L, plus optional participation in a one hour session for physical fitness. Participation in a weekend exercise is optional, but highly encouraged (and fun!).

**MS 102/102L Introduction to Leadership (2/0)**

Learn/apply principles of effective leading. Reinforce self-confidence through participation in physically and mentally challenging exercises with upper division ROTC students. Develop communication skills to improve individual performance and group interaction. Relate organizational ethical values to the effectiveness of a leader. One hour and a required leadership lab, MS102L, plus optional participation in a one hour session for physical fitness. Participation in a weekend exercise is optional, but highly encouraged.

**MS 103/103L Continuation of MS 102 (2).****MS 201/201L Self/Team Development (2/0)**

Learn/apply ethics-based leadership skills that develop individual abilities and contribute to the building of effective teams of people. Develop skills in oral presentations, writing concisely, planning of events, coordination of group efforts, advanced first aid, land navigation and basic military tactics. Learn fundamentals of ROTC is Leadership Development Program. Two hours and a required leadership lab, MS 201L, plus required participation in a two one-hour sessions for physical fitness. Participation in a weekend exercise is optional, but highly encouraged.



**MS 202/202L Individual/Team Military Tactics (2)**

Introduction to individual and team aspects of military tactics in small unit operations. Includes use of radio communications, making safety assessments, movement techniques, planning for team safety/security and methods of pre-execution checks. Practical exercises with upper division ROTC students. Learn techniques for training others as an aspect of continued leadership development. Two hours and a required leadership lab, MS 202L, plus required participation in two one-hour sessions for physical fitness. Participation in a weekend exercise is optional, but highly encouraged.

**MS 203/203L Continuation of MS 202 (2)****MS 101L, 102L, 103L, 201L, 202L and 203L Leadership Laboratory (0)**

Open only to (and required of) students in the associated Military Science course. Series, with different roles for students at different levels in the program. Learn and practice basic skills. Gain insight into Advanced Course in order to make an informed decision whether to apply for it. Build self-confidence and team-building leadership skills that can be applied throughout life.

**MS 179L Basic Course Physical Fitness (1)**

Only open to students in MS 101, 102, 201 and 202. Optional in MS 101, MS 102 and MS 103; required in MS 201, MS 202 and 203. Series, with different roles for students at different levels in the program. Participate in and learn to lead a physical fitness program. Emphasis on the development of an individual fitness program and the role of exercise and fitness in one's life.

**MS 210 Camp Challenge (0)**

A six-week summer camp conducted at an Army post. The student receives pay. Travel, lodging and most meal costs are defrayed by the Army. The environment is rigorous, and is similar to Army Basic Training. No military obligation incurred. Open only to students who have not taken all six of MS 101, 102, 103, 201, 202 and 203, and who pass a physical examination (paid for by ROTC). Completion of MS 210 qualifies a student for entry into the Advanced Course. Three different cycles offered during the summer, but spaces are limited by the Army. Candidates can apply for a space any time during the school year prior to the summer. Pass/Fail grade only.

**The Advanced Course consists of the courses MS 301, 302, 303, 310, 401, 402 and 403**

It is open only to students who have completed the Basic Course or earned placement credit for it (various methods). The Advanced Course is designed to qualify a student for a commission as an officer in the United States Army. Students must complete all courses numbered greater than 300, to include MS 310, a five-week Advanced Camp in the summer, usually between the junior and senior years. The courses must be taken in sequence unless otherwise approved by the Professor of Military Science. Students receive \$150 per month during the school year.

**MS 301/301L Leading Small Organizations I (2)**

Series of practical opportunities to lead small groups, receive personal assessments and encouragement, and lead again in situations of increasing complexity. Uses small unit defensive tactics and opportunities to plan and conduct training for lower division students both to develop such skills and as vehicles for practicing leading. Three hours and a required leadership lab, MS 301L, plus required participation in three one-hour sessions for physical fitness.

Participation in one weekend exercise is also required, and one or two more weekend exercises may be offered for optional participation.

**MS 302/302L Leading Small Organizations II (2)**

Continues methodology of MS 301. Analyze tasks; prepare written or oral guidance for team members to accomplish tasks. Delegate tasks and supervise. Plan for and adapt to the unexpected in organizations under stress. Examine and apply lessons from leadership case studies. Examine importance of ethical decision making in setting a positive climate that enhances team performance. Three hours and a required leadership lab, MS 302L, plus required participation in three one-hour sessions for physical fitness. Participation in one weekend exercise is required; two other weekend exercises optional.

**MS 303/303L Continuation of MS 302 (2)****MS 310 ROTC Advanced Camp (0)**

A five-week camp conducted at an Army post. Only open to (and required of) students who have completed MS 301 and 302. The student receives pay. Travel, lodging and most meal costs are defrayed by the U.S. Army. The Advanced Camp environment is highly structured and demanding, stressing leadership at small unit levels under varying, challenging conditions. Individual leadership and basic skills performance are evaluated throughout the camp. Although this course is graded on a Pass/Fail basis only, the leadership and skills evaluations at the camp weigh heavily in the subsequent selection process that determines the type commission and job opportunities given to the student upon graduation from ROTC and the university.

**MS 401/401L Leadership Challenges and Goal-Setting (2)**

Plan, conduct and evaluate activities of the ROTC cadet organization. Articulate goals, put plans into action to attain them. Assess organizational cohesion and develop strategies to improve it. Develop confidence in skills to lead people and manage resources. Learn/apply various Army policies and programs in this effort. Three hours and a required leadership lab, MS 401L, plus required participation in three one-hour sessions for physical fitness. Participation in one weekend exercise is also required, and one or two more weekend exercises may be offered for optional participation.

**MS 402/402L Transition to Lieutenant (2)**

Continues the methodology from MS 401. Identify and resolve ethical dilemmas. Refine counseling and motivating techniques. Examine aspects of tradition and law as relate to leading as an officer in the Army. Prepare for a future as a successful Army lieutenant. Three hours and a required leadership lab, MS 402L, plus required participation in three one-hour sessions for physical fitness. Participation in one weekend exercise is also required, and one or two more weekend exercises may be offered for optional participation.

**MS 403/403L Continuation of MS 402 (2)****MS 301L, 302L, 303L, 401L, 402L and 403L Advanced Course Leadership Laboratories (0)**

Open only to students in the associated Military Science course. Series, with different roles for students at different levels in the program. Involves leadership responsibilities for the planning, coordination, execution and evaluation of various training and activities with Basic Course students and for the ROTC program as a whole. Students develop, practice and refine leadership skills by serving and being evaluated in a variety of responsible positions.

**MS 179L Advanced Course Physical Fitness (1)**

Only offered to (and required of) students in MS 301, 302, 303, 401 402 and 403, of which this program is an integral part. Series, with different roles for students at different levels in the program. Participate in and learn to plan and lead physical fitness programs. Develops the physical fitness required of an officer in the Army. Emphasis on the development of an individual fitness program and the role of exercise and fitness in one's life.

**CALPOLY POMONA UNIVERSITY**

The CPU designation means that such courses are offered for the entire university community regardless of major or school. Many CPU courses have been specifically designed to meet the requirements of general education or to assist students in career/academic choices. For further information in CPU coursework please contact the Office of Academic Programs, Building 98.

**GENERAL EDUCATION COURSES****CPU 201/201A Exercise, Nutrition and Fitness for Modern Society (3/1)**

Importance of good nutrition, cardiorespiratory and muscular endurance, strength and flexibility for adult health. Role of exercise and nutrition in control/prevention of cardiovascular disease, obesity and stress-related illness. Rationale for and participation in various adult fitness activities. Team-taught. 3 lectures, 2 one-hour activities. Corequisites: CPU 201/201A.

**CPU 210/210A Actualized Living (3/1)**

Lifelong physiological and socio-psychological aspects of the leisure phenomenon. Experience in assessing student's leisure knowledge and habits coupled with a comprehensive leisure counseling follow through. Includes a one unit component in death and dying. Meets G.E. Category-V requirement. Team taught. 2 lectures, 1 lecture/discussion, 1 two-hour activity. Corequisites: CPU 210/210A.

**EGR 402 Ethics and Engineering Decision-Making (4)**

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

**ACADEMIC/CAREER GUIDANCE COURSES****CPU 100 Career and Personal Exploration (4)**

Systematic development of information about (1) self including values, interests, and skills, (2) environment including career clusters, fields and occupational information, (3) decision-making and (4) career search techniques. Includes vocational testing and use of the computer-based System of Interactive Guidance and Information (SIGI PLUS). Materials fee required.

**CPU 101 Introduction to the University (1-3)**

This course offers first-time freshmen students an orientation to the university. The class concerns instruction in the structure of the university, scheduling classes, career planning and choice of major, use of the library, co-curricular programs, use of the advisory process, study skills, etc.

**CPU 102 Fundamental Principles of Learning Skills (3)**

Introduction to and practice in college study techniques and learning

skills including: listening, notetaking, memory improvement, and time management. Topics discussed among others: class scheduling, career planning, use of the library and advisory centers, and co-curricular programs. 3 lecture/discussions.

**CPU 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to eight units, with a maximum of four units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination. Corequisites may be required.

**CPU 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to eight units, with a maximum of four units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination. Corequisites may be required.

**ENVIRONMENTAL HEALTH SPECIALIST MINOR**

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

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

Core courses		Units
Basic Biology . . . . .	BIO 115/115L	5
General Chemistry . . . . .	CHM 121/121L	4
General Chemistry . . . . .	CHM 122/122L	4
Elements of Organic Chemistry . . . . .	CHM 201	3
Fundamentals of Physics . . . . .	PHY 102	4
College Algebra . . . . .	MAT 105	4
Elementary Statistics with Applications . . . . .	STA 120	4
		<hr/> 28

Required of all students:

Public Administration . . . . .	PLS 314	4
Introduction to Arthropods . . . . .	AGB 165	4
or		
Introduction to Entomology . . . . .	ZOO 426/426L	4
Basic Microbiology . . . . .	MIC 201/201	5
General Epidemiology . . . . .	MIC 330	4
		<hr/> 17

Select 3 courses from the following:

Applied Microbiology . . . . .	MIC 310/310L	5
Water Pollution Biology . . . . .	BIO 420	3
Radiation Biology . . . . .	BIO 431/431	5

Air Pollution Problems	CHM	460	3
Public Health Entomology	ZOO	435/435	4
			10-14

Select 3 courses from the following:

Pesticide and Hazardous Material Laws	AGB	301	3
Vertebrate Pest Management	AGB	323/323L	4
Produce Market Quality	AGB	325/325L	4
Urban Pest Management	AGB	342/342L	4
			11-12

### PHYSIOLOGY MINOR

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

#### Requirements

(Prerequisites listed in parentheses)

Assumed entry level skills: High school chemistry and algebra

Core (all courses)		Units
Basic Biology (none)	BIO 115/115L	5
General Chemistry (none)	CHM 121/121L	4
General Chemistry (CHM 121/121L)	CHM 122/122L	4
Elementary Statistics with Applications	STA 120	4
Total Units		17

#### Restricted Electives

Anatomy (select one course)

Human Anatomy (BIO 115/115L)	ZOO	234/234L	4
Comparative Vertebrate Anatomy (ZOO 138/138L)	ZOO	451/451L	5
Anatomy & Physiology of Domestic Animals (BIO 115/115L)	AVS	350	5
Total Units			4-5

Physiology (select one course)

Human Physiology (BIO 115/115L)	ZOO	235/235L	4
Comparative Animal Physiology (ZOO 137/137L, 138/138L)	ZOO	424/424L	5
Total Units			4-5

### Chemistry

Elements of Organic Chemistry or equivalent (CHM 122)	CHM	201	3
Elements of Organic Chemistry Lab (CHM 122)	CHM	250L	1
Total Units			4

Total Units, Restricted Electives 12-14

### Advanced Physiology Courses

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

#### Physicochemical Principles

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

#### Physiology

Physiological Ecology (ZOO 424/424L or consent of instructor)	ZOO	440/440L	4
Endocrinology (CHM 327, ZOO 424/424L and/or consent)	BIO	520/520L	4
Renal Physiology (ZOO 424/424L)	BIO	521	3
Physiological Psychology (BHS 204, 205, PHY 202, 203)	PSY	303	5
Mammalian Endocrinology (AVS 350)	AVS	412	4
Physiology of Lactation (AVS 350 and AVS 412)	AVS	413	3
Reproductive Physiology of Food Animals (AVS 350 or ZOO 424/424L)	AVS	414	4
Avian Physiology (none)	PS	431	3
Biomedical Instrumentation and Measurements (BIO 115/115L, ECE 323 or ECE 333 or consent)	ECE	435	3
Biomedical Instrumentation and Measurements Laboratory (ECE 435 concurrent)	ECE	485	1
			3-5

#### Nutrition

Nutrition (CHM 201, CHM 250L, ZOO 235/235L)	FN	235	3
Nutrition Lab (FN 235 concurrent)	FN	361	
Advanced Nutrition (CHM 321, FN 235, ZOO 235/235L)	FN	433	4
Nutritional Assessment-Biochemical (FN 433 concurrent)	FN	445	2
Advanced Nutrition (FN 433)	FN	434	4
Diet Therapy (FN 433, FN 445)	FN	443	4
Diet Therapy (FN 443)	FN	444	3
Animal Nutrition (CHM 321)	AVS	402	4
Ruminant Nutrition (CHM 321)	AVS	403	4

Advanced Nutrition (FN 434) . . . . .	FN	533	3
Recent Advances in Nutrient Metabolism (consent) . . . . .	FN	535	2
Nutrition Through the Life Cycle (FN 433) . . . . .	FN	536	3
Biological Control Systems (upper division course in control systems) . . . . .	EGR	588	4
			<hr/> 3-4

#### Ergonomics

Physiology of Exercise (ZOO 235/235L) . . . . .	KIN	303/303L	3,1
Lifespan Motor Development (Junior or Senior standing) . . . . .	KIN	312/312A	3,1
Growth, Aging, and Physical Activity . . . . .	KIN	365/365A	3,1
Biomechanical Kinesiology (KIN 302) . . . . .	KIN	402/402L	3,1
Physiology of Exercise II (KIN 303/303L) . . . . .	KIN	403/403L	3,1
Motor Learning & Human Performance . . . . .			
(KIN 303/303L, 425/425A) . . . . .	KIN	430/430L	3,1
Sports Medicine (KIN 303/303L) . . . . .	KIN	455	4
Exercise Metabolism and Weight Control (KIN 303/303L, FN 205 or FN 235 and FN 236L) . . . . .	KIN	456	3
Advanced Motor Learning & Human Performance (KIN 430/430L) . . . . .	KIN	580	3
Advanced Motor Development (KIN 312) . . . . .	KIN	583	3
			<hr/> 3-4

Total Units—Advanced Courses. . . . . 20

Total Units—Minor 49-51

#### QUANTITATIVE RESEARCH MINOR

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

#### Requirements

Core		Units
Elementary Statistics with Applications . . . . .	STA	120 4
Sampling Survey Methods . . . . .	STA	310 4
Units . . . . .		<hr/> 8

<i>Intermediate</i> (Choose one sequence)			
Managerial Statistics . . . . .	OM	302	4
Advanced Managerial Statistics . . . . .	OM	380	4

Agricultural Data Management . . . . .	ABM	375/375L	3/1
Advanced Managerial Statistics . . . . .	OM	380	4
Statistics for Behavior Sciences . . . . .	BHS	307/307A	3/1
Computer Methods in Behavior Science . . . . .	BHS	340/340A	3/1
Statistics in the Behavioral Sciences . . . . .	BHS	307/307A	3/1
Policy Analysis and Program Evaluation . . . . .	PLS	417/417A	3/1

Statistical Computing . . . . .	STA	210	4
Nonparametric Statistics . . . . .	STA	320	4

Statistical Computing . . . . .	STA	210	4
Biometrics . . . . .	BIO	411	3
Planning Research Methods I . . . . .	URP	331/331L	4/2
Planning Research Methods II . . . . .	URP	332/332L	4/2
Economic Statistics . . . . .	EC	321	4
Economic Statistics . . . . .	EC	322	4
Econometrics . . . . .	EC	421	4

Units. . . . . 7-12

#### Applied Methods (Choose one course from each group)

##### GROUP I

Marketing Research I . . . . .	IBM	408	4
Real Estate Market Analysis . . . . .	FRL	483	4
Survey Research . . . . .	SOC	433/433A	3/1

##### GROUP II

Project Design and Development . . . . .	OM	460	4
Experimental Psychology: Research, Design and Methodology . . . . .	PSY	433/433L	4/1
Design of Experiments . . . . .	STA	435	4

Units . . . . . 8-9

#### Project

Students will do a quantitative research project in their major field of study. . . . . 4

Total Units . . . . . 27-32

#### TOTAL QUALITY MANAGEMENT MINOR

The Total Quality Management (TQM) Minor may be taken by students having any major in the University. It is particularly appropriate for students having majors in the following areas: Technology and Operations Management, Industrial and Manufacturing Engineering, Management and Human Resources, International Business and Marketing. The Minor is intended to allow students to gain the knowledge and skills necessary for effective application of quality management techniques in manufacturing, service, and not-for-profit organizations. The Total Quality Management Minor will help for the need for graduates, especially from business and engineering, who are trained in the concepts, techniques, tools and methods of analysis used for the continuous improvement of product, service, and process quality. Computer-based approaches are used wherever they are available and appropriate. For more information, students may contact any of the



following faculty members: Dr. Mostafa El Agizy (Operations Management), Dr. Peggy Snyder (Management and Human Resources), and Professor Phil Rosenkrantz (Industrial and Manufacturing Engineering).

### Requirements

#### Prerequisites (12-26 units)

Completion of one of the following prerequisite options is required. In most instances, the prerequisites listed in an option package are part of the existing curriculum for the student in the indicated academic program area.

OPTION 1: (Business, Engineering Technology, and some Science majors. Also, all majors not included in Options 2 and 3 below)

Elementary Statistics with Applications	STA	120	(4)
Managerial Statistics	TOM	302	(4)
Production and Operations Management I	TOM	301	(4)

OPTION 2: (Engineering, and some Science majors)

Analytic Geometry and Calculus I	MAT	114	(4)
Analytic Geometry and Calculus II	MAT	115	(4)
Analytic Geometry and Calculus III	MAT	116	(4)
Calculus of Several Variables I	MAT	214	(3)
Statistical Methods in Engineering and the Physical Sciences	STA	309	(4)
Engineering Probability and Statistics	IME	312	(4)

OPTION 3: (Mathematics majors)

Analytic Geometry and Calculus I	MAT	114	(4)
Analytic Geometry and Calculus II	MAT	115(4)	
Analytic Geometry and Calculus III	MAT	116	(4)
Calculus of Several Variables I	MAT	214	(3)
Calculus of Several Variables II	MAT	215	(3)
Applied Probability Theory	STA	330	(4)
Applied Statistics	STA	331	(4)
Core Requirements			(16 units)

(Note: OM majors are required to substitute a course outside their major, with minor advisor approval, for TOM 401.)

Processes and Measurement	IME	280	(4)
Total Quality Management	TOM	401	(4)
Quality Management	TOM	435	(4)
or Quality Control by Statistical Methods	IME	415	(4)
Total Quality Management Implementation	MHR	439	(4)
Directed Elective Courses		(8 units)	
Advanced Managerial Statistics	TOM	380	(4)
Material Requirements Planning	TOM	430	(4)
Production and Inventory Management	TOM	432	(4)
Materials and Inventory Management	TOM	433	(4)
Purchasing Management	TOM	434	(4)
Operations Management in Services	TOM	453	(4)
Just-In-Time Production	TOM	455	(4)
Research Design and Methodology	TOM	460	(4)
First Line Management	MHR	313	(4)
Training and Development	MHR	405	(4)
Advanced Organizational Behavior	MHR	438	(4)
Design of Experiments	IME	435/435L	(3/1)
Fundamentals of Human Factors			
Engineering/Laboratory	IE	225/225L	(3/1)
Principles of Productivity Engineering	IE	392	(3)
Reliability Concepts and Techniques	IE	419	(3)
Human Engineering in Design/Laboratory	ME	438/448L	(2/1)
Geometric Dimensioning and Tolerancing/Laboratory	MFE	323/323L	(2/1)
Intro to Computer Integrated Manufacturing/Laboratory	MFE	450/450L	(3/1)
Producibility Engineering	MFE	484	(3)
Advanced Human Factors in Engineering Design	EGR	539	(4)
Quality Assurance	ETP	375	(3)
Nondestructive Evaluation I	ETP	437/437L	(1/1)
Nondestructive Evaluation II	ETP	438/438L	(1/1)
Analysis of Variance and Design of Experiments	STA	435	(4)
TOTAL CORE & ELECTIVE UNITS REQUIRED			(24 units)





## ATHLETIC DEPARTMENT

Karen L. Miller, Director of Athletics

Mike Ashman  
Dee DeRaleigh  
Ron Fremont  
Carlos Juarez  
Elizabeth Kopp  
Ky Kugler  
Ann Lebedeff

Thomas O. Marshall  
Wendy Nasmyth  
Jim Sackett  
Glenn Shenker  
Paul Thomas  
Chris Ward  
Rosie Wegrich

The Department of Intercollegiate Athletics offers opportunities for men and women in a wide variety of sports, which include (m) baseball, basketball, cross country, soccer, tennis, track and field and (w) volleyball. The University is a member of the National Collegiate Athletic Association (NCAA), Division II and competes in the California Collegiate Athletic Association (CCAA) conference. These opportunities are open to all qualified students. The University has gained National and International recognition from the performances of its many outstanding athletic teams.

## Course Descriptions

### KIN 181-195 Competitive Athletics (2)

May be taken by those students who compete on an intercollegiate athletic team and may be repeated for additional credit as long as normal academic progress is maintained.

- 181 Intercollegiate Basketball (Women)
- 182 Intercollegiate Baseball
- 183 Intercollegiate Basketball (Men)
- 184 Intercollegiate Soccer (Women)
- 185 Intercollegiate Cross Country (Men)
- 186 Intercollegiate Soccer (Men)
- 190 Intercollegiate Tennis (Men)
- 191 Intercollegiate Track and Field (Men)
- 192 Intercollegiate Volleyball (Women)
- 193 Intercollegiate Cross Country (Women)
- 194 Intercollegiate Tennis (Women)
- 195 Intercollegiate Track and Field (Women)











## COLLEGE OF AGRICULTURE

Wayne R. Bidlack, Dean  
 John E. Trei, Associate Dean  
 Robert R. Stein, Director of Development  
 Rhonda L. Ostrowski, Recruitment Coordinator

The agri-food industry serves the State by generating food for the U.S. and the world. While less than two percent of California's population now lives and works on the farm, it produces food worth \$24.5 billion and \$60 billion in processing, packaging and distribution of the food supply. Opportunities are tremendous for careers in national and international agri-food programs, especially for individuals with dual language skills. Agriculture graduates can expect challenging opportunities in agriculturally-related occupations in business, industry, specialized services, education, conservation, and recreation, as well as production. Additionally, the College offers challenging programs that will prepare graduates for careers in nutrition/dietetics and the apparel industry. These expanding careers provide challenging opportunities for men and women over a broad spectrum of interests and abilities. Hundreds of careers, many relatively unknown a few years ago, are attracting men and women from both urban and rural communities.

Instruction in the College of Agriculture is offered in 10 majors and 16 options leading to the bachelor of science degree. There are five Master of Science options offered in Agricultural Science, Animal Science, and Nutrition and Food Science, Plant Science, and Sports Nutrition.

Animal production flocks and herds are maintained for undergraduate instruction and graduate research programs.

Facilities on or near the campus make possible practical laboratories for the various majors. The university farm consists of fertile soils typical of the Southern California area with enough variation in soil type and climate to give students broad experience. Over 700 acres of university-owned land are available for pastures, crops, groves, and ornamental plantings.

To assure each student of occupational competence, the university provides an opportunity to learn the fundamental skills involved in the care, maintenance, and operation of equipment and facilities. All departments offer employment for student assistants.

The College of Agriculture is involved in a wide variety of continuing education programs. They range from workshops in equine management to cultural food classes, from agricultural leadership conferences to food distribution seminars, pest management and citromomics. Industry and agricultural faculty work cooperatively together in planning and presenting conferences to satisfy the needs of the agribusiness industry. A unique conference presented for the past several years has been the Agricultural Business Management conference for Japanese supermarket operators on food distribution in the United States. Short courses are provided by the agricultural education faculty in the newly emerging technical areas. Faculty stand ready to assist industry, government and others in sponsoring programs to meet the needs of the community at large.

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

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

## DEPARTMENTS AND PROGRAMS

### AGRICULTURAL ENGINEERING & IRRIGATION SCIENCE

Eudell Vis, Chair  
 Apparel Merchandising and Management (BS)  
 Fashion Merchandising minor  
 Landscape Irrigation Science (BS)  
 Minor (and certificate) in Landscape Irrigation Design

### ANIMAL AND VETERINARY SCIENCES

Cedric Y. Matsushima, Interim Chair  
 Animal Science major (BS) options in  
   Pre-Veterinary Science/Graduate School  
   Animal Industries/Business Management  
   Equine Industry  
   Animal Health Science  
 Animal Science minor  
 Physiology minor

### FOOD MARKETING and AGRIBUSINESS MANAGEMENT/AGRICULTURAL EDUCATION

Edison I. Cabacungan, Chair  
 Agricultural Science major (BS)  
 Food Marketing and Agribusiness Management major (BS)  
 Minors in Agricultural Business Management, International Agriculture, and International Agricultural Business Management

### FOOD, NUTRITION AND CONSUMER SCIENCES

Anahid T. Crecelius, Chair  
 Foods and Nutrition major (BS) options in  
   Dietetics  
   Business  
   Food Science  
   Consumer Science  
 Foods and Nutrition minor  
 Dietetic Internship  
 Subject Matter Requirements for the Single Subject Teaching Credential in Home Economics

### HORTICULTURE/PLANT AND SOIL SCIENCE

Daniel Hostetler, Chair  
 Agricultural Biology major (BS)  
 Agricultural Biology and Pest Management minors  
 Agronomy major (BS) options in  
   Crop Production  
   Crop Science  
 Agronomy minor  
 Horticulture major (BS) options in  
   Fruit Industries  
   Ornamental Horticulture  
 Ornamental Horticulture minor  
 Soil Science major (BS)  
 Soil Science minor

### MASTER OF SCIENCE IN AGRICULTURE

Melinda J. Burrill, Graduate Program Coordinator

With options in: Agricultural Science, Animal Science, Nutrition and Food Science, Sports Nutrition, and Plant Science.

### Interdisciplinary General Education (IGE)

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

### Agriculture Educational Enhancement Services (AGREES)

AGREES is a college-based program designed to improve the retention and graduation rate of underrepresented students enrolled in the College of Agriculture. AGREES provides faculty and peer interaction as well as a variety of support services to assist students in their academic pursuits at Cal Poly Pomona.

### Apparel Technology and Research Center (ATRC)

The Apparel Technology and Research Center conducts research, outreach education, and demonstration activities for the apparel industry. The Center houses a model manufacturing plant featuring state-of-the-art equipment and advanced manufacturing systems. The ATRC is the only recipient on the West Coast of both a research and demonstration contract from the Department of Defense—Defense Logistics Agency. These contracts provide over \$13 million in funding to expand the capabilities of the ATRC to work with industry. Students in the Apparel Merchandising and Management degree, as well as various Engineering and Business programs, benefit from ATRC activities.

### Center for Antimicrobial Research (C.A.R.)

C.A.R. was established to maintain academic excellence in the rapidly changing areas of biotechnology related to food safety and public health. C.A.R. conducts basic and applied research on novel antimicrobial agents and explores the potential application of such systems in medicine, oral health, animal sciences, food safety, and water quality/public health. C.A.R. will provide research-training opportunities for students in corporate-related R&D applied projects integrated with a Masters Degree program.

### Student Enterprise Projects

Students in the College of Agriculture are provided an opportunity to learn the interrelated skills involved in the production of a crop or animal project by means of the Student Enterprise Project experience. This supervised work program allows the student to utilize College of Agriculture facilities and equipment, along with financing provided through the Kellogg Unit Foundation. All aspects of project design, initiation and completion are developed by the student in consultation with the supervising faculty member. In addition to valuable experiential learning, the student is able to share in the profits generated by the project. Interested students should see their department chair for further information.

### California Agricultural Leadership Program

Cal Poly Pomona, through the College of Agriculture, is one of four universities in the state which participate in the California Agricultural Leadership Program. Under the auspices of the Agricultural Education Foundation, the Program consists of a series of seminars and travel experiences designed to broaden the perspectives of selected mid-career agricultural professionals who have demonstrated leadership potential. Participants complete the program with a greater capacity to accept leadership responsibility in any part of society. For more information, contact the Dean of the College of Agriculture.

### W. K. Kellogg Arabian Horse Center

The Center continues the tradition of the Kellogg Ranch, which has been one of the world's outstanding Arabian horse breeding farms, perpetuating the Arabian and making valuable blood lines available to the public. The Arabians are utilized in the animal science courses related to the ever-expanding field of light horse production, research and training. Public performances are given on the first Sunday of the month, October through June, at 2 p.m. In July 1989, the University established an equine outreach program to serve the interest of all breeds and horse audiences. The primary objective of this program was to develop educational opportunities and programs that would address the needs and challenges of the horse industry.

Responsibilities of the equine educational program include providing educational programs to the horse public and addressing the specialized needs of the commercial equine industry. Programs are also developed to meet the needs of specialized clientele.

### Equine Research Center

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

### Reproductive Physiology Center

The mission of the Reproductive Physiology Center is to provide an undergraduate teaching and graduate student research laboratory for the investigation of physiological events responsible for reproduction in domestic farm animals. The primary emphasis of the Center is to utilize new biotechnology procedures to manipulate and preserve male and female gametes collected from ruminant and nonruminant animals. The Center is equipped to collect, analyze and freeze spermatozoa for improving the procedures associated with artificial insemination.

### Institute for Irrigation Research and Evaluation

The Institute provides teaching and research opportunities for students and faculty in the evaluation of irrigation equipment in cooperation with the irrigation industry. Special emphasis is placed upon the development of testing equipment, facilities and procedures that analyze plastic components of irrigation systems designed for urban and landscape use. Seminars such as irrigation water management and system designs are scheduled for the irrigation professional.

### The Natural Color Resource Center

The Natural Color Resource Center is unique in the world as a repository of all the available information on Natural Colors. It makes this data available to anyone working with or requiring the state of the art on any aspect of natural colors. The Center is responding to a world wide industry need to satisfy the current strong consumer trend for an "all natural ingredient" makeup of their foods, cosmetics and pharmaceuticals. Natural colors have been known from antiquity and the reported research is scattered through out the world. The Center collects and maintains a core data base in support of, and act as a catalyst for, research at the Center, as well as through out the world. The Center encourages students to select Natural Colors as a study area for advanced degree.

**Raymond Burr Orchid Collection**

The collection consists of over 50,000 specimens of orchids, primarily of the *Cattleya* alliance, housed in the Horticulture Department nursery facilities. Primarily used for teaching and research purposes in horticulture courses, the orchids are used for instruction in propagation, including plant breeding. The collection is also utilized by community groups interested in orchid culture, and for continuing education.

**Cooperative Education**

The College of Agriculture commenced a cooperative education program with industry, business and government during the fall quarter, 1978. This program is designed to provide alternating periods of full-time study and full-time work. It is expected that each student in the co-op education program will spend a total of four quarters over a three-year period gaining work experience. For these four quarters of experience the student will receive 16 units of academic credit.

The co-op education program will:

1. Provide the opportunity for the student to gain experience in agri-food, agribusiness, agricultural production and/or government. This experience should stimulate the student's interest in those areas of academic instruction that relate to the newly acquired experience.
2. Provide students with the opportunity to evaluate alternative careers.
3. Provide an opportunity for students to earn a salary which will enable them to attend school full-time during alternating quarters.
4. Provide an opportunity for prospective employers to get acquainted with co-op students.

More information may be obtained from the Office of the Dean of Agriculture and/or the University's Career Center.

The curriculum for cooperative education is listed in the following course descriptions.

**COURSE DESCRIPTIONS****AG 100 Orientation to the College of Agriculture (1)**

An orientation course to acquaint students with the academic opportunities within the College of Agriculture and in the individual majors. Strategies to assist students with the successful completion of their college career will be introduced. Resources available to students both on and off campus will be reviewed. Open to non-majors. 1 lecture. Graded only on a credit/no credit basis.

**AG 101 Agriculture and the Modern World (4)**

An introduction to the history of modern agriculture, its integration into social, economic and political institutions, the biological systems of which it is a part, the causes and impact of world hunger, and the implications of future changes and innovations in the production of food and fiber. The course will emphasize critical analysis of current agriculture and food issues. 4 lectures. Open to all majors. Required of all agriculture majors.

**AG 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**AG 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**AG 401 Ethical Issues in Agriculture (4)**

The examination of current issues related to majors in the College of Agriculture within a framework of ethical reasoning. Students will participate in investigation and discussion of selected topics and will be encouraged to explore a personal ethical stance as a professional. 4 lectures/problem-solving. Prerequisite: senior standing.

**AG 464 Development of Leadership Skills (3)**

The exploration of professional growth and leadership development in the context of food and agriculture careers. 2 seminar-discussions. Prerequisite: senior standing.

**AG 470, 471, 472, 473 Cooperative Education (2-4) (2-4) (2-4) (2-4)**

On-the-job experience for all majors in the College of Agriculture. Students alternate one or more quarters of full-time studies in their major with an equal number of quarters of relevant full-time work for pay. Prerequisite: consent of instructor and junior standing. (Courses must be taken in ascending sequence.)





## AGRICULTURAL BIOLOGY

Daniel Hostetler, Chair, Horticulture/Plant and Soil Science  
Lester C. Young, Coordinator, Agricultural Biology

Rex O. Baker  
Richard S. Kaas  
Gregory Partida

Agricultural Biology combines the areas of agriculture, technology, and biological sciences. Protection of food, plants, animals and man is emphasized through the management of the environment and its organisms. Agricultural biologists are involved in programs of protection that are environmentally compatible and socially responsible. These programs include the management of populations of insects, mites, nematodes, plant diseases, weeds, vertebrate pests and environmentally hazardous materials.

Professional careers with county, state and federal Departments of Agriculture, Public Health Services and allied governmental agencies protecting and promoting agriculture, consumer services and environmental protection are very challenging and rewarding. Positions in sales, advisory services, and consultants with numerous pest management and related commercial organizations, agricultural production enterprises, and international and domestic public health service organizations are available. Research, teaching and graduate studies are other interesting pursuits.

A new area of emphasis is Environmental Health Science. Health sanitarians play an important role in the administration and regulatory enforcement of environmental and public health laws. Some activities environmental health professionals are involved in include:

- Drinking water sanitation and enforcement
- Vector control and public health concerns
- Prevention of atmospheric pollution
- Sanitation in production of meat, milk, and foods
- Hazardous and toxic substance control
- Housing and institutional sanitation
- Solid and liquid waste management
- Review of legislation regarding environmental health

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

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

Opportunities are expanding and are abundant for graduates. There is an increased demand for qualified graduates because of growing public awareness of environmental, consumer and public health issues. Many governmental agencies are recruiting qualified individuals. In addition to the development of knowledge necessary for occupational proficiencies, this program emphasizes sources of information. This enables the graduate to increase professional competence and to cope with the constantly growing volume of new information. Thus graduates are prepared for immediate employment in a wide range of positions and are prepared to enhance their careers after graduation.

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

## PEST MANAGEMENT AND AGRICULTURAL BIOLOGY MINORS

The Pest Management minor combines key courses in order to prepare students for the many careers which partially encompass areas of pest control. This minor is ideally suited to those majoring in Food Marketing & Agribusiness, Agronomy, Animal Science, and Fruit Industries. The Agricultural Biology minor is especially suited to individuals majoring in Biology or many areas of agriculture, and to those interested in working in careers with the county, state or federal departments of agriculture dealing with consumer and environmental protection.

## ENVIRONMENTAL HEALTH SPECIALIST MINOR

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

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

## CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Orientation to the College of Agriculture. . . . .	AG	100	(1)
Agriculture and the Modern World . . . . .	AG	101	(4)
Ethical Issues in Agriculture . . . . .	AG	401	(4)
Introduction to Arthropods. . . . .	AGB	165/165L	(4)
Environmental Toxicology. . . . .	AGB	411	(4)
Senior Project . . . . .	AGB	461	(2)
Senior Project . . . . .	AGB	462	(2)
Undergraduate Seminar. . . . .	AGB	463	(2)
Weeds and Weed Control . . . . .	AGR	330/330L	(4)
Crop Ecology . . . . .	AGR	401	(4)
Plant Structures and Functions. . . . .	BOT	124/124L	(5)
Plant Pathology . . . . .	BOT	323/323L	(4)
Basic Soil Science. . . . .	SS	231/231L	(4)
Agricultural Insect Pests . . . . .	AGB	228/228L	(4)
Pesticide and Hazardous Material Laws . . . . .	AGB	301	(3)
Pesticide and Hazardous Material Laws . . . . .	AGB	301	(3)
Integrated Pest Management. . . . .	AGB	231	(3)
Vertebrate Pest Management . . . . .	AGB	323/323L	(4)
Produce Quality and Protection . . . . .	AGB	325/325L	(3)
Invertebrate Vector Control . . . . .	AGB	342/342L	(4)
Immature Insects. . . . .	AGB	455/455L	(3)

## SUPPORT COURSES

(Required of all students)

Internship. . . . .	AGB	441	(3)
Internship. . . . .	AGB	442	(3)
College Chemistry . . . . .	CHM	122	(3)
College Chemistry Laboratory . . . . .	CHM	122L	(1)
Statistics with Applications . . . . .	STA	120	(4)
Directed Electives. . . . .			(42)

Students majoring in Agricultural Biology must complete 42 units of directed electives (listed on the reverse side of the curriculum sheet) by selecting a career emphasis track in Agricultural Biology or

Environmental Health. Students are encouraged to work closely with their advisors when selecting these career tracks.

## GENERAL EDUCATION COURSES

### Area 1:

- A. Select one course ..... (4)
- B. Select one course ..... (4)
- C. Select one course ..... (4)

### Area 2:

- A. Select one course ..... (4)
- B. College Chemistry ..... CHM 121 (3)
- College Chemistry Laboratory ..... CHM 121L (1)
- C. Basic Biology ..... BIO 115/115L (5)
- D. Select one course ..... (4)

### Area 3:

- A. Select one course ..... (4)
- B. Select one course ..... (4)
- C. Select one course ..... (4)
- D. Select one course ..... (4)
- E. Select one course ..... (4)
- F. Select one course ..... (4)
- G. Select one course ..... (4)

### Area 4:

- United States History ..... HST 202 (4)
- Introduction to American Government ..... PLS 201 (4)

### Area 5:

- Agribusiness Enterprise Management ..... FMA 328 (4)
- Accounting for Agribusiness ..... FMA 324 (4)

## PEST MANAGEMENT MINOR - 26 units required

- Introduction to Arthropods ..... AGB 165/165L (4)
- Agricultural Insect Pests ..... AGB 228/228L (4)
- Integrated Pest Management ..... AGB 231 (3)
- Pesticide and Hazmat Laws ..... AGB 301 (3)

Select three courses from the following list:

- Vertebrate Pest Management ..... AGB 323/323L (4)
- Invertebrate Vector Control ..... AGB 342/342L (4)
- Biological Control ..... AGB 403/403L (4)
- Weeds and Weed Control ..... AGR 330/330L (4)

## AGRICULTURAL BIOLOGY MINOR - 25 units required

- Plant Identification ..... AGB 224/224L (4)
- Integrated Pest Management ..... AGB 231 (3)
- Pesticide and Hazardous Material Laws ..... AGB 301 (3)
- Exclusion/Detection of Pests ..... AGB 322/322L (4)
- Vertebrate Pest Management ..... AGB 323/323L (4)
- Produce Quality and Protection ..... AGB 325/325L (3)

Select one course from the following list:

- Agricultural Insect Pests ..... AGB 228/228L (4)
- Weeds and Weed Control ..... AGR 330/330L (4)
- Crop Diseases ..... AGR 421/421L (4)
- Fruit and Vegetable Standards ..... AGB 426/426L (4)

## COURSE DESCRIPTIONS

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

### AGB 165/165L Introduction to Arthropods (3/1)

Arthropods and certain relatives affecting food, plants, animals, humans and their buildings. Emphasizing insects, mites, ticks, spiders, snails, and slugs; their morphological and phylogenetic relationships; habits and habitats; important characteristics affecting the well-being of human beings. 3 lectures, 1 three-hour laboratory. Corequisite: AGB 165/165L.

### AGB 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### AGB 224/224L Plant Identification (3/1)

Identification of ornamental, orchard, and crop plants by contrast of odors, leaf shapes, and arrangements; fruit and flower types, growth habits; coloration of plant parts, and environmental variations. Consideration of scientific, common, and family name; general propagation and most serious pests. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 124/124L. Corequisites: AGB 224/224L.

### AGB 228/228L Agricultural Insect Pests (3/1)

Recognition and distribution of important insects and mites attacking agricultural crops such as the major field, cereal, and truck crops, and citrus, avocados, deciduous fruit, small fruit, berries, grapes and nut trees. Host preference and identification of damage to plant parts. Seasonal history, habits and problems relating to pest management programs. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165/165L or equivalent. Corequisites: AGB 228/228L.

### AGB 231 Integrated Pest Management (3)

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

### AGB 299/299L/299A Special Topics for Lower Division Students (1-4)/(1-4)/(1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor. Corequisites: AGB 299/299L/299A individually or in combination.

### AGB 300 Insects and Civilization (4)

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

### AGB 301 Pesticide and Hazardous Material Laws (3)

Federal and California laws and regulations affecting individuals, corporations, and agencies providing for the public health, safety and welfare; and protecting the environment including our natural resources. Emphasis on hazardous materials, ground water protection, pesticides, and pest control laws and regulations. Pesticide safety included. Function and structure of pertinent federal, state and county agencies and their enforcement practices as they relate to agribusiness, public health and pest control operations, including case studies. 3 one-hour lectures.

**AGB 321 Urban Wildlife Pests and Civilization (3)**

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

**AGB 322/322L Regulatory Exclusion and Detection of Pests (3/1)**

Programs of regulatory exclusion and detection of injurious pests including: survey, detection, eradication and quarantine. Purpose and application of United States and California plant quarantine laws and regulations, including biological, economic, and administrative aspects. Identification, habits, seasonal history and hosts of potential pests and diseases. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165/165L. Corequisites: AGB 322/322L.

**AGB 323/323L Vertebrate Pest Management (3/1)**

Diagnosis, analysis and management of vertebrate pest damage in plant and animal production settings. Identification, biology, and ecology of vertebrate pests (small animals and birds to large predators). Evaluation of damage, control measures, non-target wildlife hazards and computer

modeling. Program development and laws and regulations. 3 lectures, 1 three-hour laboratory. Corequisites: AGB 323/323L.

**AGB 325/325L Produce Quality and Protection (2/1)**

The marketing of quality fruits and vegetables from growers to consumers. Identification, cause and analysis of defect factors resulting from insects, mites, nematodes, birds, mammals, plant diseases and nonparasitic disorders on marketing of fruits and vegetables. Written analytical reports required. 2 lectures, 1 three-hour laboratory. Prerequisite: BOT 323/323L. Corequisites: AGB 325/325L.

**AGB 336/336L Bee Science (2/1)**

Care, management, and manipulation of bees. Practical application of principles for effective establishment and maintenance of apiaries. Pollination and value of bees to agriculture. Recognition and control of bee diseases. Laws and regulations pertaining to beekeeping. 2 lectures, 1 three-hour laboratory. Corequisites: AGB 336/336L.

**AGB 342/342L Invertebrate Vector Control (3/1)**

Major invertebrate pests attacking structures, wood, and stored products; recognition of stages and damage; life histories and means of control; related laws and regulations. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165 or equivalent. Corequisites: AGB 342/342L.





**AGB 377/377L Insect Population Ecology (2/1)**

The study of pest populations in crop ecosystems in relation to chemical, biological, cultural, physical, and integrated control practices. Relationships among host, pest population, related biotic agents, soil, climate and management practices. 2 lectures, 1 three-hour laboratory. Corequisites: AGB 377/377L.

**AGB 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**AGB 401/401L Field Entomology (2/2)**

Collection, classification and study of insects and other arthropods from ecological zones, animals, crop plants, or other habitat situations. 2 lectures, 2 three-hour laboratories. Prerequisite: AGB 165 or a course in general entomology and consent of instructor. Corequisites: AGB 401/401L.

**AGB 403/403L Biological Control (3/1)**

Natural and induced control of insect, mite, and weed pests using agents other than toxicants; collection, production and liberation of control agents; habits and identification of major groups of parasites and predators; recent developments in pest inhibition. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165/165L and advanced standing and consent of instructor. Corequisites: AGB 403/403L.

**AGB 411 Environmental Toxicology (4)**

Survey and analyses of the effects of civilization on the environment. Emphasis will be placed on the effects of agriculture and other forms of commerce on food, water, air and soil. 4 lecture discussions. Prerequisite: senior standing or consent of instructor.

**AGB 413 Inspection Procedure (2)**

Practical application of inspection techniques in the fields of vertebrate, insect, disease and weed pest management; pesticide use enforcement; nursery and seed regulation; plant quarantine and pest detection; and fruit and egg quality control. Development of: public relations programs, legal cases (collection, preparation and presentation of evidence); and program analysis. 2 lectures. Prerequisite: Senior standing and consent of instructor.

**AGB 424/424L Pest Control Methodology (2/1)**

Summation of entomology courses through field observation and analysis of pest levels leading to written recommendations for control. Weekly field trips to agricultural areas required with written reports on trips. 2 lectures, 1 three-hour laboratory. Prerequisite: AGB 165/165L and AGB 228, AGB 231, senior standing and consent of instructor. Corequisites: AGB 424/424L.

**AGB 426/426L Fruit and Vegetable Standards (3/1)**

Analysis and interpretation of quality provisions of the Agricultural Code relating to fruits, nuts, vegetables, eggs and honey. Analysis of minimum standards for marketing, including maturity, containers, marketing and size requirements. Written reports required. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 325/325L. Corequisites: AGB 426/426L.

**AGB 441, 442 Internship in Agricultural Biology (1-3) (1-3)**

On the job experience with public and private agencies for advanced students. Professional type experience new to the student so that a valuable contribution toward career development results. Written and oral reports necessary. Approval before enrolling required. Each course can be repeated for a total of 12 units.

**AGB 455/455L Immature Insects (1/2)**

The identification of immature arthropods through analysis and interpretation of dichotomous keys. Emphasis on those orders of insects with complete metamorphosis. 1 lecture/analysis, 2 three-hour laboratories. Prerequisite: AGB 165/165L and consent of instructor. Corequisites: AGB 455/455L.

**AGB 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

**AGB 463 Undergraduate Seminar (2)**

Critical reviews of contemporary research in the field of Agricultural Biology. The student will analyze, critique and advocate by inductive and deductive methods, that inferences in contemporary literature are based on fact or a logical, unambiguous extension of fact. Oral reports of literature and senior projects are required.

**AGB 470/470L Plant Growth Regulators (2/1)**

The natural and synthetic substances used to control the growth of economic plants and their products. Emphasizes chemical characteristics, physiological plant responses, uses, and modes of application. Related laws and regulations. 2 lectures, 1 three-hour laboratory. Prerequisite: BOT 124/124L. Corequisites: AGB 470/470L.

**AGB 499/499L/499A Special Topics for Upper Division Students (1-4)/(1-4)/(1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, activity, or a combination. Corequisites: AGB 499/499L/499A individually or in combination.

## AGRICULTURAL EDUCATION

Flint Freeman, Coordinator, Agricultural Education

Robert J. Tullock, Graduate Coordinator, M.S. in Agriculture, Agricultural Science Option

The primary function of the agricultural education program is the preparation of teachers of agricultural education for the public secondary schools of California. Specialized preprofessional and professional courses are offered for undergraduate and graduate (fifth year) students. Technological, scientific, and broad general education course work for agriculture teaching candidates is offered throughout the College of Agriculture and other Colleges including the School of Education and Integrative Studies.

Students with an interest in becoming agriculture teachers are advised to enroll in the agricultural science major and obtain a B.S. degree, or they may complete a B.S. degree in one of the other approved majors in the College of Agriculture. Agricultural science majors and all students who wish teacher certification are required to show competency in four areas of agriculture. This can be accomplished by completing the subject matter program in agriculture or receiving a passing score on the SSAT in Agriculture.

In addition to coursework in four areas of agriculture, students who plan to teach agriculture must have two years of practical experience in agriculture and must complete an Agricultural Specialist credential. The Agricultural Specialist credential requires a minimum of 45 additional units beyond the B.S. degree. Some of the graduate work may be applied towards a Master of Science in Agriculture, Agricultural Science option.

Enrollment in a Single Subjects credential program is required in order to qualify for student teaching. Candidates for the Single Subjects teaching credential who are not agricultural science majors are advised to wisely use the electives available in their major in order to complete required teaching credential courses which are not normally specified in their undergraduate major. Because of the wide range of variables involved, all candidates for teaching certification are urged to consult the Agricultural Education Program as early as possible in their college careers.

For students wishing to obtain a Master of Science in Agriculture, such a degree has been approved with an option in agricultural science.

### CORE COURSES FOR MAJOR

Required of all students. A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major. Students interested in teaching should see the Teacher Preparation section for additional secondary education requirements.

Orientation to the College of Agriculture. . . . .	AG	100	(1)
Agriculture and the Modern World . . . . .	AG	101/101A	(4)
Ethical Issues in Agriculture . . . . .	AG	401	(4)
Development of Leadership Skills. . . . .	AG	464	(3)
Development of Competitive Activities . . . . .	AGS	250	(2)
Introduction to Agricultural Education Programs	AGS	300	(3)
Agriculture Skills and Facilities . . . . .	AGS	420/420A	(3)
Field Experiences in Agriculture Education. . . . .	AGS	441	(4)
Senior Project . . . . .	AGS	461	(2)
Senior Project . . . . .	AGS	462	(2)
Accounting for Agribusiness . . . . .	FMA	324	(4)
Agribusiness Enterprise Management. . . . .	FMA	328	(4)
Introduction to Animal Nutrition. . . . .	AVS	100	(3)
Feeds and Feeding. . . . .	AVS	101/101L	(2)
Animal Agriculture Science . . . . .	AVS	111	(4)
Introduction to Livestock Evaluation. . . . .	AVS	241/241L	(2)

Agronomic Practices . . . . .	AGR	120/120L	(4)
Horticulture Principles and Practices . . . . .	HOR	131/131L	(4)
Basic Soil Science. . . . .	SS	231/231L	(4)
Select 11 units from LIS, AE . . . . .			(11)

Select 3 Animal Management Science courses. Must include 1 ruminant and 1 nonruminant course. (12 units)

Swine Management Science. . . . .	AVS	122/122L	(4)
Sheep Management Science. . . . .	AVS	123/123L	(4)
Equine Management Science. . . . .	AVS	125/125L	(4)
Poultry Management Science. . . . .	AVS	126/126L	(4)
Companion Animal Care. . . . .	AVS	128	(4)
Beef Management Science . . . . .	AVS	131/131L	(4)

Select 3 courses from among the following (10-12 units):

Pesticides and Hazardous Materials Laws. . . . .	AGB	301	(3)
Weeds and Weed Control . . . . .	AGR	330/330L	(3)
Crop Ecology . . . . .	AGR	401	(4)
Environmentally Sustainable Agriculture . . . . .	AGR	437/437L	(4)
Greenhouse Management . . . . .	HOR	323/323L	(4)
Landscape Management . . . . .	HOR	443/443L	(4)

Select 2 courses from among the following (7-8 units):

Introduction to Arthropods. . . . .	AGB	165/165L	(4)
Vegetable Crop Systems . . . . .	AGR	226/226L	(4)
Pomology. . . . .	FI	203/203L	(4)
Plant Propagation. . . . .	HOR	132/132L	(3)

### SUPPORT AND ELECTIVE COURSES

(Required of all students)

Secondary School Health Education. . . . .	KIN	442	(3)
Fundamentals of Physics . . . . .	PHY	102	(4)
Unrestricted Electives. . . . .			(15-18)

### GENERAL EDUCATION COURSES

(Required of all students)

Global Resources for Food. . . . .	IA	101	(4)
Introduction to American Government . . . . .	PLS	201	(4)
United States History. . . . .	HST	202	(4)
Culture, People, and Dress . . . . .	AMM	108	(4)
Basic Biology . . . . .	BIO	115/115L	(5)
Plants and Civilization . . . . .	AGR	311	(4)
College Chemistry . . . . .	CHM	121	(3)
College Chemistry . . . . .	CHM	121L	(1)
Freshman English I. . . . .	ENG	104	(4)
Ethics. . . . .	PHL	204	(4)
College Algebra. . . . .	MAT	105	(4)
Logics and Semantics. . . . .	PHL	202	(4)
General Psychology . . . . .	PSY	201	(4)
Cognitive Processes . . . . .	PSY	334	(4)
Stress Management. . . . .	KIN	370	(1)
United States History. . . . .	HST	201	(4)
Public Speaking. . . . .	COM	100	(4)
Elementary Spanish. . . . .	FL	151	(4)
History of Garden Art. . . . .	HOR	214	(4)

### SINGLE SUBJECTS TEACHING CREDENTIAL

Students wishing teacher certification in agriculture are required to show competency in four areas of agriculture. This can be accomplished



by receiving a passing score on the Single Subject Assessment Test in Agriculture or completing the Subject Matter Program in Agriculture. Interested individuals should contact the Agricultural Education Program Coordinator for additional information.

**Subject Matter Program**

Those qualifying for a credential through course work rather than the SSAT must complete the following:

- 18 units in Animal and/or Veterinary Science
  - 18 units in Agricultural Mechanics, Agricultural Engineering, or Landscape Irrigation.
  - 8 units in Agricultural Business Management and/or Farm Management/ Agricultural Economics
  - 26 units in a combination of courses in Agronomy, Plant Science, Soils, and Ornamental Horticulture, and Agricultural Biology.
- Students who are Agricultural Science majors automatically meet this requirement as a part of their degree requirements.

Others should consult with the Agricultural Education Coordinator. In addition to a B.S. in Agriculture, students preparing to student teach must complete requirements for the single subjects credential. The courses to be taken are required of all teaching credential candidates regardless of subject matter area.

A minimum of 45 graduate credit units are required for the Single Subject credential. A complete listing of these courses may be obtained from the Teacher Education Department.

**AGRICULTURAL SPECIALIST CREDENTIAL**

In addition to a B.S. in Agriculture, students preparing to teach agriculture must complete the requirements for the single subjects credential and the requirements for the Agricultural Specialist credential. The courses include:

Early Field Experience in AGS. Ed. . . . .	AGS	441	(4)
Introduction to Agricultural Education			
Programs . . . . .	AGS	300	(3)
Special Problems. . . . .	AGS	400	(2)



Agriculture Skills and Facilities . . . . .	AGS	420/420A	(3)
Program Planning and Development. . . . .	AGS	430	(3)
Youth and Adult Leadership Programs . . . . .	AGS	505/505A	(3)
Teaching Methods in Agriculture . . . . .	AGS	440	(4)

Students are also required to have a concentration of 27 units, including 9 upper division, in one area of agriculture. This is generally completed as an undergraduate. A minimum of two years of verified work experience in agriculture is also required. A total of 45 graduate credit units are required for the Agricultural Specialist credential.

+Students may complete the requirements for both the Single Subject and the Agricultural Specialist credentials concurrently. A limited number of courses may be taken at the undergraduate level. Students should consult with the Agricultural Education program coordinator prior to enrolling in any courses to be used for credentialing purposes.

### Courses in Related Agriculture

#### AGS 250 Development of Competitive Agricultural Activities (2)

The philosophy and development of competitive activities for students of agriculture. Selection of contest officials, development of contest patterns, scoring of placing cards, and publications of results. Use of the California Curricular Code. Practical application of this class will occur with the operation of Agriculture Field Day. 2 lectures.

#### AGS 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor.

#### AGS 300 Introduction to Agricultural Education Programs (3)

Overview of agriculture programs including goals and purposes. Qualifications essential to success in agricultural education. Programs of studies to meet requirements for instruction in agriculture. 3 lecture discussions.

#### AGS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### AGS 420/420A Agriculture Skills and Facilities (2/1)

Development, operation, and management of agriculture facilities. Skills necessary for classroom, laboratory, and school farm instruction in agricultural education will be demonstrated. Emphasis will be on facility management and individual skills development and assessments. 2 lectures, 1 activity. Concurrent enrollment required.

#### AGS 430 Program Planning and Development (3)

Study of career opportunities in agriculture. Program development in such areas as the Future Farmers of America, and other youth groups. Supervised practice including cooperative work experience in agriculture. Development of up-to-date approaches in an integrated program. Operating policies and procedures. 3 lectures/problem-solving.

#### AGS 440/440A Procedures in Agricultural Education (2/2)

Approaches to the learning process and development of daily and unit plans as well as the utilization of resources. Class demonstration in teaching procedures with emphasis being given to J.I.T., micro-teaching, and the development of pedagogical skills including development analysis and evaluation. 2 lectures, 2 activity periods. Concurrent enrollment required.

#### AGS 441 Field Experiences in Agricultural Education (4)

An overview of Agricultural Education in the public schools. Professional type experience new to the student so that a valuable contribution toward career development results. Supervised, focused observation/participation at the secondary school level. Written reports necessary.

#### AGS 450/450A Field Practices and Supervision (1/2)

Organization and implementation of an instructional program in agricultural education. Field application of Future Farmers of America, supervised practice, and classroom instruction. 1 lecture, 2 activity. Concurrent enrollment required.

#### AGS 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.

#### AGS 499/499A/499L Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination of both. Graduate courses are listed in the graduate section of this catalog. Prerequisite: permission of instructor.

## AGRICULTURAL ENGINEERING

This major is being phased out. Admissions to this program are closed. The following curriculum is in effect to accommodate current students. For the other program in the Agricultural Engineering/Irrigation Science Department, see Landscape Irrigation Science.

Eudell Vis, Chair  
Joe Y. T. Hung  
Ramesh Kumar

Agricultural Engineering is an expanding field of engineering that applies the knowledge and skills of science, physics, chemistry and mathematics to enhance the quality and quantity of food, natural resources, alternate fuels, and other agricultural products. Agricultural engineers are called upon to utilize engineering principles in such areas as food engineering, soil and water, electric power and processing, power and machinery, and agricultural structures and environment.

Cal Poly Pomona offers a strong emphasis in irrigation, both in agricultural and landscape irrigation design. This Department is at the forefront in the application of drip and trickle irrigation as a method of conservation of water resources. Irrigation, drainage, flood and erosion control, and water supply require study of soils, movement of water through the soil, and design criteria for canals, ditches and small dams.

The rapid expansion in the marketing of convenience foods can lead to opportunities for the student to apply engineering principles to food process design. Students with an interest in the power and machinery area learn power testing procedures for tractors, design of hydraulic systems, the effects of noise and vibration on equipment operators, and characteristics of food products that impact machine design. The trend to large dairy, beef, swine and poultry enterprises has necessitated the automation of feed handling and knowledge of electric power and electronic controls is necessary to engineer these complex systems.

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

Students are urged to consider the Integrated General Education (IGE) program as a valuable means of satisfying the General Education requirements of the degree. Graduates of the program are prepared to do production work in their first jobs as well as to grow with their profession throughout their engineering careers. The curriculum is designed to prepare a student for direct entry into the engineering profession and for graduate school.

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

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Orientation to the College of Agriculture. . . . .	AG	100	(1)
Agriculture and the Modern World . . . . .	AG	101	(4)
Engineering Digital Computations. . . . .	ME	132/142L	(3)
Engineering Analysis of Agricultural Machines. . . . .	AE	210/210L	(3)
Processing Equipment and Procedures for:			
Agricultural Products . . . . .	AE	234	(3)
Strength of Biological Materials . . . . .	AE	330	(3)
Food Process Engineering . . . . .	AE	332/332L	(4)
Instruments and Controls . . . . .	AE	350/350L	(3)
Human Engineering. . . . .	AE	410	(2)
Hydraulic Systems. . . . .	AE	411	(3)
Farm Power and Machinery Design . . . . .	AE	415	(4)
Agricultural Environments and Structures . . . . .	AE	420/420L	(3)
Irrigation Engineering . . . . .	AE	440/440L	(4)
Erosion Control and Drainage Engineering . . . . .	AE	441/441L	(4)
Senior Project . . . . .	AE	461	(2)
Agricultural Engineering Design . . . . .	AE	464	(4)
Applied Electrical Engineering . . . . .	ECE	232	(4)
Strength of Materials. . . . .	ME	218	(3)
Strength of Materials. . . . .	ME	219	(3)
Strength of Materials Laboratory . . . . .	ME	220L	(1)
Thermodynamics. . . . .	ME	301	(4)
Fluid Mechanics . . . . .	ME	311	(3)

### SUPPORT AND ELECTIVE COURSES

(Required of all students)

General Surveying. . . . .	AE	232	(3)
Analytical Geometry and Calculus II . . . . .	MAT	115	(4)
Analytic Geometry and Calculus . . . . .	MAT	116	(4)
Calculus of Several Variables . . . . .	MAT	214	(3)
Calculus of Several Variables . . . . .	MAT	215	(3)
Differential Equations . . . . .	MAT	216	(4)
Vector Statics. . . . .	ME	214	(3)
Vector Dynamics. . . . .	ME	215	(4)
General Physics . . . . .	PHY	133	(3)
General Physics Laboratory . . . . .	PHY	153L	(1)
Basic Soil Science. . . . .	SS	231/231L	(4)
General Physics . . . . .	PHY	131	(3)
General Physics . . . . .	PHY	132	(3)
General Physics Laboratory . . . . .	PHY	152L	(1)
General Chemistry . . . . .	CHM	112	(3)
General Chemistry Laboratory . . . . .	CHM	152L	(1)
Agricultural Science Elective (restricted)			
See advisor). . . . .			(3)
Engineering Design Elective (restricted). . . . .			(8)
Engineering Science Elective (restricted) . . . . .			(8)

### GENERAL EDUCATION COURSES

#### Area 1:

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

#### Area 2:

Analytic Geometry and Calculus . . . . .	MAT	114	(4)
General Physics Laboratory . . . . .	PHY	151L	(1)
Life Science . . . . .	BIO	110	(3)
General Chemistry . . . . .	CHM	111	(3)
General Chemistry Laboratory . . . . .	CHM	151L	(1)
Engineering Numerical Computations . . . . .	ME	330	(4)

**Area 3:**

A. Elective		(4)
B. Elective		(4)
C. Elective		(4)
D. Principles of Economics	EC 201	(4)
or Principles of Economics	EC 202	
E. Elective	SOC/PLS390	(4)
F. Elective	SOC/PLS390	(4)
G. Elective		(4)

**Area 4:**

Introduction to American Government	PLS 201	(4)
United States History	HST 202	(4)

**Area 5:**

Ethics and Engineering Decision-Making	EGR 402	(4)
Capital Allocation Theory	EGR 403	(4)

**LANDSCAPE IRRIGATION DESIGN MINOR**

Principles of Irrigation	LIS 212	(4)
Landscape Hydraulics	LIS 221	(4)
Landscape Sprinkler Irrigation	LIS 231/231L	(4)
Computer Aided Drafting	LIS 241/241L	(4)
Micro Irrigation	LIS 340/340L	(3)
Landscape Drainage	LIS 341	(4)
Automatic Irrigation System Controls	LIS 365/365L	(4)
Landscape Irrigation Trouble Shoot	LIS 452/452L	(3)
Total Units		30

**COURSE DESCRIPTIONS**

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

**AE 124/124L Landscape Construction (2/1)**

Theory and application of hardscape materials used in the landscaping trade. Techniques and safety using common tools in the construction of decks, enclosed wooden structures, and concrete surfaces. Uses of lighting, masonry, irrigation, plumbing equipment, and plastics. 2 lectures/problem-solving and 1 three-hour laboratory. This is a service course for students in majors other than agricultural engineering. Concurrent enrollment required.

**AE 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**AE 210/210L Engineering Analysis of Agricultural Machines (2/1)**

A functional analysis of soil working tools, planting equipment, pest control equipment, and harvesting equipment. Study of tractor and mechanical power as used in agricultural operations. 2 lectures/problem-solving, 1 three-hour laboratory. Concurrent enrollment required.

**AE 231/231L Materials and Creative Construction (1/1)**

Creative use of construction, flower and plant materials to develop an art form to match the chosen theme of a floral festival. Use of various tools and equipment to achieve the desired aesthetic and functional perceptions. 1 lecture presentation, 1-three-hour laboratory. Can be repeated for a maximum of 4 units of letter grade and additional 2 units of credit/no credit. This is a service course for students in majors other than agricultural engineering. Concurrent enrollment required.

**AE 232/232L General Surveying (2/1)**

Measurement of distances, elevations, angles, and directions. Contours, maps, plane table mapping, earth yardage for land forming, cuts and fills, road curves, and aerial photogrammetry. Care of surveying equipment, note taking and calculations. 2 lectures/problem-solving; and 1 three-hour laboratory. Prerequisite: MAT 106. This is a service course for students in majors other than agricultural engineering. Concurrent enrollment required.

**AE 234 Processing Equipment and Procedures for Agricultural Products (3)**

Introduction to pumps, fans, sizing, sorting and materials handling equipment; the application of psychrometrics to drying systems for agricultural products. 3 lectures/problem-solving. Prerequisites: AE 101 and PHY 132.

**AE 240/240L Irrigation (3/1)**

Principles and practices of irrigation. Irrigation design engineering. Pumps, wells, water conveyance and measurement. Surface, sub-surface, drip and sprinkler irrigation. Science of plant-soil-water relationships. Water requirements of crops. Leaching and drainage problems. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisite: AE 131/131L, SS 231/231L, MAT 105 or 106 or equivalent. This is a service course for students in majors other than agricultural engineering. Concurrent enrollment required.

**AE 299 Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**AE 301/301L Facilities Maintenance Technology (3/1)**

Application of basic science to the operation and maintenance of electrical and mechanical equipment; refrigeration, heating, cooking, dish-washing, cleaning, etc. Energy use and cost are included. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MAT 105 or equivalent. This is a service course for students in majors other than agricultural engineering. Concurrent enrollment required.

**AE 330 Strength of Biological Materials (3)**

Resistance to mashing and resulting damage to such products as fruits, vegetables, grain, and eggs. Absorption of loads applied to these biological materials and how the loads are transmitted to container walls and floors. 3 lectures/problem-solving. Prerequisite: ME 219, and MAT 216.

**AE 332/332L Food Process Engineering (3/1)**

Application of fluid mechanics, heat transfer, and thermodynamics to the processing of food. Drying, evaporation, dehydration, and freezing for the preservation of foods. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: AE 234, ME 301, ME 311, or consent of instructor. Concurrent enrollment required.

**AE 350/350L Instruments and Controls (2/1)**

Fundamentals of instruments and their operation characteristics with respect to damping, range, and accuracy. Electric, electronic, and fluidic controls for sensing and controlling devices. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: MAT 216, PHY 133. Concurrent enrollment required.



**AE 381/381L Apparel Production I (3/1)**

Introduction to apparel manufacturing from cut order planning through general warehousing and distribution. Emphasis on understanding the relationship of each manufacturing process for apparel production, manufacturing line design, work measurement techniques, and the role of quality control. 3 lectures/problem-solving, 3 hours laboratory. Prerequisite: IME 239.

**AE 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**AE 410 Human Engineering (2)**

Human factors in the design of agricultural equipment and facilities. Effect of noise, vibrations, temperature, humidity, etc. on human performance and ability to operate equipment. Design of locations of controls and sensing equipment with respect to body dimensions. 2 lectures/problem-solving. Prerequisite: junior, senior standing, or consent of instructor.

**AE 411 Hydraulic Systems (3)**

Hydraulic system components used in agricultural machines and facilities. Design of hydraulic systems for powering, sensing and controlling machine functions. 3 lectures/problem-solving. Prerequisite: MAT 216.

**AE 415 Farm Power and Machinery Design (4)**

Design of agricultural machinery and components such as agricultural v-belts, chains, couplings, drawbar, axle and shaft. Horsepower requirements of agricultural equipment and engine selection and testing. 4 lecture/problems. Prerequisites: AE 210/210L, ME 215, ME 219.

**AE 420/420L Agricultural Environments and Structures (2/1)**

Design of building walls, floor, and members to withstand forces of wind, snow, and product storage. Optimum building environments are designed for animals, greenhouse plants, and fruit and vegetable storage. 2 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: AE 332/332L, ME 219. Concurrent enrollment required.

**AE 440/440L Irrigation Engineering (3/1)**

Operating characteristics of different systems of irrigation; sprinkler, drip, flooding, etc. Calculation of water requirements for crops and soils. Engineering design of water application rates, soil absorption rates and automatic equipment. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ME 311. Concurrent enrollment required.

**AE 441/441L Erosion Control and Drainage Engineering (3/1)**

Analysis of hydrological events which impact on land drainage problems, erosion and floods. Engineering design for reducing erosion due to water, wind and other artificial and natural causes. Engineering design for reducing excessive water in the soil to improve crop production. Flood routing analysis and design of erosion control and drainage structures. 3 lecture/problems, 1 three-hour laboratory. Prerequisite: ME 311. Concurrent enrollment required.

**AE 461 Senior Project (2)**

Students will select an engineering problem in their area of interest. Project will be completed under appropriate faculty supervision and will culminate in a written engineering report.

**AE 464 Agricultural Engineering Design (4)**

Design of structures, machines, and processes common in agriculture, water, and food-related fields. Design procedures based on theory and accepted engineering practices for specific problems. Students will be expected to go through the entire design procedure for a given problem. 4 lectures/problem-solving. Prerequisite: senior standing.

**AE 481/481L Apparel Production II (3/1)**

Computer simulation of manufacturing systems to analyze quick response modular manufacturing systems, bundle systems, and UPS. Definitions, principles of simulation, and applications in apparel industry. Instrumentation and tools to evaluate ergonomic factors are studied. Software for utilization in total quality management programs are introduced. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: AE 381.

**AE 491 Internship in Agricultural Engineering or Apparel Merchandising (1-4)**

Professional level work experience with public agencies or private companies for advanced students. Work experiences are valuable for development of career goals and for application of academic training. Written reports are required. Course may be repeated for a maximum of 12 units.

**AE 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, activity, laboratory, or a combination. Prerequisite: permission of instructor.

## AGRONOMY

Daniel Hostetler, Chair, Horticulture/Plant and Soil Science

Gerald L. Croissant, Coordinator, Agronomy

Daniel G. Hostetler

Diana Jerkins

Victor Wegrzyn

Agronomy is the study of the science and technology of crop production for food, forage and fiber. This discipline feeds and clothes a growing world population. Graduates in the Agronomy major can look forward to a wide range of rewarding career opportunities, both domestically and internationally. Students receive excellent training in fundamental principles as well as the more technical and scientific areas. Agronomy students have the freedom to pursue individual interest areas via a 48 unit directed elective package from which they choose their courses from approved department lists.

The Agronomy major is divided into two options: Crop Production and Crop Science.

The Crop Science option is an exciting area, combining agronomy with biotechnology and advanced sciences. Studies in these areas prepare students for entrance into graduate plant science programs throughout the country. Recent graduates from this option are actively employed in careers in plant breeding and genetic engineering, plant pathology, nematology, environmental crop physiology, conservation, and ecology. The Department has excellent rapport with the University of California, Davis where a number of our students pursue graduate studies. Agricultural biotechnology companies actively seek graduates in this option because of their advanced science training combined with sound fundamental agronomic training.

The Crop Production option is designed to give students a practical, yet scientific, background in the production of crops. Courses emphasize current practices employed by commercial agriculture in California and other major agricultural areas. Students in the Crop Production option choose from career tracks in production or a new area in sustainable agriculture. The 48 unit directed elective area contains courses in environmental protection, ecology, toxicology and conservation. This emphasis area is tied closely to programs at the Regenerative Studies Center where students work and live in a sustainable community growing their own food.

Agronomy students at Cal Poly Pomona have the unique opportunity to obtain actual experience with crop plants. The University farm regularly hires students and interns to assist in the maintenance of over 800 acres of vegetable, field, forage, and cereal crops as well as native range and irrigated pastures. Enterprising students are allowed to conduct individual or group crop projects, many involving several acres of land. These projects provide valuable training in all phases of crop and farm management and at the same time, allow students to share in the profits.

Employment possibilities are numerous and varied. In addition to commercial crop production, students are prepared to work as consultants to growers, the seed industry, crop processing and marketing, the agricultural chemical industry, as well as numerous other careers. Excellent opportunities also exist at the county, state and federal levels with agricultural commissioners, California Department of Food and Agriculture, and the United States Department of Agriculture.

### Agronomy Minor

The Agronomy minor is designed for students majoring in another discipline that has close ties to plant growth, production and nutrition. It is a valuable addition for those majoring in Botany, Horticulture, Soil Science, Food Marketing & Agribusiness, Animal

and Veterinary Science, Agricultural Biology, Agricultural Science, Nutrition and Consumer Sciences, Agricultural Engineering and Landscape Irrigation Science.

### CORE COURSES FOR MAJOR

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

Orientation to the College of Agriculture. . . . .	AG	100	(1)
Agriculture and the Modern World . . . . .	AG	101	(4)
Ethical Issues in Agriculture . . . . .	AG	401	(4)
Introduction to Arthropods. . . . .	AGB	165/165L	(4)
Environmental Toxicology. . . . .	AGB	411	(4)
Weeds and Weed Control . . . . .	AGR	330/330L	(4)
Crop Ecology . . . . .	AGR	401	(4)
Senior Project . . . . .	AGR	461	(2)
Senior Project . . . . .	AGR	462	(2)
Undergraduate Seminar. . . . .	AGR	463	(2)
Plant Structures and Functions. . . . .	BOT	124/124L	(5)
Plant Pathology . . . . .	BOT	323/323L	(4)
Basic Soil Science. . . . .	SS	231/231L	(4)
Agronomic Practices . . . . .	AGR	120/120L	(4)
Field Crop Systems . . . . .	AGR	220/220L	(4)
Pasture and Forage Systems . . . . .	AGR	223/223L	(4)
Vegetable Crop Systems . . . . .	AGR	226/226L	(4)
Plant Breeding. . . . .	AGR	404/404L	(4)
Crop Diseases . . . . .	AGR	421/421L	(4)

### SUPPORT AND ELECTIVE COURSES

(Required for Specific Options)

#### Crop Science Option

Integrated Pest Management. . . . .	AGB	231	(3)
College Chemistry . . . . .	CHM	122	(3)
College Chemistry Laboratory . . . . .	CHM	122L	(1)
Elements of Organic Chemistry . . . . .	CHM	201	(3)
Elements of Organic Chemistry Laboratory . . . . .	CHM	250	(1)
Soil Fertility and Fertilizers . . . . .	SS	233/233L	(4)
Statistics with Applications . . . . .	STA	120	(4)
Directed Electives - 38 units of directed electives to be selected from approved departmental lists with prior consent of instructor (courses are listed on the curriculum sheet). Approved lists include study areas in:			

Basic Science. . . . .	(8)
Advanced Science . . . . .	(20)
Agricultural Support . . . . .	(10)
Total. . . . .	(38)

#### Crop Production Option

Integrated Pest Management. . . . .	AGB	231	(3)
Soil Fertility and Fertilizers . . . . .	SS	233/233L	(4)

Directed Electives – 48 units of Directed Electives to be selected from approved departmental lists with prior consent of instructor (courses are listed on the curriculum sheet). Students must select an emphasis area in production or sustainable agriculture. Approved lists include study areas in:

#### Production

Basic Agricultural Production and Management. . . . .	(8)
Advanced Agricultural Production and Management . . . . .	(12)
Diversified Agricultural Support . . . . .	(12)

Business Management .....	(4)
Animal and Veterinary Science/Agricultural Engineering .....	(4)
Science Support .....	(8)
Total .....	(48)

**Sustainable Agriculture**

Environmentally Sustainable Agriculture .....	AGR	437/437L	(4)
Life Support Processes .....	RS	301	(4)
Global Regenerative Systems .....	RS	302/302L	(4)
Shaping a Sustainable Future .....	RS	303/303L	(4)
Soil Resource Management and Conservation ..	SS	334/334L	(4)
Agricultural Support .....			(10)
Diversified Support .....			(8)
Science Support .....			(10)
Total .....			(48)

**GENERAL EDUCATION COURSES****Area 1:**

Select pattern 1 or 2 .....	(12)
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**Area 2:**

A. Select 1 course .....	(4)
B. College Chemistry .....	CHM 121 (3)
College Chemistry Lab .....	CHM 121L (1)
C. Basic Biology .....	BIO 115/115L (5)
D. Select 1 course (upper division) .....	(4)

**Area 3:**

A. Select 1 course .....	(4)
B. Select 1 course .....	(4)
C. Select 1 course .....	(4)
D. Select 1 course .....	(4)
E. Select 1 course .....	(4)
F. Select 1 course .....	(4)
G. Select 1 course .....	(4)

**Area 4:**

Introduction to American Government .....	PLS 201 (4)
United States History .....	HST 202 (4)

**Area 5:**

(Completion of a Regenerative Studies minor substitutes for upper division General Education requirements in Areas 2D and 5.)

Accounting for Agribusiness .....	FMA 324 (4)
Agribusiness Enterprise Management .....	FMA 328 (4)

**AGRONOMY MINOR**

Units Required—24

Upper Division Units Required—12

Required Courses (all students)

Plants and Civilization .....	AGR 311 (4)
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Select 16 units from the following:

Agronomic Practices .....	AGR 120/120L (4)
Field Crops Systems .....	AGR 220/220L (4)
Pasture and Forage Systems .....	AGR 223/223L (4)
Vegetable Crop Systems .....	AGR 226/226L (4)
Crop-Animal Systems .....	AGR 229/229L (5)
Crop Quality and Utilization .....	AGR 322/322L (4)
Weeds and Weed Control .....	AGR 330/330L (4)
Seed Production .....	AGR 331/331L (4)

Select 4 units from the following:

Crop Ecology .....	AGR 401 (4)
Plant Breeding .....	AGR 404/404L (4)
Crop Diseases .....	AGR 421/421L (4)
Environmentally Sustainable Agriculture .....	AGR 437/437L (4)

**COURSE DESCRIPTIONS**

All courses offered in Agronomy may be taken on a CR/NC basis except by majors.

**AGR 120/120L Agronomic Practices (2/2)**

Practical application of primary and secondary crop production cultural practices with a relationship to field conditions. Sequence and necessity of operations from soil preparation through harvesting. Analysis of equipment efficiency to crop culture. 2 lectures, 2 three-hour laboratories. Corequisites: AGR 120/120L.

**AGR 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**AGR 220/220L Field Crop Systems (3/1)**

Production and management of the major California field crops such as cereals, cotton, field beans, sugar beets and potatoes. Characteristics of the major varieties in relation to applicable cultural practices, cost of production, harvesting, marketing, grading and processing. 3 lectures, 1 three-hour laboratory. Corequisites: AGR 220/220L

**AGR 222 Culinary Produce Technology (4)**

Integration of principles of culture, procurement, identification, and quality of standard and gourmet vegetables, fruits, and herbs, for restaurant and culinary uses. Onsite studies/discussion. Organic vs. standard produce. Case studies. 4 lectures/problem-solving.

**AGR 223/223L Pasture and Forage Systems (3/1)**

Establishment, management, and composition of irrigated and rangeland pastures adapted to Southwestern conditions. Identification, botanical characteristics, and livestock utilization of major pasture species. 3 lectures, 1 three-hour laboratory. Corequisites: AGR 223/223L.

**AGR 226/226L Vegetable Crop Systems (3/1)**

Cultural practices, varieties, economics of production of major warm and cool season vegetables. Application of production techniques on college-operated acreage. 3 lectures, 1 three-hour laboratory. Corequisites: AGR 226/226L

**AGR 229/229L Crop-Animal Systems (3/2)**

Production, management and utilization of principal feed crop species in the Southwest. Identification, botanical characteristics, and nutrient value of major feed crops. Poisonous plants and toxicology. Animal health as affected by crops and crop contaminants. Ecology of pasture and range systems. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 110 or BIO 115/115L. Corequisites: AGR 229/229L.

**AGR 299/299L/299A Special Topics for Lower Division Students (1-4)/(1-4)/(1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter.

Instruction is by lecture, laboratory, activity, or a combination. Corequisites: AGR 299L/299A individually or in combination. Prerequisite: permission of instructor.

#### **AGR 311 Plants and Civilization (4)**

A critical review of science, technology and the environment as related to plant domestication and current world food and fiber production. Societal implications associated with the biological and technical innovations in world cropping systems will be discussed. Students will evaluate and discuss issues in an open classroom forum. Oral and written reports. 4 lectures/problem-solving. Prerequisites: ENG 104 and satisfactory completion of Category IIa, b and c.

#### **AGR 322/322L Crop Quality and Utilization (3/1)**

Grades, quality factors, and processing of cereal, fiber, and forage crops. Market and nutritional values. Optimum harvesting and storage conditions to preserve quality and facilitate utilization. 3 lecture, 1 three-hour laboratory. Corequisites: AGR 322/322L.

#### **AGR 330/330L Weeds and Weed Control (3/1)**

Recognition and control of weeds occurring in crop and range lands, ornamental plantings, and non-cropped situations. Classification of weeds. Cultural, chemical, and biological control practices. Laws and regulations. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115/115L or BOT 124/124L. Corequisites: AGR 330/330L.

#### **AGR 331/331L Seed Production (3/1)**

California field, vegetable and flower seed production. Location and methods of growing, harvesting, storing. Economic outlook for principal kinds. Certified seed production. Seed laws. 3 lectures, 1 three-hour laboratory. Corequisites: AGR 331/331L.

#### **AGR 351/351L Post Harvest Physiology of Fruit and Vegetables (3/1)**

Issues affecting the quality of fruit, vegetable and floral commodities from the point of harvest, transportation through marketing channels, and to the consumer. Topics will include storage, ripening, and processing of these fresh commodities. Major pathological organisms affecting quality will be discussed. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115/115L. Corequisite: AGR 351/351L.

#### **AGR 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **AGR 401 Crop Ecology (4)**

The environmental, physiological, and production factors in the growth of horticultural and agronomic plants in a managed setting. 4 lectures. Prerequisite: SS 231/231L, senior standing.

#### **AGR 404/404L Plant Breeding (3/1)**

Principles and techniques of improving agronomic and horticultural crop species. Application of field plot design and statistics to experimentation in crop improvement. 3 lecture. 1 three-hour laboratory. Prerequisite: BIO 115/115L. Corequisite: AGR 404/404L.

#### **AGR 421/421L Crop Diseases (3/1)**

Methods of recognizing and controlling diseases of commercial vegetable and field crops. Chemical and cultural control methods that are presently being utilized in California. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 323/323L. Corequisites: AGR 421/421L.

#### **AGR 437/437L Environmentally Sustainable Agriculture (3/1)**

An examination of environmental problems which will impact the sustainability of the American agricultural system into the future. Studies on waste management, nitrogen and pest management, soil conservation and health, land conservancy, food distribution, and governmental policies affecting plant and animal agriculture. 3 lectures, 1 three-hour laboratory. Corequisite: AGR 437/437L.

#### **AGR 441, 442 Internship in Agronomy (1-4) (1-4)**

On-the-job experience with public and private agencies for advanced students. Professional type experience new to the student so that a valuable contribution toward career development results. One unit credit for each 100 hours of experience. Written reports necessary. Approval required before enrolling. Prerequisite: junior standing.

#### **AGR 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Student must take GWT before enrollment in AGR 461.

#### **AGR 463 Undergraduate Seminar (2)**

Critical review of contemporary research in the field of Agronomy. The student will analyze, criticize and advocate by inductive and deductive methods that inferences in contemporary literature are based on fact or logical, unambiguous extension of fact. Oral reports of contemporary literature and senior projects are required. Prerequisite: AGR 462

#### **AGR 499/499L/499A Special Topics for Upper Division Students (1-4)/(1-4)/(1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Corequisites: AGR 499/499L/499A individually or in combination. Prerequisite: permission of instructor.



## ANIMAL AND VETERINARY SCIENCES

Cedric Y. Matsushima, Chair

Leo B. Abenes  
Wayne R. Bidlack  
Robert E. Bray  
Melinda J. Burrill  
Edward A. Cogger  
Edward S. Fonda  
Gerald E. Hackett, Jr

Calvin N. Kobluk  
G. Duane Sharp  
John E. Trei  
Steve J. Wickler  
Adolph A. Wysocki

A four-year curriculum leading to a Bachelor of Science degree in Animal Science with options in preveterinary science/graduate school, animal industries/business management, equine sciences and animal health science is offered by the department.

Courses offered by the department are designed to fulfill career needs for men and women in the science and business phases of the animal industry.

Specialized laboratories are provided for meat, wool, poultry, eggs, feed processing and animal production. The department maintains 330 acres of range land and 100 acres of irrigated pasture. Livestock includes a purebred breeding herd of Aberdeen-Angus and Polled Herefords, and commercial feeder cattle; the Kellogg Arabian horses; flocks of purebred Rambouillet, Suffolk, St. Croix, Finnsheep and Hampshire sheep; a herd of purebred Duroc and a herd representative of commercial breeds of swine.

A Master of Science degree in Agriculture with an option in animal science is offered. Specializations available within the degree are animal nutrition, animal breeding, meat science, and animal physiology.

Location of the university provides rich opportunities for students to obtain specialized and practical educational experience in production, management, feeding, marketing and processing. Cooperation of prominent local breeders, feeders, producers, marketing organizations and related animal industries offers additional opportunity for field study. Facilities for student-owned and operated livestock projects are made available by the Cal Poly Pomona Foundation.

The preveterinary science/graduate school option meets requirements for admission to schools of veterinary medicine, related medical technical fields, and for graduate study in animal nutrition, meat science, animal breeding and animal physiology.

The Equine Sciences option is designed to prepare students for employment as managers and related agribusiness opportunities in the equine industry. The option combines course work in equine production, nutrition, breeding, genetics and diseases with studies in the management aspects of an equine enterprise.

The Animal Industries/Business Management option stresses preparation for management positions in the production and marketing of animal agribusiness products. Particular emphasis is given to animal industries needing animal specialists as part of their management and marketing team. This option is also useful for students planning to teach agriculture at the secondary level or to serve in developing countries.

The Animal Health Science option prepares graduates to become veterinary technologists and to sit for state and national animal health accreditation agencies and licensing agency exams. Graduates with this option can pursue careers as veterinary assistants in public and private facilities or as veterinary technologists in public health organizations and research institutions. This program is run jointly with Mount San Antonio College which is on the semester system and, therefore, has a different academic calendar.

For the student interested in meat science and processing, specialized courses are available. A student may develop a program emphasizing meat science by consulting with the appropriate departmental advisor.

Non-majors may elect to minor in Animal Science by completing a minimum of 32 units, 9 of which must be upper division.

### PHYSIOLOGY MINOR

The Physiology minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Animal Science.

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

### QUANTITATIVE RESEARCH MINOR

The Quantitative Research minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Animal Science. A full description of this minor is included in the "University Programs" section of this catalog.

### CORE COURSES FOR MAJOR

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

Orientation to the College of Agriculture. . . . .	AG	100	1
Agriculture and the Modern World . . . . .	AG	101	4
Agricultural Issues and Ethics. . . . .	AG	401	4
Development of Leadership Skills. . . . .	AG	464	3
Introduction to Animal Nutrition. . . . .	AVS	100	3
Feeds and Feeding. . . . .	AVS	101/101L	2
Animal Agricultural Science. . . . .	AVS	111	4
Animal Diseases . . . . .	AVS	201	3
Anatomy and Physiology of Domestic Animals. .	AVS	350/350L	5
Genetics. . . . .	BIO	303/303L	4
or Genetics of Domestic Animals. . . . .	AVS	204	(3)
Any two of the following: . . . . .	(7-8)		
(must include ruminant and nonruminant)			
Sheep Management Science . . . . .	AVS	123/123L	(4)
Beef Management Science . . . . .	AVS	131/131L	(4)
Dairy Management Science. . . . .	AVS	150/150L	(4)
Swine Management Science . . . . .	AVS	122/122L	(4)
Poultry Management Science. . . . .	AVS	126/126L	(4)
Equine Management Science. . . . .	AVS	125/125L	(4)
Companion Animal Care. . . . .	AVS	128	(4)

### OPTION COURSES FOR MAJOR

(Required in specific options)

### PRE-VETERINARY SCIENCE/GRADUATE SCHOOL

Animal Parasitology. . . . .	AVS	302/302L	4
Meat Science and Industry. . . . .	AVS	327/327L	4
Applied Animal Feeding. . . . .	AVS	303/303L	4
or Advanced Animal Nutrition . . . . .	AVS	402/402A	(4)
or Ruminant Nutrition . . . . .	AVS	403	(3)
Animal Breeding . . . . .	AVS	404/404A	4

Physiology of Reproduction and Lactation . . . . .	AVS	414/414L	4
or Mammalian Endocrinology. . . . .	AVS	412	(4)
Biotechnology Applications in Animal Science. . . . .	AVS	430/430L	4
Senior Project. . . . .	AVS	461	2
and Senior Project . . . . .	AVS	462	2
or Problem Solving Methodologies. . . . .	AVS	464	(5)
Undergraduate Seminar. . . . .	AVS	463	2

**Support and Directed Courses**

Computer Applications in Animal Science . . . . .	AVS	428/428L	3
College Chemistry . . . . .	CHM	122/122L	4
College Chemistry . . . . .	CHM	123/123L	4
Organic Chemistry . . . . .	CHM	314/317L	4
Organic Chemistry . . . . .	CHM	315	3
Organic Chemistry . . . . .	CHM	316	3
Elements of Biochemistry . . . . .	CHM	321/321L	4
Trigonometry . . . . .	MAT	106	4
College Physics . . . . .	PHY	121/141L	4
College Physics . . . . .	PHY	122/142L	4
Elementary Statistics with Applications. . . . .	STA	120	4
Plant Structure and Functions. . . . .	BOT	124/124L	5
or Basic Soil Science. . . . .	SS	231/231L	(4)
Vertebrate Zoology. . . . .	ZOO	138/138L	5
Embryology . . . . .	ZOO	414/414L	5

**ANIMAL INDUSTRIES/BUSINESS MANAGEMENT**

Principles of Market Animal and			
Carcass Evaluation. . . . .	AVS	240/240L	4
Meat Science and Industry. . . . .	AVS	327/327L	4
Animal Parasitology. . . . .	AVS	302/302L	4
Applied Animal Feeding. . . . .	AVS	303/303L	4
or Advanced Animal Nutrition . . . . .	AVS	402/402A	(4)
or Ruminant Nutrition . . . . .	AVS	403	(3)
Animal Breeding . . . . .	AVS	404/404A	4
Physiology or Reproduction and Lactation . . . . .	AVS	414/414L	4
or Mammalian Endocrinology. . . . .	AVS	412	(4)
Biotechnology Applications in Animal Science. . . . .	AVS	430/430L	4
Senior Project. . . . .	AVS	461	2
and Senior Project . . . . .	AVS	462	2
or Problem-Solving Methodologies . . . . .	AVS	464	(5)
Undergraduate Seminar. . . . .	AVS	463	2

**Support and Directed Courses**

Computer Applications in Animal Science . . . . .	AVS	428/428L	3
Principles of Economics. . . . .	EC	201	4
Crop-Animal Systems. . . . .	AGR	229/229L	4
or Pasture and Forage System. . . . .	AGR	223/223L	(4)
Managing Agribusiness Organizations. . . . .	FMA	201	3
Sales and Advertising . . . . .	FMA	225	4
Food and Agribusiness Marketing . . . . .	FMA	304	4
Politics of Food and Agriculture. . . . .	FMA	313	4
Financial Analysis for Agribusiness I. . . . .	FMA	326	4
Agricultural Cooperatives . . . . .	FMA	360	4
Basic Soil Science. . . . .	SS	231/231L	4

Restricted Electives from Plant and Soil Science, Agribusiness, Business Management., College of Business (to be taken in consultation with option coordinator and/or major advisor) . . . . . 14

**EQUINE SCIENCES**

Light Horse Halter and Performance Evaluation . . . . .	AVS	132/132L	2
Farrier Science. . . . .	AVS	234	2
Farrier Science. . . . .	AVS	235L	2
Horsemanship . . . . .	AVS	335	2
Equine Herd Health Care Management . . . . .	AVS	365/365L	(4)

or Equine Nutrition. . . . .	AVS	355/355L	3
Animal Breeding . . . . .	AVS	404/404A	4
Physiology of Reproduction and Lactation . . . . .	AVS	414/414L	4
or Mammalian Endocrinology. . . . .	AVS	412	(4)
Applied Animal Feeding. . . . .	AVS	303/303L	4
or Advanced Animal Nutrition . . . . .	AVS	402/402A	(4)
or Ruminant Nutrition . . . . .	AVS	403	(3)
Biotechnology Applications in Animal Science . . . . .	AVS	430/430L	4
Senior Project. . . . .	AVS	461	2
and Senior Project . . . . .	AVS	462	2
or Problem Solving Methodologies. . . . .	AVS	464	(5)
Undergraduate Seminar. . . . .	AVS	463	2

**Support and Directed Courses**

Computer Applications in Animal Science . . . . .	AVS	428/428L	3
Crop-Animal Systems. . . . .	AGR	229/229L	4
or Pasture and Forage System . . . . .	AGR	223/223L	(4)
Basic Soil Science. . . . .	SS	231/231L	4
Financial Analysis for AgribusinessI. . . . .	FMA	326	4
Elementary Statistics with Applications. . . . .	STA	120	4
Introduction to Cities and Planning. . . . .	URP	101	4
Equine Enterprise Management. . . . .	FMA	329	3
Introduction to Adapted Physical Education . . . . .	KIN	206	3
Cluster Courses: . . . . .			17

Select one cluster. Courses in these areas will be decided in consultation with option coordinator and/or advisor.

Cluster 1: Business and Marketing

Cluster 2: Physiology and Nutrition

**ANIMAL HEALTH SCIENCE**

Careers in AHS. . . . .	AVS	104	1
Companion Animal Care Lab . . . . .	AVS	128L	1
Animal Handling and Restraint. . . . .	AVS	129/129L	4
. . . . . (AGAN 51*)			
Clinical Laboratory Practices . . . . .	AVS	205/205L	4
. . . . . (AGHE 62A/B#)			
Clinical Biochemistry and Pharmacology . . . . .	AVS	207/207L	4
. . . . . (AGHE 64#)			
Veterinary Radiology . . . . .	AVS	208/208L	3
. . . . . (AGHE #65)			
Anesthesiology and Surgery for			
Veterinary Assistants. . . . .	AVS	209/209L	4
. . . . . (AGHE 61#)			
Work Experience in Animal Health Science . . . . .	AVS	244	2
Laboratory Animal Health Care . . . . .	AVS	266/266L	4
. . . . . (AGHE 79#)			
or Equine Herd Health Care Management . . . . .	AVS	365	4
Veterinary Medical Law and Language. . . . .	AVS	310	3
Laboratory Animal Management Rules and			
Regulations . . . . .	AVS	369	3
Internship in Animal Science . . . . .	AVS	441	2
Critical Care, Advanced Surgical Assisting, and			
Anesthesiology . . . . .	AVS	407/407L	4

\*Course numbers in parentheses refers to equivalent course taught at Mount San Antonio College (Mt. SAC).

#Animal health science students are expected to enroll in the equivalent course at Mount San Antonio College. Contact Jean Hoffman, RVT at (909) 594-5611, Extension 4544. Please note that Mount San Antonio College is on the semester system; therefore, its academic calendar is quite different.

**Support and Directed Courses**

Computer Applications in Animal Science . . . . .	AVS	428	3
Vertebrate Zoology . . . . .	ZOO	138/138L	5
Basic Microbiology . . . . .	MIC	201/201L	5
College Chemistry . . . . .	CHM	122/122L	4
Elements of Organic Chemistry . . . . .	CHM	201/250L	4
Elements of Biochemistry . . . . .	CHM	321/321L	4
Training and Development . . . . .	MHR	405	4
Unrestricted Electives . . . . .			23

Students are required to take 23 units of unrestricted electives. Courses should be taken in consultation with the option coordinator and faculty advisor.

**GENERAL EDUCATION**

(Required for all students in all options)

**Track B**

Freshman English I . . . . .	ENG	104	4
Advocacy and Argument . . . . .	COM	204	4
or Freshman English II . . . . .	ENG	105	4
College Algebra . . . . .	MAT	105	4
Basic Biology . . . . .	BIO	115/115L	5
College Chemistry . . . . .	CHM	121/121L	4
Science Tech. and Civ. (II,D) - Elective . . . . .			4
Arts (III,A) - Elective . . . . .			4
Philosophy and History (III,B) - Elective . . . . .			4
Literature and Foreign Language (III,C) - Elective . . . . .			4
Economic Institutions (III,D) - Elective . . . . .			4
Social Institutions (III,E) - Elective . . . . .			4
Political and Historical Institutions (III,F) - Elective . . . . .			4
Integrated Being (III,G) - Elective . . . . .			4
United States History, Constitution and American Ideals - Elective . . . . .			4
United States History, Constitution and American Ideals - Elective . . . . .			4
Upper Division General Education . . . . .			4
Upper Division General Education . . . . .			4

**ANIMAL SCIENCE MINOR COURSES**

Introduction to Animal Nutrition . . . . .	AVS	100	3
Animal Agricultural Science . . . . .	AVS	111	4
Feeds and Feeding . . . . .	AVS	101/101L	2
Meat Science and Industry . . . . .	AVS	327/327L	4
Approved Animal Science Electives . . . . .			5

Select one management course . . . . . 4

Beef Cattle Management Science  
 Sheep Management Science  
 Dairy Management Science  
 Swine Management Science  
 Poultry Management Science  
 Equine Management Science

Select 9 units of upper division approved

Animal Science Electives . . . . . 9

**COURSE DESCRIPTIONS**

CR/NC courses noted with a +

**AVS 100 Introduction to Animal Nutrition (3)**

An introductory course discussing the fundamentals of animal nutrition, the composition of feeds, feeding standards and their application to livestock production. 3 lectures.

**AVS 101/101L Feeds and Feeding (1/1)**

A practical, applied course which provides instruction in the use of the nutritional values of feedstuffs and the nutritional requirements of animals in the formulation of least-cost, balanced rations for domestic farm animals. 1 lecture, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: AVS 100 or instructor approval.

**AVS 104 Careers in Animal Health Sciences (1)**

An introductory course to familiarize students with the employment opportunities in the Animal Health Sciences. Emphasis placed on the diversity of careers, training, experience required, the responsibilities of professionals in animal health care, animal nursing care, and management of animal teaching and research facilities. 1 lecture.

**AVS 111 Animal Agricultural Science (4)**

A study of the basic physiological, economic, environmental and nutritional considerations impacting both the producer and consumer; the course deals with the role, production, and use of animal products to resolve problems associated with world population and food production. 4 lectures.

**AVS 122/122L Swine Management Science (3/1)**

A study of the swine industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment, and facilities to ensure scientifically-based management decisions. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**AVS 123/123L Sheep Management Science (3/1)**

A study of the sheep industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment and facilities to ensure scientifically-based management decisions. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**AVS 124/124A Basic Equitation (1/2)**

The fundamentals of the art of equitation. The anatomy of the horse as it pertains to riding. Equipment utilized in training and riding, care of the horse and safety precautions emphasized. 1 lecture, 2 two-hour activities. Concurrent enrollment required.

**AVS 125/125L Equine Management Science (3/1)**

A study of the horse industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment, and facilities to ensure scientifically-based management decisions. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**AVS 126/126L Poultry Management Science (3/1)**

A study of the poultry industry including breeds and breeding systems, incubation, nutrition, disease control, equipment, and facilities. Poultry biology also examined. This course emphasizes knowledge required for scientifically-based management decisions. Discussion and lecture formats will be used. 3 lectures, 1 three-hour laboratory.

**AVS 128 Companion Animal Care (4)**

A survey course to familiarize students with the routine problems encountered, and the responsibilities involved in owning companion animals for recreational purposes. 4 lectures.

**AVS 128L Companion Animal Care Lab (1)**

An experiential course designed to provide instruction in basic and skilled nursing techniques in companion animal medical care. Classes will be held in on and off campus veterinary or animal facilities as is appropriate. This course is intended for lower division students in the AVS Animal Health Sciences Option. Prerequisite: Concurrent enrollment in AVS 128, enrollment in the AHS Option.

**AVS 129/129L Animal Handling and Restraint (2/2)**

Instruction in the general concepts of restraint and handling of wild and domestic animals. Emphasis will be placed on both physical and chemical restraint. Discussion will also include the tools of restraint, handler safety and emergency animal medical problems that might occur during restraint. 2 lectures, 2 three-hour laboratories. (AGAN 51 at Mt. SAC).

**AVS 131/131L Beef Cattle Management Science (3/1)**

A study of the beef cattle industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment, and facilities to ensure scientifically-based management decisions. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**AVS 132/132L Light Horse Halter and Performance Evaluation (1/1)**

Visual evaluation of various breeds of light horses at the halter and under saddle. Intensive training for intercollegiate horse judging competition. 1 lecture, 1 three-hour laboratory. Concurrent enrollment required.

**AVS 150/150L Dairy Cattle Management Science (3/1)**

A study of the dairy cattle industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding systems, disease control, equipment, and facilities to ensure scientifically-based management decisions. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**+AVS 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Graded only on a CR/NC basis.

**AVS 201 Animal Diseases (3)**

Study of factors contributing to animal diseases and their control. 3 lectures.

**AVS 204 Genetics of Domestic Animals (3)**

An introductory course dealing with the basic genetics of all species of livestock and common companion animals. Emphasis will be placed on inherited abnormalities, traits of economic importance, conventional methods of dealing with these traits, and technologies of the future. 3 lectures. Prerequisites: AVS 111, BIO 115/115L.

**AVS 205/205L Clinical Laboratory Practices (2/2)**

An advanced laboratory course providing instruction in hematology, clinical pathology, microbiology, urinalysis and necropsy procedures used to diagnose health problems in veterinary clinics and diagnostic laboratories. 2 lectures and 2 three-hour laboratories. Prerequisites: BIO 115, CHM 121. (AGHE 62A/62B at Mt. SAC).

**AVS 207/207L Clinical Biochemistry and Pharmacology (2/2)**

The use of clinical chemical procedures, the classification and action of pharmaceuticals, and the dispensing of medications will be studied.

Includes conversion and calculation of drugs, prescription writing and routes of administration. 2 lectures, 2 three-hour laboratories. Prerequisites: CHM 201, 250. (AGHE 64 at Mt. SAC).

**AVS 208/208L Veterinary Radiology (1/2)**

Instruction in the use of radiological equipment and the development and interpretation of X-rays as used in veterinary clinics. 1 lecture and 2 three-hour laboratories. Prerequisites: BIO 115/115L, AVS 350/350L or similar anatomy and physiology. (AGHE 65 at Mt. SAC).

**AVS 209/209L Anesthesiology and Surgery for Veterinary Assistants (2/2)**

Instruction in surgical receiving, surgical procedures, anesthetic nursing, incubation, induction and monitoring, including instrumentation and equipment operation and care. 2 lectures, 2 three-hour laboratories. Prerequisite: AVS 205/205L and Basic Anatomy. (AGHE 61 at Mt. SAC).

**AVS 211 Drugs and Society (4)**

An introductory course that identifies and explains the action of different drugs. The compounds discussed include over-the-counter drugs, prescription drugs, social drugs and drugs of abuse. Major emphasis on human pharmacology with some discussion of domestic animals. No prerequisites. Meets General Education Category 3G requirements. 4 lectures.

**AVS 224L Intermediate Equitation (2)**

A laboratory riding class allowing students to develop proficiency in the riding skills they have been exposed to in prior experience. 2 three-hour laboratories.

**AVS 234 Farrier Science (2)**

Understanding the fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern and leg. Caring for the horse's feet and legs, principles of horseshoeing and introduction to corrective shoeing. 2 lectures.

**AVS 235L Farrier Science (2)**

Fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern and leg. Trimming feet, fitting, milling shoes, principles of horseshoeing, an introduction to corrective shoeing. 2 three-hour laboratories. Prerequisite: AVS 234 or concurrent enrollment in AVS 234.

**AVS 240/240L Principles of Market Animal and Carcass Evaluation (2/2)**

A study of the relationship between live meat animal evaluation and carcass evaluation. Visual appraisal techniques used in the quality and yield grading of live meat-type animals compared to the grading parameters used for carcass evaluation. Incorporates the effect of selection and management on body composition and live animal and carcass value. 2 lectures, 2 three-hour laboratories. Concurrent enrollment required.

**AVS 241L Introductory Livestock Evaluation (2)**

Instruction in selection of beef cattle, sheep, swine, and horses according to utility, type and breed. 2 three-hour laboratories.

**+AVS 244 Work Experience in Animal Health Sciences (2)**

Practical experience working in public or private clinics or laboratories where application of animal health sciences or research takes place. Experiences should be useful in preparation for state board exams in veterinary technology and/or AAALAC exams for certification in laboratory animal care. This course is intended for lower division students in the AVS Animal Health Sciences Option.



**AVS 266/266L Laboratory Animal Health Care and Therapeutic Techniques (3/1)**

Specific instruction for feeding, caring for, and therapeutic techniques according to "The Guide" for laboratory animals under confinement conditions will be studied. Will include techniques (parenteral and oral) for administration of medications or treatment. 3 lectures, 1 three-hour laboratory. Prerequisites: AVS 100, AVS 101/101L. (AGHE 79 at Mt. SAC).

**AVS 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, activity, or a combination.

**AVS 300 Animal Issues in Science and Society (4)**

This course addresses global issues and ethics relating to animal use in science and society. These issues include the use of animals for food, research and companionship. The impacts of livestock production on environment such as global warming, soil erosion, forestry and rangeland resources, water resources and livestock-wildlife interactions will be considered. 4 lectures. Meets General Education 2d requirements. Prerequisite: Track B, Area 2, subareas A, B and C.

**AVS 302/302L Animal Parasitology (3/1)**

The study of animal parasites and their relationship to clinical and subclinical parasitic diseases of livestock, companion animals, laboratory animals and wildlife. Emphasis will be placed on zoonotic parasites and parasites most commonly found in North America. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**AVS 303/303L Applied Animal Feeding (3/1)**

A study of the nutritional requirements for maintenance, growth, fattening, reproduction and lactation of domestic animals. The use of computerized least-cost formulation of rations to satisfy nutritional requirements. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: AVS 101/101L.

**AVS 304 Avian Health Care and Management (3)**

Consideration of the etiology, symptomatology, and control of infectious, nutritional, and parasitic diseases of poultry. 3 lectures.

**AVS 310 Veterinary Medical Law and Language (3)**

Instruction in the application of the rules, guidelines, and regulation of federal, state, county, municipal and local governments, report writing and accounting procedures used in the operation of animal health care. Documentation requirements, licensing requirements and task appropriation by level of supervisors. 3 lectures. Prerequisite: AVS 104.

**AVS 311 The Animal Industries and Society (4)**

The course deals with the science and industry of animal production and the role and use of food animals and animal products to resolve problems associated with humanity. Meets General Education Category 2d requirements. 4 lectures. Prerequisite: Track B, Area 2, Subareas A, B and C.

**AVS 327/327L Meat Science and Industry (3/1)**

Introduction to processing and utilization of fresh and value-added red meat products. Discussions on identity standards, factors affecting sensory, nutritional, and shelf-life qualities, food safety and inspection, and grading of red meats. 3 lectures, 1 three-hour laboratory.

**AVS 328/328A Seafood and Poultry Processing Technology (3/1)**

Introduction to the processing, marketing and utilization of fresh and value-added seafood and poultry products for the supermarket and food service industries. Examination of classification and standards to identify, marketing channels and forms, grading systems, factors affecting quality, food safety and public health considerations, and processing methods for the respective product types. 3 Lectures, 1 two-hour activity. Concurrent enrollment required.

**AVS 335L Horsemanship (2)**

Theory and practice of basic training principles and methods. Handling, training, grooming of the young foal and yearling. Instruction in long line training and ground driving. 2 three-hour laboratories. Prerequisite: AVS 125/125L.

**AVS 341L Livestock Evaluation (3)**

Intensive visual evaluation of breeding and market swine, sheep and beef cattle in preparation for intercollegiate livestock judging competition. Extensive training in the preparation and delivery of oral reasons. 3 three-hour laboratories. Prerequisite: AVS 241L.

**AVS 345 Equine Genetics and Breeding Principles (3)**

Principles of inheritance for qualitative and quantitative traits. Inheritance of color in the horse. Genetically caused abnormalities; methods of detection of carrier animals. Mare and stallion selection; pedigrees and other types of performance information and their use. 3 lectures. Prerequisites: BIO 115/115L, AVS 125/125L.

**AVS 350/350L Anatomy and Physiology of Domestic Animals (4/1)**

An integrated approach to the structure and function of animal systems. Topics to be discussed include the cell, the muscular-skeletal system, the nervous system, the cardio-vascular system, the respiratory system, and the excretory system. 4 lectures, 1 three-hour laboratory. Prerequisites: BIO 115/115L, one quarter of Chemistry. Concurrent enrollment required.

**AVS 355 Equine Nutrition (3)**

Anatomy of the digestive tract of the horse as it affects feeding practices. Nutrient requirements for maintenance, work, pregnancy, and lactation in the horse. Interpreting National Research Council "Nutrient Requirements For Horses." Assessing recent advances in horse nutrition. 3 lectures. Prerequisites: AVS 101/101L, AVS 125/125L.

**AVS 365/365L Equine Herd Health Care and Management (3/1)**

A study of the etiology, symptomatology, and control of infectious, nutritional and parasitic diseases of horses. 3 lectures, 1 three-hour laboratory. Prerequisite: AVS 125/125L. Concurrent enrollment required.

**AVS 369/369L Laboratory Animal Management, Rules and Regulations (3/1)**

Instruction in the specific concepts of laboratory management according to "The Guide" will be the basis of study. An emphasis will be placed on supervisory management of laboratory animal facilities and accreditation requirements. 3 lectures, 1 three-hour laboratory. Prerequisite: AVS 266/266L.

**AVS 375/375A Equine Riding Instruction (1/2)**

Development of teaching techniques and theory of efficiently and safely instructing large groups of beginning and advanced riders. 1 lecture, 2 two-hour activities. Prerequisites: AVS 124/124A, AVS 224L.

**+AVS 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Graded only on a CR/NC basis.

**AVS 402/402A Animal Nutrition (3/1)**

Metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures, 1

two-hour recitation. Concurrent enrollment required. Prerequisites: CHM 201, 250, or CHM 314, 317L or instructor approval.

**AVS 403 Ruminant Nutrition (3)**

Implications of recent findings in ruminant nutrition. The physico-chemical processes of digestion and absorption. Metabolism and the importance of rumen microflora. Normal metabolism and abnormal metabolic disorders. Modes of action of feed additives. 3 lectures. Prerequisite: CHM 201, 250L, or CHM 314, 317L or instructor approval.



**AVS 404/404A Animal Breeding (3/1)**

Introduction to the basic principles of applied quantitative genetics and their use in the improvement of livestock. Methods of heritability estimation, selection, and systems of mating. 3 lectures, 1 two-hour recitation. Prerequisite: BIO 303303L or AVS 204.

**AVS 405/405L Immunological Procedures in Animal Production (3/1)**

The application of immunology to disease control in farm animals; the use of immunological techniques in animal research; and potential as a tool in livestock production. 3 lectures, 1 three-hour laboratory. Prerequisite: AVS 350/350L. Concurrent enrollment required.

**AVS 407/407L Critical Care, Advanced Surgical Assisting and Anesthesiology (2/2)**

Instruction in the specific concepts of intensive care veterinary nursing, surgical assisting in advanced and/or specialized surgical techniques and advanced anesthesia techniques will be mastered. 2 lectures, 2 three-hour laboratories. Prerequisites: AVS 208/208L, 209/209L.

**AVS 412 Mammalian Endocrinology (4)**

A general course surveying the glands of internal secretion and their role in development, growth, metabolic regulation, lactation, and reproduction of animals. 4 lectures. Prerequisite: AVS 350/350L or equivalent.

**AVS 414/414L Physiology of Reproduction and Lactation (3/1)**

A study of the physiological processes of reproduction from gametogenesis to parturition. The reproductive cycles of the food animals and the physiology of milk secretion including factors affecting milk production will be discussed. 3 lecture discussions, 1 three-hour laboratory. Prerequisite: AVS 350/350L or equivalent. Concurrent enrollment required.

**AVS 415/415L Applied Reproductive Management of Domestic Animals (3/1)**

Fundamentals and techniques used in the manipulation of gametes in the reproductive management of birds, cattle, horses, sheep and swine. Applied physiological aspects of reproductive management, semen cryopreservation, artificial insemination and embryo micromanipulation techniques used in the livestock industry will be evaluated. 3 lectures; 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: AVS 414.414L.

**AVS 424L Nutritive Analysis (2)**

Laboratory course involving the principles and practices in quantitative analysis of feedstuffs. 2 three-hour laboratories. Prerequisites: CHM 201, 250L or instructor approval.

**AVS 427/427L Meat Processing and Technology (3/2)**

Manufacturing of processed meats, and meat products as related to processing operations, sanitation, product formulation, quality control, and smokehouse operations. 3 lectures, 2 three-hour laboratories. Prerequisite: AVS 327/327L. Concurrent enrollment required.

**AVS 428/428L Computer Applications for Animal Science (1/2)**

A course requiring investigation and application of advanced software such as document processing, decision aids, database management, spreadsheets. Statistical analysis and communications in Animal Science. 1 lecture, 2 three-hour laboratories. Concurrent enrollment required.

**AVS 430/430L Biotechnology Applications in Animal Science (3/1)**

A study of the principles and applications of biotechnology in Animal Science. Discussion of the implications of genetic engineering, gene transfer, transgenic animals, embryo transfer and embryo manipulation for livestock improvement; present and future importance to the agriculture industry, human and veterinary medicine, ethical issues, patent law and strategies for future problem-solving. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: AVS 111, Management Science Courses, AVS 350/350L, BIO 303 or AVS 204 or AVS 345.

**AVS 431 Avian Physiology (3)**

Detailed consideration of the physiology of avian species with emphasis on birds of economic importance to man. 3 lectures.

**AVS 432/432A Advanced Animal Breeding (3/1)**

Introduction to the theoretical development and principles of quantitative genetics including selection theory and heritability, breed, strain and line formation. 3 lectures, 1 two-hour recitation.

**AVS 435 Equine Exercise Physiology (3)**

The basic and applied physiology of the exercising horse. Discussion of muscular respiratory, cardiovascular, nutritional and osmo-regulatory physiology. Includes gait analysis, lameness and pharmacology. 3 lectures. Prerequisite: AVS 350/350L.

**AVS 436 Biochemical Adaptations in Animals (3)**

A view of how the biochemistry of animals has adapted to the environment. Topics include adaptations to exercise, high altitude, diving, hibernation, desiccation, temperature, lactation. Students are expected to present seminars. 3 lectures. Prerequisites: BIO 115 and junior standing.

**+AVS 441 Internship in Animal Science (1-16)**

On-the-job training in animal science, providing collegiate level experiences in animal production, agribusiness and related areas. Experiences may be useful for preparation of senior projects. Total credit limited to 16 units. Graded only on a CR/NC basis. Prerequisite: permission of coordinator required in advance.

**+AVS 442 Externship in Animal Health Sciences I (2)**

Practical experience working in public or private clinics or laboratories where application of animal health sciences or research takes place. Experiences should be useful in preparation for state board exams in veterinary technology and/or AAALAC exams for certification in laboratory animal care. This course is intended for upperdivision students in the AVS Animal Health Sciences Option. Graded only on a CR/NC basis. Prerequisite: AVS 244

**+AVS 443 Externship in Animal Health Sciences II (2)**

Practical experience working in public or private clinics or laboratories where application of animal health sciences or research takes place. Experiences should be useful in preparation for state board exams in veterinary technology and/or AAALAC exams for certification in laboratory animal care. This course is intended for upper division students in the AVS Animal Health Sciences Option. Graded only on a CR/NC basis. Prerequisite: AVS 442 or concurrent enrollment.

**AVS 461, 462 Senior Project (2) (2)**

Selection and completion of a project under minimum 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.

### **AVS 463 Undergraduate Seminar (2)**

New methods and developments, practices, and procedures in the field. 2 lectures. Prerequisite: senior standing.

### **AVS 464/464A Livestock Management Systems Problem-Solving Methodologies (3/2)**

A systems approach to integrated livestock management. Students utilize their previous learning experience to resolve management problems inherent in the livestock industry using systems-based problem-solving methodologies. 3 lectures, 2 two-hour recitations. Prerequisite: senior standing or consent of instructor. Concurrent enrollment required.

### **AVS 472/472L Feed Manufacturing Technology (3/1)**

An integration of prior course work to the feed industry including plant design, plant management, materials handling and storage, manufacturing operations, speciality feeds, computer applications, quality assurance, sanitation and pest management, safety, energy requirements, and environmental concerns. 3 lectures/problem-solving, 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: AVS 303/303L or AVS 402/402A or AVS 403.

### **AVS 499/499A/499L Special Topics for Upper Division Students (1-4)/(1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor.

Graduate courses are listed in the "Graduate Studies" section of the catalog.



## APPAREL MERCHANDISING AND MANAGEMENT

Betty K. Tracy, Program Director

Jean A. Gipe Cynthia Regan

California's apparel industry is considered a trend-setting influence in the United States and international fashion markets. California is the largest apparel manufacturing state in the United States and in combination with the fashion retailing industry provides a substantial number of jobs. Los Angeles is the leading national center for apparel and fashion, and careers in the Los Angeles area are many and varied. The United States apparel industry is moving into a new era of high technology, innovative manufacturing, and retailing processes and systems to meet the needs of a globally competitive marketplace.

Apparel and fashion industry careers require varying skills and abilities. People with a creative flair do well in product development and promotion whereas people with analytical skills excel in production, market research and retail.

The Bachelor of Science in Apparel Merchandising and Management has two Options: Apparel Manufacturing and Fashion Retailing. These options, similar at the freshman, sophomore and beginning junior levels, diverge in the balance of upper division coursework into one of two areas of specialization. The common core of courses for the two Options provides graduates with a broad based interdisciplinary educational background in apparel and fashion products as well as manufacturing and retailing processes. Graduates will have experience in all areas of the apparel soft goods chain including product development, production, wholesale sales, distribution, retail buying, selling, and promotion. Through a combination of coursework and internship experience, graduates will be prepared for supervisory, managerial and executive level career paths.

The apparel curriculum is a combination of theory and application in both the classroom and on-the-job internships. An Apparel Industry Advisory Board works closely with the apparel faculty in keeping the curriculum current and providing internship opportunities.

Students are actively involved in the apparel industry and utilize actual manufacturing and retailing facilities for first hand knowledge. The Apparel Manufacturing option is endorsed by the American Apparel Manufacturers Association.

Students work closely with their faculty advisors on career counseling, scheduling and internship placement. They may also participate in the student organization, the Apparel Merchandising and Management Association, as well as many professional organizations and events.

The Apparel Merchandising and Management major also offers a joint minor with the International Business and Marketing Management Department in Fashion Merchandising.

For more information, contact the Apparel Program Director in Building 45 Room 104 at (909) 869-2220.

Any student who meets the CSU entrance requirements will be eligible to enter this program. A student who successfully completes the 198 required units as described will be eligible for graduation.

### CORE COURSES

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

Orientation to College. ....	AG	100	(1)
Fashion Industry .....	AMM	101	(4)

Culture, People, and Dress .....	AMM	108	(4)
Introduction to Textile Science .....	AMM	160/160L	(3/1)
Apparel Design Analysis. ....	AMM	210	(4)
Fashion Promotion .....	AMM	230	(4)
Apparel Merchandising and Buying I .....	AMM	250	(4)
Apparel Product Analysis .....	AMM	301/301A	(2/2)
Apparel Product Development I .....	AMM	310	(3)
Visual Merchandising/Store Design I .....	AMM	370/370A	(2/1)
Internship .....	AMM	442	(4)
Apparel Importing and Exporting .....	FMA	331	(4)
Apparel Production I .....	AE	381/381L	(3/1)
Managerial Statistics. ....	OM	302 or	(4)
or Data Management for Agribusiness .....	FMA	375	(4)
Ethical Issues in Agriculture .....	AG	401	(4)

### APPAREL MANUFACTURING

Option Courses:

Apparel Production II. ....	AE	481/481L	(3/1)
Apparel Product Development II .....	AMM	314/314A	(2/2)
Apparel Product Development III. ....	AMM	410/410A	(2/2)
Apparel Product Development IV .....	AMM	414/414A	(2/2)
Apparel Product Development Simulation. ....	AMM	418/418A	(2/2)
Product Control Laboratory .....	ETP	276/276L	(3/1)
Product and Facility Planning/Laboratory .....	ETP	371/371L	(3/1)
Industrial Costs and Controls .....	IME	239	(3)

Support Courses:

Introduction to Microcomputers .....	CIS	101	(4)
Foreign Language (Spanish or Japanese). ....	FL		(4)
See Advisor			

Restricted Electives: select 20 units from the approved list

### FASHION RETAILING

Option Courses:

Apparel Merchandise Buying II. ....	AMM	350	(4)
Visual Merchandise/Store Design II .....	AMM	374	(3)
Visual Merchandise/Store Design III. ....	AMM	470/470A	(2/1)
Visual Merchandise/Store Design IV. ....	AMM	474/474A	(2/1)
Fashion Retailing Simulation. ....	AMM	478/478A	2/2
Industrial Costs and Controls .....	IME	239	(3)
Principles of Marketing Management .....	IBM	301	(4)
Marketing Strategy .....	IBM	302	(4)

Support Courses:

Introduction to Microcomputers .....	CIS	101	(4)
Foreign Language (Spanish or Japanese). ....	FL		(4)
See Advisor			

Restricted Electives: select 23 units from the approved list

### GENERAL EDUCATION

#### Area 1 (12)

A. Freshman English .....	ENG	104	(4)
B. Select one course from list .....			(4)
C. Select one course from list. ....			(4)

#### Area 2 (16)

A. Introduction to Statistics .....	STA	120	(4)
B. Any from list .....	CHM or PHY		(4)
C. Any course from list .....			(4)
D. Any (upper division) course from list .....			(4)

**Area 3 (28)**

A. Fine and Performing Arts – any Art course from list		(4)
B. Philosophy and History – any course from list		(4)
C. Foreign Language – Spanish or Japanese		(4)
D. Economic Institutions	EC 201 or 202	(4)
E. Social Institutions – any course from list		(4)
F. Political and Historical Institutions	AG 101	(4)
G. Integrated Being – any course from list		(4)

**Area 4 (8)**

Introduction to American Government	PLS 201	(4)
United States History	HST 202	(4)

**Area 5 (8) (Upper Division)**

Principles of Management	MHR 301	(4)
Agribusiness Personnel Management	FMA 402	(4)
or Multicultural Organizational Behavior	MHR 318	

**Fashion Merchandising Minor**

This interdisciplinary minor is designed for students other than AMM majors who seek additional study in the fashion industry. The minor provides students with a background in both fashion as well as business to better prepare them to seek employment in manufacturing or retailing. The minor in Fashion Merchandising is administered jointly by the Department of International Business and Marketing and the College of Agriculture.

The attainment of a minor in Fashion Merchandising is accomplished by appropriate selection, timely scheduling, and satisfactory completion of specifically designated courses and electives totaling a minimum of 36 quarter units as outlined below:

Fashion Industry	AMM 101	(4)
Apparel Design Analysis	AMM 210	(4)
Apparel Importing and Exporting	FMA 331	(4)
Principles of Marketing Management	IBM 301	(4)
Marketing Internship	IBM 441/2	(4)
Select two courses from Group A		(8)
Select two courses from Group B or C		(8)

**Group A**

Culture, People and Dress	AMM 108	(4)
Fashion Promotion	AMM 230	(4)
Apparel Product Analysis	AMM 301/301A(2/2)	

**Group B**

Professional Selling	IBM 208	(4)
Retail Management	IBM 308	(4)
Retailing Problems	IBM 447	(4)

**Group C**

Introduction to International Business	MHR 332	(4)
International Marketing Management	IBM 414	(4)
International Food and Agribusiness Marketing I/A/FMA	330	(4)
Strategy in International Marketing	IBM 415	(4)

**COURSE DESCRIPTIONS****AMM 101 Fashion Industry (4)**

History, development and scope of domestic and international fashion industry, investigation of processes and career opportunities in fashion design, production, wholesaling, retailing and promotion. Oral and written findings on current topics relevant to the fashion industry. 4 lectures/problem-solving.

**AMM 108 Culture, People, and Dress (4)**

Study of the interrelatedness of socio-psychological, economic and political/religious influences on dress in historical perspective. Cross-cultural analysis and interpretation of Western and non-Western clothing behavior through written analysis papers. 4 lectures.

**AMM 160/160L Introduction to Textile Science (3/1)**

Introductory study of the chemical and physical properties of textile fibers, dyes and finishes; fabric geometry including yarn and fabric structure; methodologies for evaluating textile properties and performance; textile products as represented by technologies of diverse cultures. 3 lectures, 1 three-hour laboratory.

**AMM 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**AMM 210 Apparel Design Analysis (4)**

Analyze designs for profitable lines based on aesthetic, functional and structural design factors. Use of art principles as applied to clothing design and human body forms as they relate to target customers. Written and oral projects. 4 lecture discussions.

**AMM 230 Fashion Promotion (4)**

Principles and techniques of fashion writing, advertising, publicity and special events to promote and increase sales in wholesaling and retailing of apparel and related products. Written analysis and presentation. 4 lectures/problem-solving.

**AMM 250 Apparel Merchandise Buying I (4)**

Apparel and fashion buying in the retail and wholesale environment. Buyer's role in merchandising and manufacturing management. Sourcing apparel and other fashion items. Pricing and promoting apparel. Written and oral projects. 4 lectures/problem-solving.

**AMM 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor.

**AMM 301/301A Apparel Product Analysis (2/2)**

Analysis and comparison of techniques and equipment used to produce apparel products. Manufacturing terms and construction methods using industrial equipment. Written and oral projects. Concurrent enrollment required. 2 lectures/problem-solving, 2 two-hour activities. Prerequisite: all lower division AMM courses or equivalent.

**AMM 310 Apparel Product Development I (3)**

Analysis of fashion merchandising principles and problems, merchandising goals and plans related to apparel product development. Relationship of fashion information, fashion services, apparel suppliers, production considerations and PDM technology to successful development of a complete apparel product line. Written and oral projects. 3 lectures/problem-solving. Prerequisite: all lower division AMM courses or equivalent.

**AMM 314/314A Apparel Product Development II (2/2)**

Principles and methods of developing apparel designs and speci-

cations. Uses of CAD in development of specific apparel products to execute merchandise plans. Written and oral analysis projects. Concurrent enrollment required. 2 lectures/problem-solving, 2 two-hour activities. Prerequisite: AMM 310.

#### **AMM 350 Apparel Merchandise Buying II (4)**

Intensive study of apparel buying processes, strategic planning, assortment development and purchase order management. Written analysis of competitive positioning, market share strategy and sales forecasting. 4 lecture/problem-solving hours. Prerequisite: Completion of AMM 250 or equivalent.

#### **AMM 370/370A Visual Merchandising/Store Design I (2/1)**

Understanding of design principles and color theory as they relate to display areas and interior design of stores. Analysis of their use in merchandising of goods and customer appeal. Experimental application to all facets of apparel retailing. Written and oral projects. Concurrent enrollment required. 2 lectures/problem-solving, 1 two-hour activity. Prerequisite: all lower division AMM courses or equivalent.

#### **AMM 374 Visual Merchandising/Store Design II (3)**

A study of historical interiors with application to the design of contemporary stores and visual displays. Focus on interior architecture, furniture, textiles and colors of key periods. Written and oral projects. 3 lecture-problem solving hours. Prerequisite: AMM 370/370A.

#### **AMM 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **AMM 410/410A Apparel Product Development III (2/2)**

Development of apparel product prototypes, "samples" and "duplicates." Uses of PDS technology in development of "first pattern." Fit standards and verification. Criteria for evaluation of apparel product prototypes, "samples" and "duplicates." Written and oral student projects and presentations. Concurrent enrollment required. 2 lecture/problem-solving, 2 two-hour activities. Prerequisite: AMM 314/314A.

#### **AMM 414/414A Apparel Product Development IV (2/2)**

Principles of production pattern-making, grading and marker-making. Criteria for selection of GMS technology or use of services. Spreading, cutting and final costing determinations. Written and oral analysis projects. Concurrent enrollment required. 2 lectures/problem-solving, 2 two-hour activities. Prerequisite: AMM 410/410A.

#### **AMM 418/418A Apparel Product Development Simulation (2/2)**

Principles, procedures and practices in producing a line of clothing for the ready-to-wear fashion industry. Written and oral presentation of solutions to fashion production problems unique to ready-to-wear. Concurrent enrollment required. 2 lectures, 2 two-hour activities. Prerequisite: AMM 414/414A.

#### **AMM 442 Internship (1-8)**

New, on-the-job professional experience related to apparel manufacturing or fashion retailing. A valuable contribution toward career goals based on completed coursework. Periodic analytical reports required. Prerequisite: prior consent of faculty coordinator.

#### **AMM 460/460L Advanced Textile Science (3/1)**

Theoretical analysis of textile structures. Assessment of current research and development in textiles. Evaluation of chemical and physical properties of fibers, fabrics, dyes and finishes. 3 lectures, 1 three-hour laboratory. Prerequisite: AMM 160/160L.

#### **AMM 470/470A Visual Merchandising/Store Design III (2/1)**

Techniques used to present visual displays and store design. Selection and application of materials and equipment drawing of floor plans, color boards, models and containers. Appreciation for creative use and limitations of available materials. Written and oral projects. Concurrent enrollment required. 2 lectures/problem-solving, 1 two-hour activity. Prerequisite: AMM 374.

#### **AMM 474/474A Visual Merchandising/Store Design IV (2/1)**

The study of space and lighting principles in store design and product display. Guidelines and codes regulating the use of space and lighting. The application of lighting to attract target customers, provide a positive visual environment and sell merchandise. Written and oral projects. Concurrent enrollment required. 2 lectures/problem-solving, 1 two-hour activity. Prerequisite: AMM 470/470A.

#### **AMM 478/478A Fashion Retailing Simulation (2/2)**

Design and develop displays, department and store layouts using principles and techniques of visual merchandising. Develop a buying plan, identify sources, and schedule promotions. Analyze existing sites and critique case studies. Written and oral projects. Concurrent enrollment required. 2 lectures/problem-solving, 2 two-hour activities. Prerequisite: AMM 474/474A.

#### **AMM 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor.

## FOOD MARKETING and AGRIBUSINESS MANAGEMENT

This major is offered in the Food Marketing and Agribusiness Management/Agricultural Education Department. Two career tracks are offered within the major: International Agribusiness, and Food Marketing and Management.

Edison I. Cabacungan, Chair

William C. Hughes  
Marvin L. Klein  
Arthur F. Parker  
James M. Weidman

The Food Marketing and Agribusiness Management major teaches the application of business concepts to the agricultural industry. Because of the wide selection of course offerings, a broad range of occupational choices is available to the graduate. These include the banking and finance area, food and fiber processing, sales and marketing positions, federal, state and county government units, agricultural communications, farm and ranch management, commodity and produce brokerage, international trade, packing house management and supermarket management. The core is designed to provide students with an understanding of the basic functions of business and the application of theory and practice to the agribusiness industry. The directed electives and career tracks allow the student to design a curriculum that is more closely in tune with the student's career goals. The two career tracks allow students to tailor course work to their particular interests.

The International Agribusiness track includes courses within the university to prepare students for employment in some aspect of international trade, with more emphasis given to the international marketing area. The Food Marketing and Management track is directed more towards the domestic agribusiness industry. Within this track, students can generally emphasize some aspect of marketing or management with courses in both agriculture and business. Interested students can even direct their course work towards a specific technical area such as management of crop or animal enterprise. As a supplement to classroom and laboratory meetings, field trips are taken to distribution centers, production areas, and other related industries within agriculture. Frequent visits by guest speakers from leading agricultural firms further ensure that students gain practical, current knowledge. In addition to business management, sales, and sales-promotional training, students may elect studies in specified production fields to gain valuable production techniques and experience necessary for job competency. As a senior, the student is encouraged to take part-time employment in a related agricultural industry of interest and to work closely with management people in the development of the senior feasibility study.

### CORE COURSES FOR MAJOR

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

Orientation to the College of Agriculture. . . . .	AG	100	(1)
Agriculture and the Modern World . . . . .	AG	101	(4)
Introduction to Microcomputing . . . . .	CIS	101	(4)
Global Resources for Food. . . . .	IA	101	(4)
Managing Agribusiness Organizations. . . . .	FMA	201	(3)
California and World Agriculture . . . . .	FMA	300	(3)
Food and Agribusiness Marketing . . . . .	FMA	304	(4)
Seminar in Food and Agribusiness Management	FMA	310	(3)
Applied Economics for Agribusiness . . . . .	FMA	311	(4)
Politics of Food and Agriculture. . . . .	FMA	313	(3)

Accounting for Agribusiness . . . . .	FMA	324	(4)
Financial Analysis for Agribusiness. . . . .	FMA	326	(4)
International Food and Agribusiness Management. . . . .	FMA	330	(4)
Data Management for Agribusiness . . . . .	FMA	375	(4)
Senior Feasibility Study. . . . .	FMA	490	(3)
or Internship in Food Marketing and Agribusiness Management . . . . .	FMA	441	(3)
Senior Seminar . . . . .	FMA	491	(2)
Ethical Issues in Agriculture . . . . .	AG	401	(4)
Development of Leadership Skills. . . . .	AG	464	(3)

### SUPPORT AND ELECTIVE COURSES

(Required of all students) A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Legal Environment of Business Transactions. . . .	FRL	201	(4)
Marketing Strategy . . . . .	IBM	302	(4)
Professional Selling . . . . .	IBM	208	(4)
or Buyer Behavior. . . . .	IBM	411	(4)
or International Marketing Mgmt. . . . .	IBM	414	(4)
or another marketing courses (see advisor). . . .			(4)
Career track (see advisor). . . . .			(46)
Unrestricted Electives. . . . .			(4-5)

### GENERAL EDUCATION COURSES

#### Area 1:

a. Freshman English I . . . . .	ENG	104	(4)
b. Advocacy and Argument . . . . .	COM	204	(4)
or Public Speaking . . . . .	COM	100	
c. Freshman English II . . . . .	ENG	105	(4)
or Critical Thinking . . . . .	PHL	202	

#### Area 2:

a. Statistics with applications . . . . .	STA	120	(4)
b. Choose one course . . . . .			(4-5)
c. Choose one course . . . . .			(4)
d. Choose one course . . . . .			(4)

#### Area 3:

a. Choose one course . . . . .			(4)
b. Choose one course . . . . .			(4)
c. Choose one course . . . . .			(4)
d. Principles of Economics . . . . .	EC	201	(4)
e. Choose one course . . . . .			(4)
f. Choose one course . . . . .			(4)
g. General Psychology . . . . .	PSY	201	(4)

#### Area 4:

Introduction to American Government . . . . .	PLS	201	(4)
United States History . . . . .	HST	202	(4)

#### Area 5:

Marketing Principles . . . . .	IBM	301	(4)
Multicultural Organizational Behavior . . . . .	MHR	318	(4)

### AGRICULTURAL BUSINESS MANAGEMENT MINOR

Accounting for Agribusiness . . . . .	FMA	324	(4)
Financial Analysis for Agribusiness I . . . . .	FMA	326	(4)
Agribusiness Enterprise Management. . . . .	FMA	328	(4)

Select 20 units from the following:

Global Resources for Food. . . . .	IA	101	(4)
Managing Agribusiness Organizations. . . . .	FMA	201	(3)



Sales and Advertising Management . . . . .	FMA	225	(4)
California and World Agriculture . . . . .	FMA	300	(3)
Agricultural Commodity and Futures Trading . . .	FMA	305	(3)
Wholesaling and Retailing of Food . . . . .	FMA	306	(4)
Seminar in Food and Agribusiness Management	FMA	310	(3)
Applied Economics for Agribusiness . . . . .	FMA	311	(4)
The Politics of Food and Agriculture . . . . .	FMA	313	(3)
Equine Enterprise Management. . . . .	FMA	329	(3)
International Food and Agribusiness Marketing .	FMA	330	(4)
Data Management for Agribusiness . . . . .	FMA	375	(4)
Operations Management for Agribusiness. . . .	FMA	376	(4)
Agribusiness Personnel Management . . . . .	FMA	402	(4)
Food and Agricultural Marketing Applications. .	FMA	405	(4)
Equine Investment Management. . . . .	FMA	429	(3)
Assessing International Agrimarketing Opportunities. . . . .	FMA	431	(4)
Real Property Appraisal and Acquisition . . . .	FMA	406	(4)
Total Units . . . . .		32	

**INTERNATIONAL AGRICULTURAL BUSINESS MANAGEMENT MINOR**

Global Resources for Food. . . . .	IA	101	(4)
California and World Agriculture . . . . .	FMA	300	(3)
International Food and Agribusiness Marketing .	FMA	330	(3)
Agricultural Policy in Developing Nations . . . .	IA	362	(4)
Food and Agricultural Marketing Applications. .	FMA	405	(4)
Assessing International Agrimarketing Opportunities. . . . .	FMA	431	(4)
Internships in Agricultural Business Management. . . . .	FMA	441/442	(2-3)
Select two courses* . . . . .			(6-8)
Total Units. . . . .		30-33	

\*1. College of Agriculture majors can take either

- Two FMA courses or
- Two internationally-oriented College of Business courses or
- One of each

2. Non-College of Agriculture majors must take two non-FMA College of Agriculture courses to provide technical expertise.



**COURSE DESCRIPTIONS**

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

**FMA 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**FMA 201 Managing Agribusiness Organizations (3)**

A comprehensive overview of management fundamentals emphasizing the study of management and business organizations in the contemporary food and agricultural system. Includes various management theories, approaches and techniques and how they might be applied to organizations within the food and agricultural system. The conflict between organizational and personal values will also be covered. 3 lectures.

**FMA 225 Sales and Advertising Management (4)**

Industry-sponsored agricultural advertising programs; tools of publicity, merchandising and public relations. Detailed examination of local types of advertising media, and rates for short, seasonal promotions. Advertising provisions of marketing orders. Seminar type discussions and guest speakers. 4 lecture discussions.

**FMA 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor.

**FMA 300 California and World Agriculture (3)**

Discussion and analyses of contemporary issues of the food and agricultural system in California and the world. Overview of principles and issues such as the resource base, environmental and health consequences of production and marketing, international trade and free trade agreements, and designing an economically and environmentally sustainable food and agricultural system for California and the world. 3 lecture/discussions. Prerequisite: EC 201 or consent of instructor.

**FMA 304 Food and Agribusiness Marketing (4)**

Economic aspects of marketing agricultural products. Problems and alternative solutions of various marketing institutions. Current trends and developments in California product marketing. 4 lectures. Prerequisite: EC 201 or permission of the instructor.

**FMA 305 Agricultural Commodity Marketing and Futures Trading (3)**

Principles of marketing agricultural commodities. Understanding the operation of commodity markets, developing marketing strategies and learning the mechanics of futures trading. Application for specific commodities. 3 lectures.

**FMA 306 Wholesaling and Retailing of Food Products (4)**

Principles and practices of distributing food products from producer to consumer; buying, assembling, transporting, handling, receiving and merchandising. Functions of wholesalers and intermediate handlers, chain stores, food brokers, jobbers. Operating costs of retail stores; site selection; scheduling; management of store personnel; pricing, inventory control. 4 lectures.

**FMA 310 Seminar in Food and Agribusiness Management**

Seminar on special problems encountered in food and agribusiness business management with an emphasis on the food consumer. Economic, social, cultural and demographic factors influencing consumer behavior and consumption patterns covered. Market surveillance techniques used by managers will also be discussed. 3 Lecture/discussions. Prerequisite: Junior status or food/agribusiness industry experience.

**FMA 311 Applied Economics for Agribusiness (4)**

Intermediate micro-economic theory applied to production and marketing problems in agriculture. 4 lectures/problem-solving. Prerequisite: EC 201 or equivalent.

**FMA 313 Politics of Food and Agriculture (3)**

The political framework affecting the food and agricultural system. Federal and state laws and regulations impacting agribusiness. Contemporary development and economic analysis of public programs and policies. Current policies and programs as well as alternate policies evaluated. Seminar discussions. Policy case studies. 3 lecture discussions. Prerequisite: EC 201 or consent of instructor.

**FMA 324 Accounting for Agribusiness (4)**

Emphasis on the practical applications of accounting information for managers of food marketing and agribusiness management. Analysis of accounting data and its meaning for management and financial decisions. Includes the basics of recording transactions as well as accounting for assets, liabilities, owner's equity and net income, and the interpretation of this information. 4 lectures/problem-solving.

**FMA 326 Financial Analysis for Agribusiness I (4)**

Techniques of financial analysis. To include capital budgeting, sources of loans for agribusiness, analysis of financial statements, credit instruments, risk and insurance for agriculture, farm credit system. 4 lectures/problem-solving. Prerequisite: FMA 324.

**FMA 327 Financial Analysis for Agribusiness II (3)**

Continuation of FMA 326. Financial forecasting, leverage and growth, further topics in the time value of money, working capital management, financing operations. 3 lectures. Prerequisite: FMA 326.

**FMA 328 Agribusiness Enterprise Management (4)**

Criteria for decision making involving food and agribusiness enterprises. Case studies used. Budgeting processes, credit use, and feasibility analysis. Source of economic information. Introduction to simulation of management process. Seminar discussions and feasibility study prepared. 4 lectures.

**FMA 329 Equine Enterprise Management (3)**

Equine enterprise analysis with emphasis on capital acquisition, leasing, land acquisition, legal problems and labor problems. 3 lectures. Prerequisites: FMA 328, AVS 125/125L.

**FMA 330 International Food and Agribusiness Marketing (4)**

Marketing of food, fiber and horticultural products in foreign markets. Special emphasis on selecting export markets, procedures for establishing contacts, promotion, financing, insuring, shipping tariffs, customs, regulations and other matters related to food and fiber products. Management practices and problems of firms involved in exporting and importing textiles and garments, livestock, fruits, vegetables, grains and other food and fiber products. 4 lecture discussions.

**FMA 331 Apparel Importing and Exporting (4)**

Fundamentals of apparel importing and exporting. Analysis, planning and implementation of strategies for global marketing of apparel. Management practices and issues facing firms that are involved in the importing and exporting of apparel. 4 lecture discussions. Prerequisite: Course in micro-economics or marketing would be desirable but not required.

**FMA 350/LIS 350 Water and Civilization (4)**

Water and its relationship to civilization from ancient history to modern developments. Survey of global water resources and current issues of distribution, relationship to economic development, and the environment. Analysis of state and regional water supplies, water districts. Determination of water requirements for agriculture in arid and humid regions.

**FMA/IA 360 Agricultural Cooperatives (4)**

Structure, management and organization of the Agricultural Cooperative with emphasis upon current management practice. Includes comparison of cooperative with other business forms, ideals, history, and progress of the cooperative movement, problems in establishing a new cooperative; financing and membership problems. 4 lecture discussions.

**FMA 375 Data Management for Agribusiness (4)**

Principles and procedures involved in analysis of agricultural data for management. Includes single two-sample hypothesis testing for means and proportions. Chi-square, simple and multiple regression and correlation. Microcomputer applications. 4 lectures/problem-solving. Prerequisite: STA 120 or equivalent.

**FMA 376 Operations Management for Agribusiness (4)**

Application of statistical and other quantitative techniques employed in agricultural economic and operations analysis. Areas covered include statistical forecasting, resource allocation, break-even analysis, project management, inventory control, total quality management (TQM), and quality control. 4 lectures/problem-solving. Prerequisite: FMA 375.

**FMA 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**FMA 402 Agribusiness Personnel Management (4)**

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

**FMA 405 Food and Agricultural Marketing Applications (4)**

An application of theories, principles and procedures involved in developing a marketing strategy. Students will work as a team to develop a marketing plan for an agricultural product. Topics covered will include all aspects of food and fiber market strategy planning such as identifying a target market, analyzing market opportunities, developing a marketing mix, and completing a budget for the plan. Course requirement: Current NAMA membership. 4 lecture discussions.

**FMA 406 Real Property Appraisal and Acquisition (3)**

Principles, methods and techniques of appraising agricultural real property for loans, purchase and sale, tax assessments, condemnations, and other purposes. 3 lecture discussions.

**FMA 429 Equine Investment Management (3)**

In-depth analysis of equine investments. Emphasis on capital acquisition, equine tax law, limited partnerships, joint ventures, and stallion or mare syndications. 3 lectures.

**FMA 431 Assessing International Agrimarketing Opportunities (4)**

Comparative agribusiness systems and methods to assess international agribusiness trade and foreign investment opportunities. Analyzes the international forces with which the international agribusiness firm must contend and potential responses. Includes integration of foreign food and agricultural marketing, natural resource and production policies with impact on private sector responses. Term project on a product and country required. 4 lectures/discussions. Prerequisites: IA 101, FMA 300 or IA 362, and FMA 330, or equivalents.

**FMA 441, 442 Internship in Food Marketing and Agribusiness (1-4) (1-4)**

On-the-job training in agricultural business management providing collegiate level experience in food distribution, agricultural management. One unit credit for each 120 hours of experience and training. No more than 6 units of credit can be earned. Useful for preparation of senior project. Application to coordinator required during the quarter prior to the internship.

**FMA/IA 450 Agricultural Water Resource Management (4)**

Water resource management applied to current issues. Water delivery systems in the U.S. and California, survey of water rights, water pollution, water conservation, food and agricultural system water use, and efficient water management. Includes water problems in developing nations. 4 lecture discussions.

**FMA 461, 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. Must be taken in sequence, not concurrently. Prerequisites: FMA 101, 311, 324, 326, 375.

**FMA 463 Undergraduate Seminar (2)**

New methods and developments, practices, and procedures in the field. 1 meeting. Prerequisite: senior project completed.

**FMA 490 Senior Feasibility Study (3)**

Selection and completion of a major feasibility study under faculty supervision. Prerequisites: FMA 311, 324, 376.

**FMA 491 Senior Seminar I (2)**

The first course in the capstone series for majors. Panel discussions and debates on current topics. Also includes career-related activities involving interviews with industry representatives and resume writing. 2 seminars. Prerequisite: FMA 490.

**FMA 492 Senior Seminar II (2)**

The second course in the capstone series for majors. Includes debates on current topics, case studies monitored by faculty in various

specialities as well as industry representatives. Students will give video-taped presentation. 2 seminars. Prerequisite: FMA 491.

**FMA 499/499A/499L Special Topics for Upper Division Students  
(1-4)/(1-4)/(1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination of lecture and laboratory or activity. Prerequisite: permission of instructor.

**FMA 575 Statistics for Agriculture (4)**

A summary of statistical tools and techniques used in agriculture. Includes hypothesis testing, Chi Square, ANOVA, correlation, as well as simple and multiple regression. Application of computer to selected statistical techniques. Review of statistical literature from various fields of agriculture. Open to graduate students only. 4 lectures/problem-solving. Prerequisite: STA 120 or equivalent.



## FOODS AND NUTRITION

The Foods and Nutrition major offered in the Department of Food, Nutrition and Consumer Sciences has four options. These are: Dietetics, Foods in Business, Food Science and Consumer Science. The Food, Nutrition and Consumer Sciences Department also provides a program which meets the subject matter requirements for the Single Subject Teaching Credential in Home Economics and Designated Subjects Credential in Adult and Vocational Education. See the program requirements following those of Foods and Nutrition.

Anahid T. Crecelius, Chair

Nenita B. Cabacungan  
Kara Caldwell-Freeman  
Marie A. Caudill  
Ramiro C. Dutra  
Bonni Farmer  
Mark S. Meskin  
Martin F. Sancho  
Ruby Trow

A Bachelor of Science degree with a major in foods and nutrition prepares students for challenging and rewarding careers and provides a strong academic background for graduate study and research. Foods and nutrition majors select a career track to gain experience in technological skills, problem-solving, communication skills, interpersonal relations, and organizational and leadership competencies as applied to the areas of dietetics, business, industry, food science, and consumer science.

High school students planning to major in foods and nutrition are advised to build a background in foods, chemistry, mathematics, and biology. Community college students should concentrate on chemistry (including organic), biology (including bacteriology), foods, nutrition, statistics, communication skills, and general education.

The curriculum, facilities, and faculty reflect the Food, Nutrition and Consumer Sciences Department's commitment to a strong, up-to-date, science-based undergraduate program that provides the types of skills and knowledge needed by graduates to meet professional goals. Career options offered within the major are the following:

### Dietetics Option

This career option is an Approved American Dietetic Association Didactic Program in Dietetics. Students pursuing career goals in the dietetic field qualify for post-graduate internships, preprofessional practice programs, and/or graduate programs which can lead to membership in the American Dietetic Association (ADA). The department offers a post-baccalaureate Dietetic Internship Program which is accredited by the American Dietetic Association. Upon completion of a dietetic internship or pre-professional practice program, students are eligible to take an examination to become registered dietitians. Students requesting transcript evaluation by the ADA will be required to pay an extra transcript fee of \$20 if registered as students at Cal Poly Pomona or \$25 if not currently enrolled. A physiology minor may be included in this career option with a few additional courses.

Dietitians are members of the professional health care team and are experts in food as it relates to health. Dietitians are facilitators who translate scientific knowledge into practical applications so that consumers can make informed decisions about their diet.

Dietitians are employed in critical and long-term care facilities, community and government agencies, schools, and the private sector. Administrative dietitians supervise and coordinate large feeding operations in hospitals, extended care facilities, restaurants, colleges, schools, and businesses.

### Business Option

The business option prepares students for careers in: recipe and product development, product evaluation, food styling, marketing and sales, quality control, sensory evaluation, safety and sanitation and media presentation and promotion and market research. A marketing minor may be included in this career option with a few additional courses.

Students choosing this area not only acquire technical expertise but also develop communication and interpersonal skills. Internships with food and equipment businesses give students on-the-job training.

### Food Science Option

The food science option offers the required background for the technical jobs in the wide employment spectrum of the food industry. Students electing this option are, therefore, prepared for food technology positions including, but not limited to, processing, chemical and microbiological quality assurance, new product development, safety and sanitation, labeling requirements, water and energy conservation, integrated technical management, nutrient analysis of foods and beverages, and government inspection.

This option, which also leads to a minor in chemistry, with a few additional courses, integrates food science with the physical and biological sciences and enables students to advance in the food industry along the lines of production, research or management.

### Consumer Science Option

The Consumer Science option prepares students to interface between industry and the consumer. They will interpret and disseminate technical information to consumers and will be a conduit from the consumer to industry. Consumer scientists are employed by schools, government agencies, non-governmental agencies, business and industry.

Consumer scientists educate individuals and families about their rights, responsibilities and protection as consumers, thus enabling them to make informed decisions about the quality of goods and services in the local and global economy. Consumer scientists also research consumer needs and priorities to inform industry in the appropriate product development and technology.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Orientation to the College of Agriculture. . . . .	AG	100	(1)
Introduction to the Professions . . . . .	FN	100	(1)
Introduction to Foods. . . . .	FN	121/121L	(4)
Nutrition . . . . .	FN	235	(3)
Nutrition Laboratory . . . . .	FN	236L	(1)
Experimental Food Science . . . . .	FN	321/321L	(4)
Current Issues in the Food Chain. . . . .	FN	325	(4)
Cultural Aspects of Food. . . . .	FN	328/328L	(4)
Undergraduate Investigations and Seminar. . . . .	FN	463	(4)
Professional Option Courses (all students must complete one of the following options)			

### Dietetics Option

Nutrition of the Life Cycle. . . . .	FN	335	(4)
Nutrient-Drug Interactions. . . . .	FN	343	(2)
Nutrition Education. . . . .	FN	345/345A	(3)
Community Nutrition. . . . .	FN	346/346L	(3)
Food Service Systems I. . . . .	FN	357/357L	(4)
Food Service Systems II . . . . .	FN	358/358L	(5)

Food Service Systems III	FN	359/359L	(4)
Advanced Nutrition	FN	433	(4)
Advanced Nutrition	FN	434	(4)
Nutritional Assessment	FN	435/435L	(2)
Diet Therapy	FN	443/443L	(4)
Diet Therapy	FN	444	(3)
Ethical Issues in Agriculture	AG	401	(4)
or Bioethics	PHL	433	(4)

**Business Option**

Unit-Operations in Food Processing	FN	317/317L	(4)
Sensory Evaluation of Foods	FN	418/418A	(4)
Food Chemistry and Toxicology	FN	420/420L	(4)
Recipe Development; Food Presentation	FN	421/421L	(4)
Internship	FN	441	(2)
Food Science Colloquium	FN	464	(2)
Consumerism Its Impact and Issues	FNC	245	(4)
Principles of Marketing Management	IBM	301	(4)
Professional Presentation Techniques	FNC	390/390L	(3)
Writing for the Professions	ENG	301	(4)
Ethical Issues in Agriculture	AG	401	(4)
or Bioethics	PHL	433	(4)

**Food Science Option**

Unit Operations in Food Processing	FN	317/317L	(4)
Sensory Evaluation	FN	418/418A	(4)
Food Chemistry and Toxicology	FN	420/420L	(4)
Internship	FN	441/442	(2)
Food Science Colloquium	FN	464	(2)
Meat Science and Industry	AVS	327/327L	(4)
College Chemistry	CHM	123/123L	(4)
Quantitative Analysis	CHM	221/221L	(4)
Spectro Methods	CHM	342/342L	(4)
Separation Methods	CHM	343/343L	(4)
Applied Microbiology	MIC	310/310L	(5)
or Food Microbiology	MIC	320/320L	(4)
Ethical Issues in Agriculture	AG	401	(4)
or Bioethics	PHL	433	(4)

**Consumer Science Option**

Nutrition Education	FN	345/345A	(3)
Family Issues	FNC	101	(4)
Consumerism: It's Impact and Issues	FNC	245	(4)
Family Resource Management	FNC	342	(4)
Professional Presentation Techniques	FNC	390/390L	(3)
Family Financial Behavior	FNC	440	(4)
Writing for Professions	ENG	301	(4)
or Writing as Media Professional	COM	108	(4)
Internship	FN	441	(4)
Ethical Issues in Agriculture	AG	401	(4)

**SUPPORT AND ELECTIVE COURSES**

(Required of all students)

Introduction to Microcomputing	CIS	101	(4)
College Chemistry	CHM	122/122L	(4)
Elements of Organic Chemistry	CHM	201/250L	(4)
Basic Microbiology	MIC	201/201L	(5)
Hotel and Restaurant Sanitation and Safety	HRT	225	(4)
Elements of Biochemistry * #	CHM	321/321L	(4)

Genetics *	BIO	303	(4)
Human Physiology *	ZOO	235/235L	(4)
Trigonometry#	MAT	106	(4)
College Physics#	PHY	121/141L	(4)
College Physics#	PHY	122/142L	(4)

\*Required only for Dietetics Option

#Required for Food Science Option

Directed Electives for Dietetics	(10)
(from approved departmental list)	
Unrestricted Electives for Dietetics	(10)
Directed Electives for Business	(22)
(from approved departmental list)	
Unrestricted Electives for Business	(17)
Directed Electives for Food Science	(7)
(from approved departmental list)	
Unrestricted Electives for Food Science	(10-11)
Directed Electives for Consumer Science	(32)
(from approved departmental list and with prior consent of departmental advisor)	
Unrestricted Electives for Consumer Science	(12)

**GENERAL EDUCATION COURSES**

Required of all students. (73 units) TRACK B

Pick courses from approved lists shown in Schedule of Classes unless specified. Underlined courses are required for major and may also satisfy GE.

**Area 1:**

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

**Area 2:**

A. Introduction to Statistics	STA	120	(4)
B. College Chemistry	CHM	121/121L	(4)
C. Basic Biology	BIO	115/115L	(5)
D. Science, Technology and Civilization			(4)

**Area 3:**

A. Arts			(4)
B. Philosophy and History			(4)
C. Literature and Foreign Language			(4)
D. Economic Institutions			(4)
E. Social Institutions			(4)
F. Agriculture and the Modern World	AG	101	(4)
G. General Psychology	PSY	201	(4)

**Area 4:**

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

**Area 5:**

Dietetics Option: FMA 324 and FMA 328  
 Business Option: FMA 324 and FMA 328  
 Food Science Option: FMA 324 and FMA 328  
 Consumer Science Option: SOC 321 and SOC 323

**FOODS AND NUTRITION MINOR**

The purpose of the minor in Foods and Nutrition is to help students understand the role that nutrients play in maintaining good health.

Introduction to Foods	FN	121/121L	(4)
Current Issues in the Food Chain	FN	325	(4)
Nutrition Science and Health	FN	305	(4)

or Introduction to Nutrition .....	FN	235	
and Nutrition Laboratory .....	FN	236L	
Nutrition of the Life Cycle .....	FN	335	(4)
Community Nutrition .....	FN	346/346L	(3)
College Chemistry .....	CHM	121/121L	(4)
College Chemistry .....	CHM	122/122L	(4)
Elements of Organic Chemistry .....	CHM	201/250L	(4)
One upper division FN class .....			(3-4)
Total units required .....			(38-39)

### COURSE DESCRIPTIONS

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

#### FN 100 Introduction to the Profession (1)

Orientation to careers in Dietetics, Food Science, Foods In Business, and Consumer Science. Introduction to professional associations, publications and legislation pertinent to the professions discussed. Required of all FNCS students. 2 hour activity.

#### FN 121/121L Introduction to Foods (2/2)

Scientific principles and techniques of food preparation by conventional and microwave methods. Study of food categories, elements of food sanitation, legislation and consumer choices. 2 lectures, 2 three-hour laboratories. Concurrent enrollment required.

#### FN 200 Special Problems (1-2)

Individual or group investigation, research, studies or surveys of selected problems for lower division students. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### FN/KIN 203 Health, Nutrition and the Integrated Being (4)

Investigation of specific areas of the integrated being dealing with nutrition, stress, drugs, sexuality, major health problems and death and dying. Understanding their effect on "the integrated being" and the development of behaviors and actions that will promote optimum physical and mental health. Meets General Education Area 3g requirement. Team- taught. 4 lecture discussions.

#### FN 205 Contemporary Nutrition (4)

Concepts of nutrition related to macro-nutrients, micro-nutrients, and energy metabolism. Food intake and its relationship to health. Use of the scientific method to assess the reliability of nutrition information. Computer analysis and written evaluation for individual dietary intake. 4 lectures/problem-solving. For students not majoring in Foods and Nutrition.

#### FN 228 Food and Culture (4)

Interrelationship of food availability, historical developments, socio-economic institutions, political, religious, and other influences on food





patterns. In-depth study of a selected culture group. Oral presentation and discussion of group projects. 4 lectures.

### **FN 235 Nutrition (3)**

Role of the carbohydrates, lipids, proteins, minerals, vitamins and water, in human nutrition. Dietary standards and recommended allowances. Computation of nutritional needs and written dietary analysis. Oral report of selected nutrients. 3 lectures/problem-solving. Prerequisite: CHM 201, 250 or equivalent. To be taken concurrently with FN 236L.

### **FN 236L Nutrition Laboratory (1)**

Introduction to techniques and experiments used in nutrient analysis in foods and nutritional assessment in living organisms. 1 three-hour laboratory. Prerequisites: CHM 201, 250 or equivalent. To be taken concurrently with FN 235.

### **FN 299/299A/299L Special Topics (1-4)**

Group study of a selected topic, the title to be specified in advance for lower division students. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor.

### **FN 305 Nutrition, Science and Health (4)**

Integrative approach to nutrition, health and fitness based on physiological and chemical principles. Role of diet and other influences that affect wellness and prevention of degenerative disease. Nutritional self-assessment. Written critiques of current controversies and other assigned topics. 4 lecture discussions. Prerequisite: Completion of Category II A, B, C of General Education or consent of instructor.

### **FN 317/317L Unit Operations in Food Processing (3/1)**

Principles of food processing including refrigeration, freezing, dehydration, canning, and fermentation as they relate to the technology of foods and beverages. Introduction to ecology. Field trips. 3 lectures, 1 three-hour laboratory. Prerequisite: MIC 201/201L or equivalent. Concurrent enrollment required.

### **FN 321/321L Experimental Food Science (2/2)**

Experimental approach to solve food preparation problems. Recent developments in food ingredient uses and food preparation techniques. Individual guided projects involving problem identification, literature search, project design, data collection, critical analysis of data, oral and written presentation of findings. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: FN 121/121L, CHM 201, CHM 250, STAT 120. Concurrent enrollment required.

### **FN 325 Current Issues in the Food Chain (4)**

Scientific analysis of current national and global issues in the production, processing, distribution and consumption of foods as related to health, safety, and consumer protection. 4 lecture discussions.

### **FN 328/328L Cultural Foods (3/1)**

Relation of environment, technology, religion, social institutions and other aspects of culture to food patterns of selected cultures, countries and regions. Individual oral reports and group projects involving selection, preparation, presentation and evaluation of food patterns. 3 lectures/problem-solving, 1 three-hour laboratory. Concurrent enrollment required.

### **FN 335 Nutrition of the Life Cycle (4)**

Nutritional needs of pregnancy, lactation, childhood, adolescence,

adulthood and the aged. Planning and computation of normal diets for all phases of the life cycle. Reading and reporting of current developments in nutrition. 4 lectures/problem-solving. Prerequisite: FN 205, FN 305 or FN 235/236L, ZOO 235/235L.

### **FN343 Nutrient-Drug Interactions (2)**

Basic principles of absorption, distribution, biotransformation and excretion of drugs. Introduction to the biochemical and physiological effects of drugs and their mechanisms of action. Effect of drugs on nutritional status. Nutritional effects on drug absorption, metabolism, action and potency. 2 lecture discussions.

### **FN 345/345A Nutrition Education (2/1)**

Principles of learning and evaluation applied to nutrition. Development of instructional systems, including objectives, learning activities and strategies in various settings. Identifications and analysis of current problems inherent in such applications. Discussion and critique of student reports. 2 lectures/problem-solving, 1 two-hour activity. Prerequisites: FN 205, FN 305 or FN 235/236L. FN 328/328L and PSY 201. Concurrent enrollment required.

### **FN 346/346L Community Nutrition (2/1)**

Goals and trends in community nutrition. Dietary methodology. National nutrition status surveys. Role of public and private agencies in community nutrition programs. Analytical tools. Grantsmanship, public policy and legislation, 2 lectures, 1 three-hour laboratory. Prerequisites: FN 205 235/236L or FN 305. FN 221/221L, FN 335, FN 345/345A or consent of instructor. Concurrent enrollment required.

### **FN 357/357L Foodservice Systems I (3/1)**

Introduction to foodservice management through a systems approach perspective. Development of goals, objectives, policies and procedures for foodservice facilities. Beginning of facility planning project. 3 lectures, 1 three-hour laboratory. Prerequisite: FN 121/121L. Concurrent enrollment required.

### **FN 358/358L Foodservice Systems II (3/2)**

Management of foodservice facilities using menu as a basis for determining recipes, specifications, receiving and storage standards. Purchasing for the foodservice industry. Continuation of facility planning project. 3 lectures, 2 three-hour laboratories. Prerequisite: FN 357/357L. Concurrent enrollment required.

### **FN 359/359L Foodservice Systems III (2/2)**

Production planning, quantity food production, distribution and service, and equipment and layout in foodservice facilities. Principles and practices in planning, preparing and serving food. Completion of facility planning project. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 358/358L. Concurrent enrollment required.

### **FN 400 Special Problems (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems for upper division students. Total credits limited to 4 units, with a maximum of 2 units per quarter.

### **FN 418/418A Sensory Evaluation of Foods (2/2)**

Methods of sensory evaluation of food products. Includes difference and preference testing, applications in food research and development, consumer testing. Statistical analysis of results. 2 lectures, 2 two-hour activities. Prerequisite: STA 120, computer competency or consent of instructor. Concurrent enrollment required.



**FN 420/420L Food Chemistry and Toxicology (2/2)**

Chemical composition of foods. Chemical changes occurring during processing and storage. Detection of deterioration, adulteration and contamination with toxic materials. Laboratory analysis of various types of food. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 201, 250. Concurrent enrollment required.

**FN 421/421L Recipe Development and Food Presentation (2/2)**

Sources of recipes, testing procedures and recipe writing for conventional and microwave food preparation. Development of recipe brochure, including photography. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 121/121L or consent of instructor. Concurrent enrollment required.

**FN 433 Advanced Nutrition (4)**

Metabolic, physiological and biochemical functions of nutrients on the cellular level. Understanding and integrating the structures and functions of the various sub-cellular components and their role in maintaining a healthy organism. Oral and written analyses of current research. 4 lectures/problem-solving. Prerequisites: CHM 321/321L, FN 235, FN 236L, ZOO 235/235L To be taken concurrently with FN 435/435L.

**FN 434 Advanced Nutrition (4)**

Hormonal effects upon nutrient absorption, transport and utilization. Hormonal interactions and their effects on metabolism and diseases of hormonal origin. Update and analysis of current research. Preparation of an extensive annotated bibliography. 4 lectures/problem-solving. Prerequisite: FN 433.

**FN 435/435L Nutritional Assessment Methods (1/1)**

Evaluation of nutritional status by laboratory methods. Anthropometric measures, determination of nutrient levels in the diet and biochemical analysis of nutrients/metabolite in body fluids. 1 lecture, 1 three-hour laboratory. To be taken concurrently with FN 433. Concurrent enrollment required.

**FN 441, 442 Internship in Foods and Nutrition (1-8) (1-8)**

On-the-job training in foods and nutrition, providing professional level experiences in food service, community nutrition, research, and quality control. Experiences may be useful for preparation of senior projects. Total credit for each course is limited to eight units. Prerequisite: permission of coordinator required in advance.

**FN 443/443L Diet Therapy (3/1)**

Relationship between diet and health with emphasis on specific dietary requirements associated with certain diseases and conditions. 3 lectures, 1 three-hour laboratory. Prerequisite: FN 335, FN 433, and FN 435/FN 435L. Concurrent enrollment required.

**FN 444 Diet Therapy (3)**

Relationship between diet and health with emphasis on specific dietary requirements associated with certain diseases and conditions. 3 lectures. Prerequisite: FN 443/443L.

**FN/IA 445 Nutrition/International Development (4)**

Issues in international and national food policy formulation and implementation as well as impacts on development are discussed. Concerns about food and nutrient distribution and availability, malnutrition and human productivity are also included. 4 lectures.

**FN 461 Investigative Process in Foods and Nutrition**

Methods of defining problems and scientific investigations, assessing needs, data gathering and locating resources. Critical thinking involved in the writing of proposals and investigation of integrated issues through written reports based on library research. 2 lectures. Prerequisites: ENG. 104, 105, or COM 216; senior standing.

**FN 462 Senior Project (2)**

Independent study with approval of advisor. Project may be experimental design, survey research, content analysis, community service, or development of information/technology base. A written report will be submitted. Prerequisite: FN 461

**FN 463 Undergraduate Investigations and Seminar (4)**

Individual investigations and group studies of foods and nutrition issues. Oral presentations and written reports. 4 seminar-discussions. Prerequisites: COM 204, ENG 105 and senior standing.

**FN 464 Food Science Colloquium (2)**

Classroom interaction of students with selected food industry leaders focusing on technical, economic, regulatory, and new product trends as they impact occupational opportunities in the food and beverage industries. Written reports. 2 lectures. Prerequisite: senior standing.

**FN 499/499A/499L Special Topics (1-4)**

Group study of a selected topic, the title to be specified in advance for upper division students. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination of both. Prerequisite: permission of instructor.

**FNC 101 Introduction to Family Issues (4)**

An introduction to family studies covering issues related to family demographics, types of families, living arrangements, paths to family formation, childbearing patterns, changing roles of family members, economic well-being, child care and future outlook for children. Lecture, discussion, case studies, analysis of data sets, and student project related to a current issue. 4 lectures/problem-solving.

**FNC 245 Consumerism: Its Impact and Issues (4)**

Analysis of the role of consumption in economic systems. The consumer movement past, present and future viewed as a response to economic and social conditions. Contemporary consumer issues, information sources, legislation and protection. 4 lectures/problem-solving hours.

**FNC 342 Family and Workplace Resource Management (4)**

Introductory study of the economic, social and institutional forces that influence resource management of individuals and families. Management principles in relation to use of family resources, family structures, values and goals, problem-solving, and decision-making. 4 lectures/problem-solving.

**FNC 390/390L Professional Presentation Techniques (2/1)**

Techniques and methods used in making professional written and oral presentations and demonstrations in the subject areas of home economics and foods and nutrition for live or video-tape audiences. 2 lectures, 1 three-hour lab.

**FNC 422 Family Housing and Environment (4)**

The housing market as it relates to the social, economic and political settings. Housing styles, trends, issues and lifestyle decisions. 4 lectures/problem-solving.

**FNC 440 Family Financial Behavior (4)**

Impact of family financial decisions on lifestyle choices and coping behavior throughout the family life cycle. Emphasis on professional counseling for financial responsibility. Preparation of financial plans and analysis of investment opportunities. 4 lectures/problem-solving.

**FN 451 Competency Assessment: Portfolios (4)**

Design of prototype measures, planning and constructing performance-based outcomes assessment instruments, competency certification, subject matter standards and framework, applied performance testing, portfolio assessment; research proposal development; measures for program validation and teacher certification. 4 hours lecture/problem-solving.

**FNC 452 Evaluation in Family/Workplace Education Programs (3)**

Design of prototype measures, planning and constructing assessment instruments, competency certification for workplace readiness, subject matter standards; applied performance testing, portfolio assessment; research proposal development; measures for program validation and teacher certification. 3 lectures/problem-solving.

**FNC 453 Workforce Preparation Programs (4)**

Development of workforce training programs, foundation of skills and personal qualities for employability, job descriptions for compliance with the Americans with Disabilities Act, analysis of required employment skills, advisory committee planning and participation, program management and evaluation. Outcomes-based competency certification. 4 lectures/problem-solving. Prerequisite: upper division standing.

**FNC 455 Family Life and Parenting (3)**

Development and implementation of educational programs in family living, parenthood education, and child guidance. Role expectations and elimination of sex stereotyping; special needs of family members including single parents; cultural diversity, societal interactions and reaction to crisis and change. 3 lectures.

**SUBJECT MATTER PREPARATION PROGRAM FOR THE SINGLE SUBJECT CREDENTIAL IN HOME ECONOMICS**

In partial fulfillment of California teacher preparation credential requirements for a Single Subject Teaching Credential in Home Economics, an applicant must demonstrate subject matter competence in one of two ways: (1) complete a subject matter preparation program that has been approved by the California Commission on Teacher Credentialing (CCTC) or (2) earn a passing score on the Single Subject Assessment Test (SSAT) in Home Economics.

The Food, Nutrition and Consumer Sciences Department offers a course of study (pending CCTC approval) leading to subject matter preparation for the California Home Economics Single Subject Credential. Interested individuals should contact the Home Economics Credential Coordinator and plan a schedule of classes in close consultation with that advisor. Additional information about requirements for teaching credentials is available in this catalog and from the School of Education and Integrative Studies (SEIS).

Core coursework for the pre-credential subject matter preparation program reflects studies that meet standards in the following areas: Child Development, Guidance and Education; Resource Management and Consumer Development; Fashion and Textiles; Nutrition; Food Science, Preparation and Service; Living and Working Environments; Individual and Family Health; and Individual and Family Development, Parenting, and Human Services. Completion of this subject matter

preparation program does not fulfill all requirements for a degree. However, by carefully selecting directed and unrestricted electives, these courses can fulfill the track for Consumer Science with a B. S. degree in Foods and Nutrition.

**Pre-Credential Subject Matter Preparation Program for the Single Subject Teaching Credential in Home Economics**

		Units
Introduction to Foods. . . . .	FN	121/121L 4
Nutrition, Science and Health . . . . .	FN	305 4
Cultural Aspects of Food. . . . .	FN	328/328L 4
Internship . . . . .	FN	441/442 4
Introduction to Textile Science . . . . .	AMM	104/104L 4
Apparel Design Analysis. . . . .	AMM	210 4
Family Issues. . . . .	FNC	101 4
Consumerism: Its Impact and Issues. . . . .	FNC	245 4
Family and Workplace Resource Management. . . . .	FNC	342 4
Professional Presentation Techniques . . . . .	FNC	390/390L 3
Family Housing and Environment . . . . .	FNC	422 4
Competency Assessment: Portfolios . . . . .	FNC	451 4
Family Financial Behavior . . . . .	FNC	440 4
Evaluation in Family/ Workplace Education Programs . . . . .	FNC	452 3
Workforce Preparation Programs . . . . .	FNC	453 4
Family Life and Parenting Education. . . . .	FNC	455 3
Family as a Social Institution. . . . .	SOC	321 4
Human Sexuality. . . . .	BIO	301 4
or Human Sexual Behavior. . . . .	PSY	455 (4)
Child Development with Practicum. . . . .	*	— 4
Principles of Clothing Construction. . . . .	*	— 4
Interior Design/Home Furnishings . . . . .	*	— 4

\*Courses not offered at Cal Poly Pomona and must be taken at community or other colleges.

Additional credential preparation courses are required from the School of Education and Integrated Studies as a prerequisite to student teaching. Consult the "Teacher Education" section of this catalog, the Teacher Education Credential Office, and the Home Economics Credential Coordinator for further information.

**DESIGNATED SUBJECTS CREDENTIAL IN ADULT AND VOCATIONAL EDUCATION**

Individuals seeking a California designated Subjects Vocational Teaching Credential will qualify to teach vocational/occupational skills in Adult Vocational Education or in Regional Occupational Programs (ROPs). The Designated Subjects Vocational Teaching Credential is based upon work experience/occupational skills and/or college related work in the vocational area.

Individuals seeking a California Designated Subjects Adult Teaching Credential will be qualified to teach adults. The Designated Subjects Adult Teaching Credential is based upon completion of academic course work. There are a number of possible combinations of work experience and professional preparation which enable potential adult education or vocational teachers to qualify for the California Designated Subjects Teaching Credential. Interested persons should contact the Designated Subjects Credential Coordinator for information and application packets.

**SUPPLEMENTARY TEACHING AUTHORIZATIONS**

An introductory Home Economics Teaching Authorization may be added to an existing Single Subject or Multiple Subjects Teaching Credential qualifying the individual to teach Home Economics subject areas in grades K-9. Consult with the Home Economics Credential Coordinator or the Teacher Education Credential Office for further information.

## HORTICULTURE

Daniel Hostettler, Chair, Horticulture/Plant and Soil Science

Gregory J. Partida, Jr., Coordinator, Fruit Industries

Frederick Roth, Coordinator, Ornamental Horticulture

Edwin Barnes III

Terrance Fujimoto

Frank D. Gibbons III

Kent Kurtz

Peggy S. McLaughlin

Graduates from the Horticulture major can look forward to a wide range of career opportunities. The curriculum is science-based, yet affords men and women the flexibility to enhance their knowledge in specific areas of the horticultural industry. The major is divided into two options of Fruit Industries and Ornamental Horticulture. Specific career track areas include Landscape Management, Park Administration, Nursery Management, Turfgrass Management, and Horticultural Science.

The Ornamental Horticulture option provides students with an extensive background in one of California's largest agricultural industries. The state's increasing urbanization has created the need for professionals educated in home landscaping, parks, golf courses, botanical gardens, and general urban beautification. Increased environmental awareness has created numerous job opportunities in the growing area of maintenance and marketing of indoor and outdoor ornamental and edible plants.

The career track in Landscape Management is supported by a beautiful 1,200-acre campus which serves as a fine collection of plant materials and is a living laboratory for students. Landscape Design courses are supported by a fully-equipped Computer Aided Design (CAD) laboratory. Numerous outdoor landscapes at Cal Poly Pomona in different themes provide hands-on training for our students. The Park Administration career track affords students the opportunity to obtain skills for top level management positions in park systems. The courses in Horticulture provide a solid foundation and these are complemented by course work in public administration, relations, and management. The Turfgrass Management career track emphasizes an important part of the horticulture and parks industries. This track is supported by an excellent field laboratory where students conduct research and operate a commercial sod production area.

The Cal Poly Pomona Nursery supports the Nursery Management career track. This commercial nursery has over 40,000 square feet of greenhouse space, outdoor growing grounds and is home to the Raymond Burr Orchid Collection and Jolly Batcheller Conservatory. Students nurture numerous crops for sale at the Nursery which is open to the public. A new and exciting career track in Horticultural Science provides students the opportunity to transfer to respected graduate programs in Horticulture around the country. Exciting careers in plant breeding, genetics, pathology, and physiology await the advanced student.

The Fruit Industries Option provides students with the practical and scientific background in the production, management, processing, and marketing of fresh citrus, avocado, deciduous, and subtropical fruits. Over 100 acres of commercial bearing land on campus support this program. Students are encouraged to gain hands-on experience via internships or on-campus employment. Two emphasis areas in Fruit Industries are orchard management and fruit processing and marketing. These areas encourage students to explore areas of interest within California's large citrus, avocado, and deciduous fruit areas. Cal Poly Pomona has numerous alumni in top positions throughout the industry.

Citriculture was one of the first degree programs offered at Cal Poly Pomona. Graduates of Fruit Industries are in demand throughout the industry.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Orientation to the College of Agriculture. . . . .	AG	100	(1)
Agriculture and the Modern World . . . . .	AG	101	(4)
Ethical Issues in Agriculture . . . . .	AG	401	(4)
Introduction to Arthropods. . . . .	AGB	165/165L	(4)
Environmental Toxicology. . . . .	AGB	411	(4)
Weeds and Weed Control . . . . .	AGR	330/330L	(4)
Crop Ecology . . . . .	AGR	401	(4)
Plant Structures and Functions. . . . .	BOT	124/124L	(5)
Plant Pathology . . . . .	BOT	323/323L	(4)
Senior Project . . . . .	HOR	461	(2)
Senior Project . . . . .	HOR	462	(2)
Undergraduate Seminar. . . . .	HOR	463	(2)
Basic Soil Science. . . . .	SS	231/231L	(4)

### CORE COURSES FOR MAJOR (Option Specific)

#### Ornamental Horticulture Option

Landscape Horticulture Principles and Practices	HOR	131/131L	(4)
Plant Propagation. . . . .	HOR	132/132L	(3)
Plant Materials I . . . . .	HOR	231/231L	(3)
Plant Materials II. . . . .	HOR	232/232L	(3)
Plant Materials III . . . . .	HOR	233/233L	(3)
Turfgrass Management . . . . .	HOR	240/240L	(4)
Greenhouse Management . . . . .	HOR	323/323L	(4)

#### Fruit Industries Option

Citrus and Avocado Production I. . . . .	FI	201/201L	(4)
Pomology. . . . .	FI	203/203L	(4)
Citrus and Avocado Production II . . . . .	FI	301/301L	(4)
Advanced Pomology. . . . .	FI	303/303L	(4)
Diseases of Fruit Crops . . . . .	FI	426/426L	(4)
Soil Fertility. . . . .	SS	233/233L	(4)

### SUPPORT and ELECTIVE COURSES (Option Specific)

#### Ornamental Horticulture Option

Vegetable Crop Systems . . . . .	AGR	226/226L	(4)
Plant Physiology. . . . .	BOT	422/422L	(5)
College Chemistry . . . . .	CHM	122	(3)
College Chemistry Lab. . . . .	CHM	122L	(1)
Fruit Science Fundamentals. . . . .	FI	101/101L	(4)
Directed Electives . . . . .			(40)

Students following the option in Ornamental Horticulture must complete 40 units of directed electives by selecting one of the following five career tracks\*\*:

Landscape Management  
Turfgrass Management  
Nursery Management  
Park Administration  
Horticulture Science

#### Fruit Industries Option

Integrated Pest Management. . . . .	AGB	231	(3)
Plant Physiology. . . . .	BOT	422/422L	(5)



College Chemistry .....	CHM	122	(3)
College Chemistry Lab.....	CHM	122L	(1)
Plant Propagation.....	HOR	132/132L	(3)
Directed Electives .....			(40)

Students following the option in Fruit Industries must complete 40 units of directed electives by selecting one of the following two career tracks\*\*:

Orchard Management  
Fruit Processing and Marketing

\*\*Courses for these career tracks are listed on the reverse side of the curriculum sheet available from the Horticulture/Plant and Soil Science Office, Building 2, Room 209. Students are encouraged to work closely with a department advisor when choosing a career track.

## GENERAL EDUCATION COURSES

### Area 1:

- A. Select one course ..... (4)
- B. Select one course ..... (4)
- C. Select one course ..... (4)

### Area 2:

- A. Select 1 course ..... (4)
- B. College Chemistry .....CHM 121 (3)
- College Chemistry Lab .....CHM 121L (1)
- C. Basic Biology .....BIO 115/115L (5)
- D. Select 1 course (upper division)..... (4)

### Area 3:

- A. Select 1 course..... (4)
- B. Select 1 course..... (4)
- C. Select 1 course ..... (4)
- D. Select 1 course ..... (4)
- E. Select 1 course ..... (4)
- F. Select 1 course ..... (4)
- G. Select 1 course..... (4)

### Area 4:

- Introduction to American Government .....PLS 201 (4)
- United States History .....HST 202 (4)

### Area 5:

- Accounting for Agribusiness .....FMA 324 (4)
- Agribusiness Enterprise Management .....FMA 328 (4)





**ORNAMENTAL HORTICULTURE MINOR**  
 (25 units required)

Landscape Horticulture Principles and Practices	HOR	131/131L	(4)
Plant Materials I	HOR	231/231L	(3)
Plant Materials II	HOR	232/232L	(3)
or Plant Materials III	HOR	233/233L	
or Native Plant Materials	HOR	336/336L	
Turfgrass Management	HOR	240/240L	(4)
Arboriculture	HOR	328/328L	(3)
Greenhouse Management	HOR	323/323L	(4)
or Landscape Management Problem Solving	HOR	443/443L	
Plant Pathology	BOT	323/323L	(4)

**COURSE DESCRIPTIONS—Horticulture**

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

**HOR 131/131L Landscape Horticultural Principles and Practices (3/1)**

An introduction to the fundamental skills and principles of plant growth in the landscape. Includes planting techniques, pruning, propagation, irrigation, turfgrass maintenance and greenhouse/nursery production techniques. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**HOR 132/132L Plant Propagation (2/1)**

Methods and principles of plant production including propagation by seed, spore, and cuttings for ornamental and vegetable plants. Basic concepts and scientific methodologies used in topworking and grafting fruit and ornamental plants, types of grafts, selection and maintenance of propagation material. Horticultural equipment and structures related to plant production. Transplanting, culling and shifting of nursery stock. 2 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**HOR 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigations, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Graded on a CR/NC basis only.

**HOR 211/211L Landscape Drafting and Design (3/1)**

The fundamentals of drafting and graphic presentation. Methods and procedures for preparation of landscape structure components. 3 lectures, 1 three hours laboratory. Concurrent enrollment required.

**HOR 214 History of Garden Art (4)**

The relationship of ornamental flora to the human living experience to show the continuity with contemporary gardens, homes, parks, and other art. An introduction to the various styles in landscape art as they developed in different cultures and in preceding ages. 4 lectures.

**HOR 223/223L Basic Floral Design (1/2)**

Introduction to the theory of the basics of floral design to include principles and elements of design. Color theory, preparation, and care of flowers. The laboratory is for the applied construction of these theories. 1 lecture, 2 three-hour laboratories. Concurrent enrollment required.

**HOR 224/224L Nursery Management (3/1)**

Legal aspects and economics of operating a commercial retail or wholesale nursery. Federal, state and local regulations. Quality and inventory control, shipping practices, credit management. Site selection, nursery layout, supply purchasing, advertising related to the nursery

business. 3 lectures, 1 three-hour laboratory. Prerequisites: HOR 131/131L, 132/132L. Concurrent enrollment required.

**HOR 231/231L Plant Materials I—Fall (1/2)**

A study of trees, shrubs, vines, ground covers, and herbaceous plant materials which are of greatest ornamental value in the fall season and which are commonly used in the southern California landscape. Trees will be emphasized. Approximately 200 plants will be identified and described according to growth habit, cultural requirements, and use in the landscape. 1 lecture, 2 three-hour field laboratories. Concurrent enrollment required.

**HOR 232/232L Plant Materials II—Winter (1/2)**

A study of trees, shrubs, vines, ground covers, and herbaceous plant materials which are of greatest ornamental value in the winter season and which are commonly used in the southern California landscape. Shrubs and vines will be emphasized. Approximately 200 plants will be identified and described according to growth habit, cultural requirements, and use in the landscape. 1 lecture, 2 three-hour field laboratories. Concurrent enrollment required.

**HOR 233/233L Plant Materials III—Spring (1/2)**

A study of trees, shrubs, vines, ground covers, and herbaceous plant materials which are of greatest ornamental value in the spring season and which are commonly used in the southern California landscape. Herbaceous plant materials will be emphasized. Approximately 200 plants will be identified and described according to growth habit, cultural requirements, and use in the landscape. 1 lecture, 2 three-hour field laboratories. Concurrent enrollment required.

**HOR 240/240L Turf Management (3/1)**

Considerations in the management of turf, including such specialized areas as golf courses, bowling greens, athletic fields and park lawns. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231/231L. Concurrent enrollment required.

**HOR 299 Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**HOR 323/323L Greenhouse Management (3/1)**

Design and management of different types of greenhouses and plant shelters. Maintenance, heating, cooling, humidification systems and their controls. Mechanization, automatic and semi-automatic fertilization and watering systems. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115/115L or BOT 124/124L. Concurrent enrollment required.

**HOR 328/328L Arboriculture (2/1)**

Care and management of specimen ornamental trees. Cavity repairs, bracing and cabling, pruning. Practice in the use of lines and climbing. Safety practices. 2 lectures, 1 three-hour laboratory. Prerequisites: HOR 131/131L, HOR 231/231L, BOT 124/124L. Concurrent enrollment required.

**HOR 336/336L Native Plant Materials (2/1)**

Native California plants suitable for landscape purposes. Their identification, habits of growth, cultural requirements, and landscape use. 2 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**HOR 360/360L Landscape Development and Design (3/1)**

Methods and procedures of rendering landscape designs suitable for the residential garden. The arrangement and relationships of the various elements common to aesthetic, functional landscapes will be stressed. 3 lectures, 1 three-hour laboratory.

**HOR 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Graded on a CR/NC basis only.

**HOR 416/416L Landscape Contracting and Estimating (3/1)**

Management of landscape contracting firms. Bonding, insurance, contracts, ownership, licensing and other legal aspects of improvement to real property. Calculation of costs, manpower, and quantities of materials in landscape development. Preparation of specifications and estimates used in bidding. 3 lectures, 1 three-hour laboratory. Prerequisite: HOR 131/131L, 211/211L or permission of instructor. Concurrent enrollment required.

**HOR 420/420L Urban Forestry (3/1)**

Integrated approach to the management of and issues concerning street and park trees and open space vegetation in a public setting. Inventory practices, risk management, funding and budgeting, political considerations, tree waste management, valuation, tree resource utilization, and effective employment of volunteer assistance. 3 lectures, 1 three-hour laboratory. Prerequisite: HOR 328/328L. Concurrent enrollment required.

**HOR 422/422L Advanced Plant Propagation (3/1)**

Current topics in plant propagation concerning juvenility, growth regulators, scion/rootstock combinations, and tissue culturing. Emphasis on commercial propagation by cuttings, grafting/budding, tissue culturing, division, layering, and seeding. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 422/422L. Concurrent enrollment required.

**HOR 427/427L Diseases of Ornamental Plants (3/1)**

Diagnosis and control of biotic and abiotic diseases and selected insect problems on ornamental plants in interior and exterior landscapes, and under various production conditions. Labs include field trips to production areas. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 323/323L. Concurrent enrollment required.

**HOR 436/436L Golf Course Management (3/1)**

Management, supervision, maintenance, and operation of golf courses. A study of the equipment, scheduling, promotion and personnel required and related facilities of public and private courses. 3 lectures, 1 three-hour laboratory. Prerequisite: HOR 240/240L. Concurrent enrollment required.

**HOR 435 Specialized Plant Production (3/1)**

Controlling production of commercial horticultural crops such as cut flowers, foliage plants, bedding plants and flowering container plants. Use of photoperiod, temperature adjustment, vernalization and chemicals to schedule maturity of a crop. 3 lectures, 1 three-hour laboratory. Prerequisites: HOR 131, 132, 323, and SS 231.

**HOR 437/437L Sports Turf and Advanced Turfgrass Science (3/1)**

Advances in construction techniques, management philosophy, cultural practices and environmental factors affecting the growth of turfgrass on sports turf facilities and other related turfgrass areas. 3 lectures, 1

three-hour laboratory. Prerequisite: HOR 240/240L. Concurrent enrollment required.

**HOR 439/439L Interior Landscape Management and Design (3/1)**

Interior landscaping and design in shopping malls, offices, and other interior spaces. Identification of species used, including the proper installation, maintenance and management. Cultural practices, scheduling, pest management and cost analysis. Operational practices of interior landscaping firms. 3 lectures, 1 three-hour laboratory. Prerequisite: HOR 131/131L. Concurrent enrollment required.

**HOR 443/443L Landscape Management Problem-Solving (3/1)**

The integration of the technical aspects of landscape management in problem-solving case studies. Aspects of turf management, plant materials, personnel issues, equipment, irrigation, and chemical use will be addressed in determining the proper methodology for maintaining landscaping of parks, streets and institutional grounds. Three lectures, one three-hour laboratory. Prerequisites: HOR 131/131L, 231/231L, HOR 240/240L. Concurrent enrollment required.

**HOR 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 of total time. HOR 461 grade only.

**HOR 463 Undergraduate Seminar (2)**

An open forum of senior students in which the latest developments, practices, and procedures are discussed. Each student is responsible for the development and presentation of a topic in his/her chosen field. 2 lectures.

**HOR 499 Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination of both. Prerequisite: permission of instructor.

**COURSE DESCRIPTIONS—Fruit Industries**

All courses in Fruit Industries may be taken on a CR/NC basis except by majors.

**FI 101/101L Introduction to Fruit Science (3/1)**

Evaluation of the role of subtropical and deciduous fruit and nut crops, citrus and avocados in California horticulture. Historical development, economic importance and cultural practices common to all fruit crops. Site selection, orchard planning, variety and rootstock selection, propagation, fertilization, irrigation, pest and disease control, pruning and training, harvesting and marketing of fruit crops. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**FI 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected historical or contemporary problems in the production of fruit in California or in other areas of the world. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**FI 201/201L Citrus and Avocado Production I (3/1)**

Critical evaluation of historical and future trends in the development of the citrus and avocado industry in California. Analytical investigation of citrus and avocado orchard site selection, environmental requirements,

variety adaptations, orchard management, cultural requirements, production practices, and economics of producing citrus and avocados. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

### **FI 202/202L Subtropical Fruits (3/1)**

Historical significance and contemporary importance of subtropical fruits including the date, fig, macadamia, olive, and other selected fruits for commercial plantings in California and other areas of the United States. Critical evaluation of the climatic and cultural requirements, fruiting and growth habits, and varietal characteristics of the selected fruits from western and non-western societies. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

### **FI 203/203L Pomology (3/1)**

Economic importance of California's deciduous fruit and nut orchards. Critical evaluation of the cultural requirements of deciduous fruit and nut orchards in California and other areas of the United States, varieties, seasonal production practices, and tree climatic requirements. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

### **FI 299/299L/299A Special Topics for Lower Division Students (1-4) (1-4)**

Group study of contemporary selected topics related to basic concepts and scientific methodologies used in fruit production in western and non-western societies. The title to be specified in advance. Total credit is limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: consent of instructor.

### **FI 302/302L Citrus and Avocado Production II (3/1)**

Critical evaluation and comparison of citrus and avocado production practices from commercial citrus regions around the world. Orchard planning and development, nursery practices, tree management, pest and disease control, irrigation and fertilization, pruning, harvesting and marketing. 3 lectures, 1 three-hour laboratory. Prerequisites: FI 201/201L, Concurrent enrollment required.

### **FI 303/303L Advanced Pomology (3/1)**

Critical evaluation of the climatic and cultural requirements of fruit tree orchards, strawberries, kiwifruit, olives and other selected small fruits. The basic concepts and scientific methodologies used in the production, processing, and marketing of raisins and table and wine grapes including the techniques of irrigation, orchard layout, planting, training, pruning, pollination, fruitlet, thinning, pest control, and the use of girdling and plant growth regulators to size fruit in vineyards and orchards. 3 lectures, 1 three-hour laboratory. Prerequisite: FI 203/203L. Concurrent enrollment required.

### **FI 322/322L Fruit Processing and Handling (3/1)**

Evaluation of physical operations involved in fruit and nut harvesting, processing, and packing. Equipment used in harvesting, handling, transporting, grading, sorting, packing and shipping of fruits and nuts. Fruit and nut storage, storage diseases, and techniques used to prolong storage life. 3 lectures, 1 three-hour laboratory. Prerequisite: FI 426/426L. Concurrent enrollment required.

### **FI 341/341L Orchard Management Practices (1/2)**

Practical application of the basic concepts and scientific methodologies used in orchard cultural practices and procedures. Importance of seasonal operations in relation to overall objectives in orchard management. Use of specialized orchard equipment emphasized. 1

lecture, 2 three-hour laboratories. Prerequisites: AE 241/241L and any fruit production course, or consent of instructor. Concurrent enrollment required.

### **FI 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigations, research, studies, or survey of selected historical or contemporary problems in the production of fruit in California or in other areas of the world. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### **FI 425L Advanced Propagation (2)**

Advanced propagation will incorporate the propagation techniques and methods used in HOR 132/132L. Students in this course will be required to use the modern techniques and methods learned to complete a propagation project. Projects may include topworking or grafting trees to new varieties, or budding or tipgrafting cuttings in the nursery to selected budwood. 2 three-hour laboratories. Prerequisites: HOR 132/132L.

### **FI 426/426L Diseases of Fruit Crops (3/1)**

Philosophy of disease control and prevention in California's citrus, avocado, and deciduous fruit and nut orchards. Identification of causal agents, economic impact, critical evaluation of the basic concepts and scientific methodologies involved in control and prevention. 3 lectures, 1 three-hour laboratory. Prerequisites: FI 101/101L, FI 201/201L, FI 203/203L, and BOT 323/323L. Concurrent enrollment required.

### **FI 441 Internship in Orchard Management (12)**

On-the-job training in orchard maintenance and cultural practices. One quarter in residence at Pine Tree Ranch in Ventura County or any other orchard property with similar training opportunities. Actual operation of a commercial orchard enterprise under University faculty or staff supervision. Prerequisites: FI 101/101L, FI 201/201L, FI 341/341L or AGR 120/120L recommended; and permission of section coordinator. Letter grade only.

### **FI 499/499L/499A Special Topics for Upper Division Students (1-4) (1-4)**

Group study of contemporary selected topics related to basic concepts and scientific methodologies used in fruit production in western and non-western societies. The title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: consent of instructor.



## INTERNATIONAL AGRICULTURE

The Food Marketing and Agribusiness Management/Agricultural Education Department offers a program of courses in International Agriculture. For other programs offered in the Department, see Food Marketing and Agribusiness Management and Agricultural Education.

Edison I. Cabacungan, Chair

William C. Hughes

Marvin L. Klein

Arthur F. Parker

James M. Weidman

### COURSE DESCRIPTIONS

(Required of all students) A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

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

#### IA 101 Global Resources for Food (4)

Resource base for agricultural production on various continents. Potential for increasing food supplies. Role of agriculture in economic development. 4 lectures.

#### IA/FMA 330 International Food and Agribusiness Marketing (3)

Marketing of food, fiber, and horticultural products in foreign markets. Special emphasis on selecting export markets, procedures for establishing contacts, promotion, financing, insuring, shopping tariffs, customs, regulations and other matters related to food and fiber products. Management practices and problems of firms involved in exporting and importing textiles and garments, livestock, fruits, vegetables, grains and other food and fiber products. 3 lectures.

#### IA 362 Agricultural Policy in Developing Nations (4)

Review, analysis and discussion of relevant international government agricultural policy affecting development, trade, and food production. History, current status and projections of policy trends. 4 lectures.

#### IA 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### IA/FN 445 Nutrition and Global Development (4)

Issues in technology, food policy, nutrition and social welfare in developing societies. Integrates concerns about food and nutrient distribution and availability, malnutrition, scientific principles of nutrient utilization and metabolism, and human productivity and reproduction. Implications for a just and sustainable economic development. 4 lectures.

#### IA/FMA 450 Agricultural Water Resource Management (4)

Water resource management applied to current issues. Water delivery systems in the United States and California, survey of water rights, water pollution, water conservation, food and agricultural system water use, and efficient water management. Includes water problems in developing nations. 4 lecture discussions.

#### IA 461, 462 Senior Project (2) (2)

Students select and complete a research project under faculty supervision typical of those they will be required to handle in their field of employment. Research findings and conclusions are presented in a formal report. Prerequisite: senior standing. May not be taken concurrently.



## LANDSCAPE IRRIGATION SCIENCE -- update

Eudell Vis, Chair, Agricultural Engineering and Irrigation Science

Joe Y. T. Hung  
Ramesh Kumar

One of two majors offered in the Agricultural Engineering and Irrigation Science Department is Landscape Irrigation Science. For the other program in this department, see Agricultural Engineering.

The landscape irrigation profession has expanded rapidly and career opportunities are plentiful. The Landscape Irrigation Science major provides a broad background in the interrelationships of water, plants, soils, and the environment, along with the principles of irrigation system design and management. An effective irrigation system and water management plan can enhance the quality of the landscape and conserve water resources.

This major program will educate individuals who will be involved in the planning, design, operation and management of landscape irrigation and drainage systems for residential and commercial developments, parks, golf courses, public grounds, cemeteries, and other urban and recreational landscaped areas. Graduates will also be prepared to design new equipment and computer technologies which will enhance water conservation and reduce runoff which has the potential to contaminate water supplies.

The curriculum provides a foundation in the basic sciences and in the related fields of horticulture, plant science, soil science, and business management. In addition, an extensive curriculum in irrigation engineering technology, landscape drainage, water management, and diagnosis irrigation problems prepare the student for a wide range of career opportunities.

Students in the landscape irrigation science major will have the opportunity to work with the considerable resources on campus that focus on the landscape and on irrigation technology. These include the ornamental horticulture unit, the extensively landscaped campus, and the facilities of the Agricultural Engineering department, including the Center for Turf Irrigation and Landscape Technology.

The department has strong relationships with nearby international corporations that design and maintain the newest technologies in . Internships and scholarships are available to students majoring in this field.

Admission requirements for this program follow those for the California State University system. The degree program requires 198 quarter units and leads to a Bachelor of Science degree in Landscape Irrigation Science.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

General Survey	AE	232/232L	(3)
Micro Irrigation	LIS	340/340L	(3)
Orientation to the College of Agriculture	AG	100	(1)
Agriculture in the Modern World	AG	101	(4)
Principles of Irrigation	LIS	212	(4)
Landscape Hydraulics	LIS	221	(4)
Landscape Sprinkler Irrigation I	LIS	231/231L	(4)
Landscape Sprinkler Irrigation II	LIS	322/322L	(4)
Landscape Drainage	LIS	341	(4)
Computer-Aided Drafting	LIS	241/241L	(4)
Automatic Irrigation System Controls	LIS	365/365L	(4)

Landscape Irrigation Water Management	LIS	440/440L	(4)
Automatic Irrigation Trouble Shooting	LIS	452/452L	(3)
Ethical Issues in Agriculture	AG	401	(4)
Senior Project	LIS	461	(2)
Senior Project	LIS	462	(2)
Undergraduate Seminar	LIS	463	(2)
Development of Leadership Skills	AG	464	(3)
Internship	LIS	441	(1-4)

### SUPPORT AND ELECTIVE COURSES

(Required of all students)

Introduction to Microcomputing	CIS	101	(4)
Chemistry Laboratory	CHM	121L	(1)
Physics	PHY	121	(3)
Physics Laboratory	PHY	141L	(1)
Plant Structures and Functions	BOT	124/124L	(4)
Basic Soil Science	SS	231/231L	4
Directed Electives (See Advisor)			(29)

### GENERAL EDUCATION COURSES

#### Area 1:

Freshman English	ENG	104	(4)
Advocacy and Argument	COM	204	(4)
Freshman English	ENG	105	(4)
or	PHL	202	

#### Area 2:

A. College Algebra	MAT	105	(4)
B. College Chemistry	CHM	121/121L	(3)
C. Basic Biology	BIO	115/115L	(5)
D. Any course from Area D			(4)

#### Area 3:

A. Select one course			(4)
B. Select one course			(4)
C. Select one course			(4)
D. Select one course			(4)
E. Select one course			(4)
F. Select one course			(4)
G. Select one course			(4)

#### Area 4:

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

#### Area 5: Select two courses

Accounting for Agribusiness	FMA	324	(4)
Agribusiness Enterprise Management	FMA	328	(4)
Agribusiness Personnel Management	FMA	402	(4)

### LANDSCAPE IRRIGATION DESIGN MINOR

Principles of Irrigation	LIS	212	(4)
Landscape Hydraulics	LIS	212	(4)
Landscape Sprinkler Irrigation	LIS	231	(4)
Computer-Aided Drafting	LIS	241/241L	(4)
Micro Irrigation	LIS	340/340L	(3)
Landscape Drainage	LIS	341	(4)
Automatic Irrigation System Controls	LIS	365/365L	(4)
Landscape Irrigation Trouble Shoot	LIS	452/452L	(3)
Total Units			30

### COURSE DESCRIPTIONS

#### LIS 104 Introduction to Landscape Irrigation Design (1)

An introduction to the field of landscape irrigation design, career opportunities and responsibilities. One lecture/problem.

**LIS 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**LIS 212 Principles of Irrigation (4)**

Basic soil, water and plant relationships. Irrigation water requirements, irrigation efficiencies, and methods of irrigation applied to plants. Collection of irrigation information needed for planning, design and management. Principles of land drainage and salinity problems are also included. Four lecture/problems. Prerequisite: MAT 105 or equivalent, and SS 231/231L. Concurrent enrollment required.

**LIS 221 Landscape Hydraulics (4)**

Principles of hydrostatics, dynamics, problems involving pipe flow and channel flow specifically applied to landscape irrigation and drainage systems. Also includes related problems in water flow, such as storage tanks, water hammer, pumps, and water fountains. 4 lectures/problem-solving. Prerequisites: PHY 121 or MAT 105. Not open to engineering majors.

**LIS 231 Landscape Sprinkler Irrigation I (4)**

Soil-water plant relations, engineering sprinkler system layout, selection of sprinkler irrigation equipment such as sprinklers, valves, controllers, and specialty devices for efficient water application and to meet codes. Analysis of cost and irrigation management and maintenance are also included. 3 lecture/problems and 1 three-hour laboratory. Prerequisites:

LIS 122/122L or LIS 221, SS 231/231L, MAT 105 or 106 or equivalent. Concurrent enrollment required.

**LIS 241/241L Computer Aided Drafting (3/1)**

Application of the personal computer (AUTOCAD) to landscape irrigation design and graphics. 3 lectures/problem-solving, 1 three-hour laboratory. Concurrent enrollment required.

**LIS 322/322L Landscape Sprinkler Irrigation II (3/1)**

Design and management of sprinkler systems for athletic fields, cemeteries, parks, and golf courses. Emphasis is on the application of LIS 221 and LIS 321 to a complex irrigation system. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: LIS 221 and LIS 231/231L. Concurrent enrollment required.

**LIS 340/340L Microirrigation (2/1)**

Design, operation and maintenance of drip irrigation systems, including determination of plant water requirements, emitter selection and uniformity of water distribution. Lateral, manifold, and mainline design, filtration, fertilization and automation are included. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: AE 240 or LIS 231.

**LIS 341 Landscape Drainage (4)**

Drainage problems related to landscaping, such as sizes of storms, and surface runoff. Calculations of storm sizes with different frequencies. Minimizing and prevention of damage due to runoff or erosion. 4 lectures/problem-solving. Prerequisite: LIS 221.



**LIS 350 Water and Civilization (4)**

Water and its relationship to civilization from ancient history to modern developments. Survey of global water resources and current issues of distribution, allocation, and water quality. Analysis of California and regional water supplies. Water agencies. Methods to determine water requirements for agriculture, overview of urban water use, approaches to water management.

**LIS 365/365L Automatic Irrigation System Controls (3/1)**

Basic electricity, power and energy, circuit types, and wiring practices. Basic electronic principles applied to irrigation and other types of controllers. Circuits for controllers, electric valves, and sensing devices. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**LIS 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**LIS 440/440L Landscape Irrigation Water Management (3/1)**

Application of the science of soil-water-plant relations and climactic conditions to develop effective scheduling and management of irrigation water systems for residential, commercial, industrial, park and golf course, etc. Water conservation issues, water policies and codes and other related matters will be discussed. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisite: LIS 322/322L. Concurrent enrollment required.

**LIS 441 Internship in Landscape Irrigation Science (1-4)**

Professional level work experience with public agencies or private companies for advanced students. Work experiences are valuable for development of career goals and for application of academic training. Written reports are required. Course may be repeated for a maximum of 12 units.

**LIS 452/452L Landscape Irrigation Trouble Shooting (2/1)**

Prevention and analysis of problems and failures in landscape irrigation systems, such as irrigation controllers, remote control valves, wiring failures, sprinklers and drip system failures. Other specialty items such as cross connections, pressure regulators, vacuum breakers, pipes, etc., will be included. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: LIS 365/365L. Concurrent enrollment required.

**LIS 461, 462 Senior Project (2) (2)**

Students will select and complete a landscape irrigation related project under faculty supervision. The project could be either a design, analysis or management problem.

**LIS 463 Undergraduate Seminar (2)**

Presentation of the senior project, new methods and development, practices and procedures of the field. Prerequisite: LIS 461 and 462.

## SOIL SCIENCE

Daniel Hostetler, Chair, Horticulture/Plant and Soil Science

Gaylord Patten, Coordinator, Soil Science

Edwin Barnes III  
Robert J. Tullock  
Victor Wegrzyn

The soil science major is for those who desire to become guardians of the soil. Soil is one of the natural resources which is basic for life and human existence. As the natural medium for plant growth, it is the source of most of our food and clothing. It provides shelter in the form of bricks and timber products. Mankind also depends upon the soil as a material for supporting and locating buildings, transportation systems, waste disposal sites, outdoor recreational playgrounds, flood control ditches, and underground utility systems.

There are thousands of kinds of soil on earth, each having a unique set of characteristics. Soil science students learn how to determine these characteristics in both the field and laboratory. They learn to relate these characteristics to the genetic history of the soil and to organize and classify this information in a systematic manner. They also learn to determine the location and extent of soils in the field and to show this on a soil map.

The characteristics of a soil determine the degree of suitability for a variety of alternative uses, and the appropriate management practices required to keep the soil permanently productive. Soil quality can be altered by the activities of mankind. If abused, soil productivity declines. If treated properly, a soil will produce indefinitely. Soil scientists prevent soil deterioration while striving to maintain or improve soil productivity for all future generations.

The demand for soil scientists is keeping pace with the human population growth curve and the growing awareness for maintaining a clean and aesthetic environment. A career in soil science is an alternative for anyone who is concerned about the conservation of natural resources and the future wealth of mankind, and has a strong interest in the biological and physical sciences.

The Cal Poly Pomona soil science program enjoys an excellent local, state, and national reputation. This reputation results from a strong curriculum, taught by a well-qualified faculty, supported by laboratory and field facilities which have produced alumni who are professional soil scientists.

Soil scientists have many options for career opportunities. They can work for private industry or governmental agencies; in the laboratory, field, office or classroom; and in either urban or rural areas. They can apply their knowledge to the production of agronomic, horticultural, rangeland, or forestry plants; to the use of soils for urban planning and development; to the manufacturing and marketing of fertilizers and other agricultural materials; or to the administration of natural resource programs. Many graduates pursue advanced training and work in research and education.

About half of the Cal Poly Pomona soil science graduates are employed by a governmental agency. At the federal level they are working for the Bureau of Land Management, Forest Service, Natural Resource, Conservation Service, Environmental Protection Agency, or Agricultural Research Service. Several foreign students are employed by their native country's Department of Agriculture. At the state level in California and elsewhere, they are employed by a State University, Department of Forestry, Department of Water Resources, or Department of Health Services. At the county or local level, they are working for the Agricultural Commissioner's Office, the Agricultural Extension Office, or

the County Arboretum. One alumnus is with the Food and Agricultural Organization of the United Nations.

The soil science graduates with private industry are mainly employed by agricultural chemical companies, soil engineering testing and consulting firms, wholesale horticultural nurseries, food production and processing companies, agricultural management consulting firms, or soil testing laboratories.

### Soil Science Minor

The soil science minor is primarily for students majoring in another discipline which is dependent upon soil science. It is a valuable curricular adjunct for those majors stressing plant growth, such as: agronomy, botany, fruit industries, landscape architecture, and ornamental horticulture. The soil science minor will also strengthen the academic background of those majoring in agricultural engineering, civil engineering, agricultural science, anthropology, biology, geology, geography, international agriculture, and urban planning.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Orientation to the College of Agriculture. . . . .	AG	100	(1)
Agriculture and the Modern World . . . . .	AG	101	(4)
Ethical Issues in Agriculture . . . . .	AG	401	(4)
Basic Soil Science. . . . .	SS	231/231L	(4)
Soil Fertility and Fertilizers . . . . .	SS	233/233L	(4)
Soil Materials and Management. . . . .	SS	332/332L	(4)
Soil Resource Management and Conservation . . SS		334/334L	(4)
Soil and Plant Analysis . . . . .	SS	339/339L	(3)
Soil Chemistry. . . . .	SS	431/431L	(4)
Soil Physics. . . . .	SS	432/432L	(4)
Soil Morphology and Survey . . . . .	SS	433/433L	(4)
Senior Project . . . . .	SS	461	(2)
Senior Project . . . . .	SS	462	(2)
Undergraduate Seminar . . . . .	SS	463	(2)
Crop Ecology . . . . .	AGR	401	(4)
Environmental Toxicology. . . . .	AGB	411	(4)
Plant Structures and Functions. . . . .	BOT	124/124L	(5)
Basic Microbiology. . . . .	MIC	201/201L	(5)
Introduction to Microcomputing . . . . .	CIS	101	(4)
College Chemistry . . . . .	CHM	122	(3)
College Chemistry Laboratory . . . . .	CHM	122L	(1)
College Chemistry . . . . .	CHM	123	(3)
College Chemistry Laboratory . . . . .	CHM	123L	(1)

### SUPPORT AND ELECTIVE COURSES

(Required of all students)

Irrigation. . . . .	AE	240/240L	(4)
Animal Agricultural Science. . . . .	AVS	111	(4)
Elements of Organic Chemistry . . . . .	CHM	201	(3)
Quantitative Analysis . . . . .	CHM	221/221L	(4)
Elements of Organic Chemistry Laboratory . . . CHM		250L	(1)
Principles of Geology. . . . .	GSC	111	(3)
Principles of Geology Laboratory . . . . .	GSC	141L	(1)
College Physics . . . . .	PHY	121	(3)
College Physics . . . . .	PHY	122	(3)
College Physics Laboratory. . . . .	PHY	141L	(1)
College Physics Laboratory. . . . .	PHY	142L	(1)
Elementary Statistics with Applications. . . . . STA		120	(4)
Choose 8 units from the department environmental component list. (8)			



Choose 8 units from the department list in business applications. (8)

## GENERAL EDUCATION COURSES

### Area 1:

- A. Select one course ..... (4)
- B. Select one course ..... (4)
- C. Select one course ..... (4)

### Area 2:

- A. College Algebra .....MAT 105 (4)
- B. College Chemistry .....CHM 121 (3)
- College Chemistry Laboratory .....CHM 121L (1)
- C. Basic Biology .....BIO 115/115L (5)
- D. Select one course ..... (4)

### Area 3:

- A. Select one course ..... (4)
- B. Select one course ..... (4)
- C. Select one course ..... (4)
- D. Select one course ..... (4)
- E. Select one course ..... (4)
- F. Select one course ..... (4)
- G. Select one course ..... (4)

### Area 4:

- United States History .....HST 202 (4)
- Introduction to American Government .....PLS 201 (4)

### Area 5:

- Life Support Systems .....RS 301 (4)
- Global Regenerative Systems .....RS 302 (4)

## SOIL SCIENCE MINOR

Minimum Units—20

Minimum Upper Division Units—9

Required Courses (all students)

- Basic Soil Science. ....SS 231/231L (4)
- Soil Fertility and Fertilizers ....SS 233/233L (4)

Select 12 units from the following:

- Soil Materials and Management. ....SS 332/332L (4)
- Soil Resource Management and Conservation ..SS 334/334L (4)
- Soil and Plant Analysis .....SS 339/339L (3)
- Soil Chemistry. ....SS 431/431L (4)
- Soil Physics. ....SS 432/432L (4)
- Soil Morphology and Survey .....SS 433/433L (4)

## COURSE DESCRIPTIONS

All courses offered in Soil Science may be taken on a CR/NC basis except by majors or by students taking a minor in Soil Science.

### SS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Staff

### SS 231/231L Basic Soil Science (3/1)

Basic concepts and scientific methodologies of the living and non-living systems of soils; integrated relationships between soils and climate, plants, animals, geologic materials, land form and time; and the impact of soils on civilization. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 121/121L. Concurrent enrollment required.

### SS 233/233L Soil Fertility and Fertilizers (3/1)

Critical evaluation of concepts, methods and materials for improving the fertility of soils used for the sustained production of all types of commercial plants while preserving environmental quality as influenced by past and present social, political, and economic institutions in Western and non-Western societies. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231/231L. Concurrent enrollment required.

### SS 299/299L/299A Special Topics for Lower Division Students (1-4) (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor. Concurrent enrollment required.

### SS 332/332L Soil Materials and Management (3/1)

Comprehensive evaluation of soils, soil materials, and technical and scientific methodologies for managing soils and soil materials for the production of agronomic and horticulture crops on a sustained basis while preserving environmental quality. Presented in an interactive setting. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: SS 231/231L; computer literacy encouraged. Concurrent enrollment required.

### SS 334/334L Soil Resource Management and Conservation (4)

An integrated study of principles and methods for managing soil and water resources for multiple uses, sustainable agriculture, environmental quality, and erosion control. Integrated effects of soil, climate, topography, and land use; social, political, and economic relationships. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: SS 231/231L.

### SS 339/339L Soil and Plant Analysis (2/1)

Critical evaluation of the basic concepts and scientific methodologies for analyzing the nutrient status of soils and plant tissue as a means for diagnosing alternative fertilizer and amendment treatments as influenced by past and present social, political, and economic institutions in western and non-western societies. 2 lectures, 1 three-hour laboratory. Prerequisites: CHM 122/122L, SS 231/231L. Concurrent enrollment required.

### SS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### SS 431/431L Soil Chemistry (3/1)

Critical evaluation of the basic concepts and scientific methodologies regarding the chemical composition and reactions of the integrated solid-liquid-gaseous system in soils and their relationship to soil productivity and environmental quality as influenced by past and present social, political, and economic institutions in western and non-western societies. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 339/339L; CHM 221; or consent of instructor. Concurrent enrollment required.

### SS 432/432L Soil Physics (3/1)

Critical examination and evaluation of the universal concepts and scientific methodologies regarding the physical properties and transformations of the integrated solid-liquid-gaseous system in soils and their relationship to soil productivity, environmental quality, land utilization, and the quality of life. 3

lectures, 1 three-hour laboratory. Prerequisites: PHY 122; SS 231/231L; or consent of instructor. Concurrent enrollment required.

### **SS 433/433L Soil Morphology and Survey (3/1)**

Critical evaluation of the basic concepts and scientific methodologies regarding soil morphology and its integrated relationship to the preparation of soil surveys and soil-use interpretations as influenced by past and present social, political, and economic institutions in western and non-western societies. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231/231L. Concurrent enrollment required.

### **SS 441, 442 Internship in Soil Science (1-4) (1-4)**

On-the-job experience with public and private agencies for advanced students. Professional type experience new to the student so that a valuable contribution toward career development results. One unit credit for each 100 hours of experience. Written reports necessary. Courses may be repeated for maximum of 12 units total. Prerequisite: junior standing.

### **SS 461, 462 Senior Project (2) (2)**

An analytical investigation of a soil science research project in an area of special interest to the individual student, working under faculty supervision, culminating in a formal rhetorical, expository report that emphasizes clarity and lucidity of thought based on deductive and inductive reasoning, and the use of graphic skills. Minimum of 120 hours. Must be taken in sequence.

### **SS 463 Undergraduate Seminar (2)**

Critical reviews of contemporary research in the field of soil science. The student will analyze, criticize and advocate by inductive and deductive methods. Inferences in contemporary literature are based on fact or a logical, unambiguous extension of fact. Oral reports of literature and senior projects are required. Prerequisites: SS 462 and successful completion of the GWT.

### **SS 499/499L/499A Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor. Concurrent enrollment required.







BUSINESS





## COLLEGE OF BUSINESS ADMINISTRATION

Eduardo M. Ochoa, Dean

Lynn H. Turner, Associate Dean

Kathleen Harcharik, Director for Academic Programs and Services

Rochelle A. Kellner, Director, Student Services

Eric McLaughlin, Interim Director, Graduate Programs

Marilyn Mehaffie Ray, Director of Development and External Relations

The undergraduate and graduate programs of the College of Business Administration are accredited by AACSB -- The International Association for Management Education. AACSB accreditation assures quality and promotes excellence and continuous improvement in undergraduate and graduate education for business administration.

The College of Business Administration provides seven curricula leading to the Bachelor of Science degree in Business Administration. It also provides curricula leading to the Master of Business Administration and the Master of Science in Business Administration. The Master of Science degree offers one option, EDP Auditing. Information concerning the master's curricula may be found in the graduate listings.

The undergraduate programs of study give the student an understanding of the social and economic environment in which we live and provide a common body of knowledge for all students who major in any business field. In addition, each major emphasizes, with additional course-work, specific areas of knowledge useful for the occupational fields served by that major. All students are encouraged to experiment and broaden their interests by selection of electives. It is the purpose of the College of Business Administration to develop in students the people, technical, and managerial competence necessary for successful performance in business, industry, government, and education.

The student selects a major upon entering and immediately assumes primary responsibility for meeting the educational requirements of the program. Through early studies in the courses common to all majors (the core), the student has an opportunity to evaluate a career decision and to adjust goals, if necessary. Undergraduate courses in business fundamentals and skills equip the student with sellable entry skills. The student may augment on-campus education through job experiences in business workstudy, cooperative education, and internship programs for which the student will receive academic credit. General education courses are integrated throughout each major program. Co-curricular opportunities related to the course of study include the Cal Poly Pomona Society of Accountants; American Marketing Association; American Production & Inventory Control Society; Black Business Student Association; Delta Sigma Pi, a professional business fraternity; Finance Society; Latino Business Students Association; Law Society; M.B.A. Association; Management Information Systems Student Association; Personnel and Industrial Relations Association; Pi Sigma Epsilon; Real Estate and Development Network; Society for Advancement of Management; Society for Contracts Administration; United Shareholders Association Research Group; World Traders; Alpha Iota Delta, and Mu Kappa Tau, business honorary societies.

### MISSION OF THE COLLEGE OF BUSINESS ADMINISTRATION

The mission of the College of Business Administration is to provide quality undergraduate and graduate management education for a diverse student population. The major responsibility of the College is undergraduate education. The College also supports a quality graduate program designed primarily for working professionals. The faculty, which has both professional experience and appropriate advanced degrees, provides practical, career-oriented education.

The College seeks to instill in students the values of life-long learning, pursuing excellence, and making ethical choices. The College also seeks to cultivate in its students the capacity for critical thinking, willingness to accept challenges, skills for working with people, commitment to social responsibility, understanding of technology, and ability to respond creatively to changes in the domestic and international business environments.

The primary emphasis of the College is teaching. To promote quality teaching and the intellectual growth of the faculty, the College encourages and supports faculty involvement in research and other scholarly activities. These activities include basic or discovery research, applied research, and instructional development, with the primary focus on applied research and instructional development.

The College of Business Administration prepares its graduates for personal and professional development in business careers. Its graduates can approach business problems from a global perspective, and can apply the theories and concepts learned in their educational experiences to design practical and innovative solutions.

The College recognizes its responsibilities to develop communications with and to provide professional services to the constituencies in the region it serves. The College will work with its constituencies to provide opportunities for its students, graduates, and faculty to enhance the educational environment.

### INDUSTRIAL RESEARCH INSTITUTE FOR PACIFIC NATIONS (IRIPAC)

The Industrial Research Institute for Pacific Nations is a non-profit organization engaged in industrial and trade development research with a focus on Pacific Rim nations. The Institute is administered as the international research division of the College of Business Administration. Designed to support the advanced study of international business and to provide specialized educational opportunities for management personnel involved in the Pacific marketplace, the program offers the generation and coordination of research projects for university faculty and students, management and economic development seminars directed at better understanding of those doing business in the Pacific Rim, establishment of a reference and resource center, and publication of research papers.

### THE REAL ESTATE RESEARCH COUNCIL (RERC)

The Real Estate Research Council of Southern California is the oldest non-profit real estate data organization in the United States. Founded in 1939, the RERC produces a quarterly publication, *The Real Estate and Construction Report*, which includes data on the economy and real estate markets in the seven urban Southern California counties, and presents the report at a quarterly luncheon. The senior real estate faculty direct students who participate in the data-gathering and analyses for the preparation of the quarterly report. Members of the RERC include major development companies, financial institutions, appraisers, investors, mortgage bankers, and other firms and individuals interested in Southern California real estate. RERC is coordinated by faculty in the Finance, Real Estate and Law Department.

### DEPARTMENTS AND MAJORS/OPTIONS

#### MASTER OF BUSINESS ADMINISTRATION (MBA)

Eric McLaughlin, Interim Graduate Director  
Options in:

Accounting  
Agribusiness  
Business Education

Contract Management  
 Entrepreneurship  
 Finance  
 Human Resources Management  
 Information Management  
 International Business  
 International Marketing  
 Marketing  
 Operations Management  
 Real Estate

#### **MASTER OF SCIENCE IN BUSINESS ADMINISTRATION**

Options in:

Entrepreneurship, Creativity, and Innovative Management  
 Information Systems Audit

#### **BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION**

with majors and minors offered by the following departments:

#### **ACCOUNTING**

Donald F. Putnam, Chair, Accounting Major  
 Minor in Accounting  
 Minor in Financial Analysis

#### **COMPUTER INFORMATION SYSTEMS**

Lavette C. Teague, Acting Chair, Computer Information Systems Major  
 Minor in Business Computer Programming  
 Minor in Managerial Computing

#### **FINANCE, REAL ESTATE, and LAW**

Javad Kashefi, Chair, Finance, Real Estate, and Law Major  
 Minor in Business Law  
 Minor in Financial Analysis  
 Minor in Financial Management of Public and Private Contracts  
 Minor in Real Estate

#### **MANAGEMENT and HUMAN RESOURCES**

Peggy J. Snyder, Chair, Management and Human Resources Major  
 Minor in General Management  
 Minor in Human Resources Management  
 Minor in Entrepreneurship and Small Business Management

#### **INTERNATIONAL BUSINESS AND MARKETING**

Vernon R. Stauble, Chair, Marketing Management Major  
 Helena Czepiec, Coordinator, International Business Major  
 Minor in Fashion Merchandising  
 Minor in International Business  
 Minor in Marketing Management  
 Minor in Logistics

#### **TECHNOLOGY AND OPERATIONS MANAGEMENT**

Hassan Halati, Chair, Operations Management Major  
 Minor in Operations Management  
 Minor in Interdisciplinary Quantitative Research  
 Minor in Total Quality Management

#### **COLLEGE-WIDE MINOR**

Business

#### **COURSES REQUIRED OF ALL BUSINESS ADMINISTRATION MAJORS**

Each student who enrolls for a Bachelor of Science degree in Business

Administration is required to select one of the seven majors listed above. For all business majors, each student will be required to take the following courses:

#### **CORE COURSES FOR MAJOR**

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

#### **REQUIRED OF ALL BUSINESS MAJORS**

Legal Environment of Business Transactions . . . .	FRL	201	(4)
Financial Accounting for Decision-Making . . . . .	ACC	207	(5)
Managerial Accounting for Decision-Making . . . .	ACC	208	(5)
Principles of Management . . . . .	MHR	301	(4)
Principles of Marketing Management . . . . .	IBM	301	(4)
Managerial Finance I . . . . .	FRL	300	(3)
Managerial Finance II . . . . .	FRL	301	(3)
Management Information Systems . . . . .	CIS	310	(4)
Operations Management . . . . .	OM	301	(4)
Managerial Statistics . . . . .	OM	302	(4)
Strategic Management . . . . .	MHR	410	(4)
or Strategic Management . . . . .	OM	411	

#### **MICROCOMPUTER PROFICIENCY**

All students in any College of Business Administration major, and all other students taking certain business courses, must demonstrate proficiency with specific microcomputer software packages. The proficiency must be demonstrated prior to taking any business course with the term "microcomputer proficiency" in the prerequisite list. Some business courses identify specific microcomputer packages in their prerequisite lists. In these cases, proficiency in the noted packages must be demonstrated prior to taking the course.

Microcomputer proficiency must be demonstrated by satisfying one of the following three alternatives: 1) CIS 101; 2) microcomputer proficiency skills tests in word processing and spreadsheet; or 3) an approved college course.

#### **COLLEGE-WIDE COURSES**

#### **COURSE DESCRIPTIONS**

#### **BUS 112 Success Strategies for Business Majors (4)**

Learning techniques for freshmen and new transfer students in business majors to achieve academic and professional success. Emphasizes interaction with faculty advisors, the business community, and student organizations, career planning, and campus resources. 4 lectures/problem-solving.

#### **BUS 299/299A/299L Special Topics for Lower Division Students (1-4)**

Individual or group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

#### **BUS 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects are designed to be individual or group efforts toward solving real-life problems in the community, such as Small Business Institute cases. Formal report is required. Prerequisite: senior standing. Required minimum of 120 hours.



**BUS 499/499A/499L Special Topics for Upper Division Students (1-4)**

Individual or group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: consent of instructor.

**BUSINESS MINOR**

Many non-business students have expressed an interest in business courses that will better prepare them to enhance their non-business education in a business or government environment. The College of Business Administration has designed, in addition to the minors available within majors, a broad-based schoolwide minor to meet these needs. The minor in Business provides a solid foundation in accounting and finance, and complements these with coverage of management, marketing, production, and business computer information systems. Non-business students desiring more information should contact the Student Advising Center of the College of Business Administration. The student should formally enroll in the Minor before taking courses. A Minor Advisor is available to assist students.

The student must demonstrate microcomputer proficiency and complete the following required courses to fulfill the requirements for a minor in Business: Prerequisite: Microcomputer proficiency

Financial Accounting for Decision-Making . . . . .	ACC	207	(5)
Managerial Accounting for Decision-Making . . . . .	ACC	208	(5)
Elements of Decision-Making . . . . .	ACC	214*	(4)
Principles of Management . . . . .	MHR	301	(4)
Principles of Marketing Management . . . . .	IBM	301	(4)
Managerial Finance I . . . . .	FRL	300	(3)
Managerial Finance II . . . . .	FRL	301	(3)
Management Information Systems . . . . .	CIS	310	(4)
Multicultural Organizational Behavior . . . . .	MHR	318	(4)
Operations Management . . . . .	OM	301	(4)

\*See Advisor

**MINOR IN INTERNATIONAL BUSINESS**

The College of Business Administration offers a Minor in International Business for students majoring in other fields within the College of Business and students from other Colleges of the University who have an interest in pursuing careers that are related to international business. The purpose of the minor is to provide sufficient knowledge and expertise in International Business for students to successfully apply the specialties of their fields to international careers.

More specific information regarding the Minor in International Business is found in the section on the International Business major.

**INTERNATIONAL STUDY OPPORTUNITIES****China Summer Study Tour**

Every summer Cal Poly Pomona provides an opportunity for students to live and study in China for six weeks. Students study in English the cultural, economic and political systems of China and have an opportunity to visit business, technical, cultural and scenic locations in the various regions of China. Students earn 12 units of credit from the following courses: BUS 362 China as a Cultural Entity (4 units); BUS 432 The Use and Role of Technology in China (4 units); BUS 452 Political Economy and Business Practices in China (4 units); BUS 482 China and the U.S.: Cross Cultural Analysis (4 units). Units may be used to satisfy major course requirements or to satisfy the General Education Area 5 requirement.

**BUS 362 China As a Cultural Entity (4)**

Direct field investigation of China as a cultural entity with attention to the central issues confronting this complex society. These issues include relationship and influence of China's history on the present dynamics of contemporary Chinese culture. Instructional materials, activities, and facilities charges. 4 lectures/problem-solving. Prerequisite: consent of instructor. (Also listed as SA 362.)

**BUS 432 The Use and Role of Technology in China (4)**

Direct field investigation and academic study of productive processes and application of technology within China. Barriers and incentives for new technology; decision-making; industry specific technology; and role of foreign countries as providers. Technology tradeoffs: environment, employment, and currency reserves. Instructional materials, activities, and facilities charges. 4 lectures/problem-solving. Prerequisite: consent of instructor. (Also listed as SA 432.)

**BUS 452 Political Economy and Business Practices in China (4)**

Direct field investigation and academic study of historical and current productive/political organization of China. State ownership and the mixed economy; economic objectives and planning. Business organization; incentives and decision-making; and management. Cross cultural comparison with Western enterprise. International trade. 4 lectures/problem-solving. Instructional materials, activities and facilities charges. Prerequisite: consent of instructor. (Also listed as SA 452.)

**BUS 482 China and the United States: Cross Cultural Analysis (4)**

Examination of critical areas of U.S. and Chinese cultures that provide insights and understanding of the comparative differences of these two civilizations; historical and contemporary differences. 4 lectures/problem-solving. Instructional materials, activities and facilities charges. Prerequisite: consent of instructor. (Also listed as SA 482.)

**Semester or Year Abroad**

The College of Business Administration supports the concept of international education and encourages students to investigate opportunities for overseas study. Certain courses taken at CSU International Program study centers in foreign countries are equivalent to courses in the College of Business Administration and may be used to fulfill some of the degree requirements offered by the College and/or certain general education requirements. Students should consult the International Programs Bulletin, available at the International Center, a departmental advisor, or the campus International Programs Coordinator for more information.

**CONTINUING EDUCATION IN BUSINESS**

Many individual courses offered in the College of Business Administration provide practical learning opportunities to persons now employed in various career fields. By selecting courses that apply directly to a specific career, a person can enhance his or her professional capabilities, even though he or she may not be seeking a degree. Often, experience on-the-job is an adequate substitute for prerequisite courses so the student can enter upper division courses without completing preliminary courses. Courses that include in the description the prerequisite: "...or with the consent of the instructor" normally fall in this category. Many such courses are available in the evening. Information about the Open University and Extended University courses in business can be obtained by contacting the office of the Dean of the College of the Extended University at Kellogg West on campus. The College of

Business Administration also provides credit or non-credit programs for business organizations on-site. Further information can be obtained by contacting the dean of the College of Business Administration.

To be eligible to take undergraduate courses in the College of Business Administration for degree credit, a person must be formally admitted to the University. Admission requirements are found in the front section of this catalog. Graduate courses and entrance requirements are listed in the graduate section of this catalog.



## ACCOUNTING

Donald F. Putnam, Chair

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Nasrollah Ahadiat  
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John K. Cheever  
Keith B. Ehrenreich  
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Richard D. Hulme

Robert L. Hurt  
Antoine G. Jabbour  
John E. Karayan  
Rochelle A. Kellner  
Hong S. Pak  
Vicki S. Peden  
Anwar Y. Salimi

### VISION STATEMENT

Our vision is to continue to be recognized as a center of outstanding accounting education.

### MISSION STATEMENT

Our mission is excellence in accounting education through teaching, enhanced by research and service. We lead and encourage students and working professionals in developing their abilities to use and integrate accounting information with other information to make better decisions, to thrive in their careers, and to continue life-long learning.

### ACCOUNTING EDUCATION PROGRAM

The Accounting Department provides an education for students who wish to be management professionals with a thorough knowledge of the essential concepts of accounting and a strong background for students desiring professional careers in public, private, government, and not-for-profit accounting. The students majoring in accounting may select courses which will prepare them specifically for one or more of these career fields.

The accounting courses are taught in the framework of modern business complexity so that the students develop their decision-making skills in realistic environments and learn the wide range of ways in which the accountant's skills are used to effectively manage an enterprise.

### PREREQUISITE CORE FOR UPPER DIVISION ACCOUNTING PROGRAM

Before enrolling in the upper-division courses in the Accounting Program, accounting majors are expected to have completed college-level courses in English, mathematics/statistics, economics, computers, business law, and introductory accounting.

Students must have earned a grade of "C" (2.0) or better in each of the 12 identified lower-division courses before registering for any upper-division accounting course. The identified courses are as follows:

ENG 104 and 105; CIS 101 or microcomputer proficiency  
MAT 125 and STA 120; FRL 201  
EC 201 and 202  
ACC 207, 208, and 298

Non-accounting majors are expected to have met the above requirements to the extent that the cited courses or their equivalents are included in the requirements of their major.

### DEPARTMENT POLICY ON ACADEMIC DISQUALIFICATION

The Accounting Department may disqualify students at the end of any quarter if either: (1) their overall GPA, Cal Poly Pomona GPA, or their major GPA is below a 2.0 by 7 grade points or more, or (2) more than one-third of the units taken during the past twelve-month period do not satisfy the degree requirements.

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

Further, the department has an additional policy on satisfactory progress. Specifically, if students fails to complete any 300- or 400-level accounting course on the second try, with a grade of C or better, they will have an advising hold placed on their records. For this purpose, a "W" does not count as a try, but a "U" does. To release the hold, students must see the Department's Chair (i.e., Probationary Student Advisor). In most cases these students will be strongly counseled to seek a more suitable major.

### ACCOUNTING PREPARATION FOR TRANSFER STUDENTS (see page 149)

### MICROCOMPUTER PROFICIENCY REQUIREMENT (see page 149)

### CORE COURSES FOR MAJOR

Required of all business majors. A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Legal Environment of Business Transactions . . . . .FRL	201	(4)
Financial Accounting for Decision Making . . . . .ACC	207	5
Managerial Accounting for Decision Making . . . . .ACC	208	5
Principles of Management . . . . .MHR	301	(4)
Principles of Marketing Management . . . . .IBM	301	(4)
Managerial Finance I . . . . .FRL	300	(3)
Managerial Finance II . . . . .FRL	301	(3)
Management Information Systems . . . . .CIS	310	(4)
Operations Management . . . . .OM	301	(4)
Managerial Statistics . . . . .OM	302	(4)
Strategic Management . . . . .MHR	410	(4)
or Strategic Management . . . . .OM	411	

### ACC REQUIRED COURSES

Orientation to Professional Accounting . . . . .ACC	298	(2)
Cost Accounting . . . . .ACC	300	(4)
Intermediate Accounting I . . . . .ACC	301	(4)
Intermediate Accounting II . . . . .ACC	302	(4)
Intermediate Accounting III . . . . .ACC	303	(4)
Accounting Information Systems . . . . .ACC	305	(4)
Auditing Theory . . . . .ACC	419	(4)
Federal Tax I . . . . .ACC	431	(4)
Senior Project I . . . . .ACC	461	(2)
Accounting Theory and Research . . . . .ACC	465	(4)

### OTHER COURSES TO COMPLETE MAJOR

Law for Accountants . . . . .FRL	408	(4)
Career Tracks . . . . .		(12)

(See Department for list of career tracks and electives)

### SUPPORT COURSES

If any of these courses are used for General Education, then the Restricted Electives or Unrestricted Electives will be increased by the same number of units (see curriculum sheet for the major).

Principles of Economics . . . . .EC	201	(4)
Principles of Economics . . . . .EC	202	(4)
Money and Banking . . . . .EC	308	(4)
Freshman English II . . . . .ENG	105	(4)
Writing for the Professions . . . . .ENG	301	(4)
Introduction to Calculus for Business . . . . .MAT	125	(4)
Statistics With Applications . . . . .STA	120	(4)
Restricted Electives: (cannot include courses in Business, Economics,		

Statistics, PLS 314, or PLS 318). . . . . (2-10)  
 Unrestricted Electives . . . . . (4)

## GENERAL EDUCATION COURSES

(Required of all students)

A total of 72 quarter units of General Education courses, Track A or Track B, are required for all majors in the College of Business Administration. See the list of approved courses under General Education Requirements in this catalog.

### Areas 1 through 4

Select courses from approved list . . . . . (64)

### Area 5

Multicultural Organizational Behavior . . . . .MHR 318 (4)  
 Select one course from approved list (cannot include courses in Business, Economics, Statistics or PLS 318). . . . . (4)

## MINOR IN ACCOUNTING

The Accounting Department provides non-Accounting, undergraduate majors with the opportunity to acquire accounting knowledge and skills by completing the requirements for the Minor in Accounting as outlined below. The purpose of the minor is (1) to develop marketable skills for persons with majors other than Accounting, (2) for those students majoring in technical fields that involve the direct or indirect use of the knowledge and skills of accounting, and (3) for those students who wish to gain a better understanding of accounting for personal use.

It is possible for students majoring in most non-Accounting fields to complete the minor within the normal requirements of their degrees through careful planning and scheduling of their required and elective courses.

No courses in the minor program may be waived or substituted. The student is responsible for meeting the requirements of the minor program that are in effect at the date of signing the formal contract for the minor in Accounting. It is recommended that the contract be signed by the student before beginning the minor program.

For more information or to enroll in the minor, contact the minor Coordinator of the Accounting Department.

## COURSES IN MINOR

Required of all students.

### CORE (28 Units):

Financial Accounting for Decision Making . . . . .ACC	207	5
Managerial Accounting for Decision Making . . . .ACC	208	5
Elements of Decision-Making . . . . .ACC	214*	(4)
Orientation to Professional Accounting . . . . .ACC	298	(2)
Cost Accounting . . . . .ACC	300	(4)
Intermediate Accounting . . . . .ACC	301	(4)
Intermediate Accounting . . . . .ACC	302	(4)
Intermediate Accounting . . . . .ACC	303	(4)

### DIRECTED ELECTIVES (8 Units):

Select 8 units from one of the following area combinations (each course 4 units):

Financial: ACC 401, ACC 403, ACC 404 or ACC 465  
 Managerial: ACC 412 and ACC 413  
 Auditing: ACC 419 and ACC 420, ACC 424, or CIS 433  
 Taxation: ACC 431 and ACC 432  
 Auditing/Taxation: ACC 419 and ACC 431

Not-For-Profit: ACC 426 and ACC 428

(Other combinations require special approval by the Minor Coordinator and the Chair of the Accounting Department, depending upon the student's completion of the required course prerequisites.)

## MINOR IN FINANCIAL ANALYSIS

The Accounting Department provides non-Accounting undergraduate majors with the opportunity to acquire skills to qualify for positions such as cost/budget analyst and project control analyst. The program will greatly benefit Finance majors interested in careers as bankers and financial planners. Operations Management majors will be able to combine their skills in quantitative methods, especially forecasting, with the ability to work with accounting records.

It is possible for students majoring in most non-accounting fields to complete the minor within the normal requirements of their degrees through careful planning and scheduling of required and elective courses.

No courses in the minor program may be waived or substituted. The student is responsible for meeting the requirements of the minor program that are in effect at the date of signing the formal contract for the minor in Financial Analysis. It is recommended that the contract be signed by the student before beginning the minor program. For more information or to enroll in the minor, contact the Minor Coordinator of the Accounting Department.

## COURSES IN MINOR

### CORE (24 units):

Financial Accounting for Decision Making . . . . .ACC	207	5
Managerial Accounting for Decision Making . . . .ACC	208	5
Financial Statement Analysis . . . . .ACC	226	(4)
Managerial Finance I . . . . .FRL	300	(2)
Managerial Finance II . . . . .FRL	301	(3)
Management Science . . . . .OM	315	(3)

### DIRECTED ELECTIVES (12 units):

Business Forecasting and Financial Planning . . . .FRL	363	(4)
or Forecasting Methods for Management . . . . .OM	415	
Financial Spreadsheet Analysis . . . . .OM	308	(4)
or Decision Support Systems . . . . .OM	350	

### Upper-Division Accounting (4 units):

Accounting Information Systems . . . . .ACC	305	(4)
or Controllanship . . . . .ACC	413	
or Management Control in Not-For-Profit Organizations . . . . .ACC	428	

Other upper-division accounting courses may be selected with the concurrence of the Minor Coordinator and Chair of the Accounting Department, depending upon the student's completion of the required prerequisite courses.

## COURSE DESCRIPTIONS

### ACC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### ACC 205 Accounting for Decision-Making II (4)

Second course in introduction to financial and managerial accounting. 4



lectures/problem-solving. Only for students who have completed ACC 204 or transferable equivalents before Fall 1998. The transition program for ACC 205 will end in Winter 1999 and for ACC 206 will end in Spring 1999. Prerequisites: ACC 204. For Accounting majors a minimum grade of "C" (2.0) in ACC 204 is required.

#### **ACC 206 Accounting for Decision-Making III (2)**

Third course in introduction to financial and managerial accounting. 2 lectures/problem-solving. Only for students who have completed ACC 204 or transferable equivalents before Fall 1998. The transition program for ACC 205 will end in Winter 1999 and for ACC 206 will end in Spring 1999. Prerequisites: ACC 205 and EC 202. Recommended concurrent enrollment in ACC 298. For accounting majors a minimum grade of "C" (2.0) in ACC 205 is required. **Transfer Students** : Take ACC 214 instead of ACC 206 if your community-college accounting was preparer-based. See Accounting Department for current list of user-based colleges.

#### **ACC 207 Financial Accounting for Decision Making (5)**

Introduction to financial accounting and accounting information systems (AIS), including basic concepts, limitations, tools and methods. Use of AIS-generated information, including financial statements in decision making by investors, creditors, and other users external to the organization. 4-lecture problem solving and 1 self-paced activity. For credit, both segments are to be successfully completed. Prerequisites: Microcomputer proficiency and EC 201.

#### **ACC 208 Managerial Accounting for Decision Making (5)**

Introduction to managerial accounting and accounting information systems (AIS), including basic concepts, limitations, tools and methods. Use of AIS-generated information to support the internal decision-making functions of an organization. 4-lecture-problem solving and 1 self-paced activity. For credit, both segments are to be successfully completed. Prerequisites: ACC 207, EC 202, and microcomputer proficiency.

#### **ACC 214 Elements of Decision-Making (4)**

Introduction to financial and managerial accounting information systems, including basic concepts, limitations, tools and methods. Uses of accounting information, including financial statements and internal reports; in decision-making and in meeting various reporting requirements. 4 lectures/problem-solving. Prerequisites: Microcomputer Proficiency, EC 201, EC 202, and one year of community college preparer-based accounting. Satisfies ACC 206 requirement for transfer students.

#### **ACC 226 Financial Statement Analysis (4)**

Analysis and use of financial reports. Emphasis on interpretation of end result to prepare student to better understand and analyze actual financial reports. Statements used extensively in illustrations, problems, cases, and analysis. 4 lectures/problem-solving. Not open to accounting majors. Prerequisites: ACC 207, and Math 125 or OM 315.

#### **ACC 231 Personal Taxation and Planning (4)**

Basic principles of taxation and their application to personal financial planning, including tax return preparation. Not open to Accounting majors. Credit will not be granted for both ACC 231 and ACC 431. 4 lectures/problem-solving.

#### **ACC 298 Orientation to Professional Accounting (2)**

Accounting cycle. How transactions are presented in the financial process, including preparation of financial statements. Exposure to breadth of accounting profession, career choices available, and what

accountants actually do at work. Required skills in accounting profession. 2 lectures/problem-solving. Prerequisites: ACC 208, EC 202 and ENG 104. For Accounting majors a minimum grade of "C" (2.0) in ACC 208 is required.

#### **ACC 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

#### **ACC 300 Cost Accounting (4)**

Cost accounting fundamentals; cost allocation; budget and standards; cost information for decision and control; decision models; cost information; cost behavior and analysis. 4 lectures/problem-solving. Prerequisites: for Accounting majors, a minimum grade of "C" (2.0) in ACC 207, ACC 208, and ACC 298; ENG 104 and ENG 105; STA 120 and MAT 125; FRL 201; EC 201 and EC 202; and CIS 101 or Microcomputer Proficiency. For non-Accounting majors, a minimum grade of "C" (2.0) in ACC 207, ACC 208, ENG 104; STA 120 or MAT 125; and CIS 101 or Microcomputer Proficiency.

#### **ACC 301 Intermediate Accounting (4)**

FASB Conceptual Framework of Accounting from both conceptual and application perspectives. Decision-making skills in articulating accounting policies in business organizations. Researching accounting questions, problems, and cases using the FASB Conceptual Framework. 4-lecture problem-solving. Prerequisites: for Accounting Majors: A minimum grade of C (2.0) in Acc 300. For non-Accounting Majors: A minimum grade of C (2.0) in ACC 207, 208, and 298; ENG 104; STA 120 or MAT 125; and CIS 101 or MCP.

#### **ACC 302, 303 Intermediate Accounting II and III (4) (4)**

Applications of FASB Conceptual Framework of Accounting to specific topics in financial accounting. Decision-making and problem-solving skills. ACC 301, 302, and 303 are to be taken in sequential order. 4 lectures/problem-solving. Prerequisites: for ACC 302, a minimum grade of C (2.0) in ACC 301. For ACC 303, a minimum grade of C (2.0) in ACC 302.

#### **ACC 305 Accounting Information Systems (4)**

Role, design, implementation, and management of the accounting information system as a subset of the management information system. Interface between accountants and computer specialists. Short case studies. 4 lectures/problem-solving. Prerequisites: ACC 208 and CIS 310. For Accounting majors, minimum grade of "C" (2.0) in ACC 208.

#### **ACC 400 Special Problems for Upper-Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **ACC 401 Advanced Accounting (4)**

Miscellaneous advanced financial accounting topics, including leases, interim reporting, discontinued operations, segmental reporting, partnerships, and accounting for effects of changing prices. Heavy reliance upon official pronouncements to determine proper footnote disclosures. 4 lectures/problem-solving. Prerequisite: minimum grade of "C" (2.0) in ACC 303.

#### **ACC 403 Consolidation and Foreign Currency Accounting (4)**

Analytical study and application of principles of consolidation and

foreign currency translation. 4 lectures/problem-solving. Prerequisite: Minimum grade of "C" (2.0) in ACC 302.

#### **ACC 404 International Accounting (4)**

Examination and discussion of accounting theories, techniques, procedures, accounting standards and regulations used in other nations. Examination of contemporary practices prevailing in different parts of the world. Emphasis on multinational corporations, and their needs and practices. 4 lectures/problem-solving. Prerequisite: For Accounting majors, minimum grade of "C" (2.0) in ACC 302. (Also listed as IB 404.)

#### **ACC 412 Advanced Cost Accounting (4)**

Advanced cost accounting techniques focusing on mathematical models and contemporary technology in cost accounting, including decision-making under uncertainty, use of linear regression in cost estimates, service department cost allocations using simultaneous equations, and stochastic cost-volume-profit analysis. 4 lectures/problem-solving. Prerequisite: minimum grade of "C" (2.0) in ACC 300.

#### **ACC 413 Controllership (4)**

Analysis of controllership function in a business organization, and general problems of accounting controls. Cases and/or problems. 4 lectures/problem-solving. Prerequisite: Minimum grade of "C" (2.0) in ACC 300.

#### **ACC 419 Auditing Theory (4)**

Theory of auditing and its objectives; procedures and techniques to attain objectives; types of reports issued by auditors; professional responsibilities and ethics of auditors. 4 lectures/problem-solving. Prerequisites: Minimum grade of "C" (2.0) in ACC 303 (Substitute ACC 305 for non-Accounting majors), and OM 302.

#### **ACC 420 Advanced Auditing (4)**

Extensive procedures and techniques in carrying out audit objectives; working paper development and preparation; preparation of opinion and report rendered by auditors; application of Electronic Data Processing to auditing. Current literature. Major project. 4 lectures/problem-solving. Prerequisite: minimum grade of "C" (2.0) in ACC 419.

#### **ACC 424 Internal Auditing (4)**

Objectives, principles, and methods of internal and operational auditing with special emphasis on examination and appraisal of internal controls in the various reporting systems. Problems of communication, delegation of authority, or organization. 4 lectures/problem-solving. Prerequisite: minimum grade of "C" (2.0) in ACC 419.

#### **ACC 426 Government and Not-for-Profit Accounting (4)**

Governmental and institutional accounting and accounting for fiduciaries. 4 lectures/problem-solving. Prerequisite: minimum grade of "C" (2.0) in ACC 302.

#### **ACC 428 Management Control in Not-for-Profit Organizations (4)**

In-depth study of processes of budgeting, planning, and controlling in governmental, hospital, and educational institutions. 4 lectures/problem-solving. Prerequisites: minimum grade of "C" (2.0) in ACC 300.

#### **ACC 431 Federal Tax I (4)**

Incomes, expenses, exclusions, deductions, and credits for individual tax returns. 4 lectures/problem-solving. Prerequisite: minimum grade of "C" (2.0) in ACC 300 (ACC 305 for non-Accounting majors).

#### **ACC 432 Federal Tax II (4)**

Federal taxes on partnerships, corporations, estates, trusts, reorganizations, and tax planning. 4 lectures/problem-solving. Prerequisite: minimum grade of "C" (2.0) in ACC 431.

#### **ACC 434 Practice of Income Tax Preparation (2)**

Federal and state income tax laws as related to individuals; tax return preparation, under faculty supervision, for elderly and low-income taxpayers. One 4-hour activity.

#### **ACC 435 Tax Research and Planning (4)**

Development of tax research capabilities; interpreting statutes, cases, and rulings; and communicating research results within an environment of individual and business tax planning and analysis. Administrative judicial procedures governing tax controversies. 4 seminars. Prerequisites: minimum grade of "C" (2.0) in ACC 431.

#### **ACC 441, 442 Internship in Accounting (1-8) (1-8)**

On-the-job training in accounting involving new university-level learning experiences. Experiences may be useful as a basis for senior projects. Total credit limited to 8 units each. Maximum of 4 units of Specialty Options may be satisfied by internship. Prerequisite: permission of the Director of the Internship Program, Accounting Department.

#### **ACC 443 Internship in Public Accounting (4)**

On-the-job training with a CPA firm in phases of auditing or public accounting. The experience must be new to the student. Analytical reports of work accomplished by each student are made periodically to the faculty coordinator. Units of college credit granted are dependent on departmental approval. Maximum of four units of Specialty Options may be satisfied by internship. Prerequisite: minimum grade of "C" (2.0) in ACC 419, and consent of the Director of the Internship Program, Accounting Department.

#### **ACC 461 Senior Project (2)**

Familiarization with probable sources of data and information for research-oriented projects. Problem identification and analysis. Research methodology. Application of report writing tools and techniques. Project(s) must involve research and writing. Prerequisites: minimum grade of "C" (2.0) in ACC 302 and ENG 301.

#### **ACC 462 Senior Project (2)**

Selection and completion in formal report form of one or more project(s) under faculty supervision. Project(s) are research oriented and typical of problems which graduates may be required to solve in future occupations. Project(s) must involve library research and/or field study and writing. Prerequisite: Minimum grade of "C" (2.0) in ACC 461.

#### **ACC 465 Accounting Theory and Research (4)**

Study of the general frame of reference for the evaluation and development of sound managerial and financial accounting practices. Emphasis on the normative rather than the descriptive approach, not a review of accounting professional pronouncements. Enhances analytical, research, judgmental, and communication skills of students. 4 seminars. Prerequisite: minimum grade of "C" (2.0) in ACC 303 and ACC 419.

#### **ACC 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.





## COMPUTER INFORMATION SYSTEMS

Lavette C. Teague, Acting Chair

Thomas H. Athey	Michael J. Klosky
Donald L. Bell	Daniel P. Manson
John B. Crawford	Ida W. Mousouris
Steven S. Curl	Larisa Preiser-Huoy
Vijay D. Deokar	Steven R. Powell
Ronald W. Eaves	Louise L. Soe
Fred Gallegos	Robert V. Stumpf
Drew C. Hwang	Ward D. Testerman
Koichiro R. Isshiki	Susan J. Wilkins

### MISSION STATEMENT

The Computer Information Systems Department views its mission as complementary to that of the College of Business Administration and University missions. The Department is committed to providing opportunities to a diverse and multicultural student body for quality education in Computer Information Systems at the undergraduate and graduate levels, with particular emphasis on undergraduate preparation. This commitment also extends to the provision of supportive courses for other departments of the College of Business Administration so as to enhance their understanding of the increasingly critical role of information systems and information technology in organizations.

The academic programs of the Department enable students to obtain an in-depth specialization in one of several critical areas of the Information Systems field, and also to achieve a broad understanding of the general knowledge necessary to become an effective practitioner in this field. Both the areas of specialization and general information systems knowledge are oriented towards the cutting edge of technology as practiced by and implemented in industry. The commitment of the department to master's level education provides quality support in both general and specialized areas of the field. At both the graduate and undergraduate levels, our programs seek to emphasize the effective and practical application of the principles of Computer Information Systems to support the operational, tactical, and strategic objectives of the organizations with which our students will be associated and to emphasize the quality professional communication skills which permit our students to attain a mastery of group dynamics in professional settings.

In support of the essential aspects of the Department's mission, the Department strives for a strong practical orientation for its faculty and students which is based upon and promoted by access to state-of-the-art hardware and software for use by students and faculty in the classroom and for research. The Department also strives to retain the technical currency of faculty through links with industry and continued research and consulting. To ensure that faculty have strong skills in working with industry, all our new faculty are required to have substantial business experience in the profession prior to employment with the Department. The student body also is afforded this technical currency through aggressive and continuous monitoring and upgrading of our course offerings to reflect the dynamics of the information systems field.

The Cal Poly Pomona approach to computer information systems is unique in the field of computer education in several ways. First, the computer information systems courses are integrated with a fundamental core of business administration courses to meet the needs of the major job markets, business, and government. Second, the program concentrates on the practical application of how to use the computer to help solve management problems, rather than the engineering aspects of how to design the internal workings of a computer. Third, the program is designed with the students in mind—

they are prepared not only for well-paid employment but also a lifetime of learning and professional growth.

A student majoring in computer information systems will become prepared to seek employment in a variety of computer-related positions such as programmer, systems analyst, database administrator, telecommunications analyst, project leader, data processing manager, and information center manager, consultant, or product specialist.

The Computer Information Systems Department offers two minors: Business Computer Programming and Managerial Computing. The purpose of these minors is to develop marketable skills for a person not able to find immediate employment in his or her chosen field. Also those students majoring in technical fields that involve the use of the computer may wish to develop adjunct skills that may prove to be complementary to their major course of study. Those interested in enrolling in either of these minors should see the Department Chair, Building 98, Room C4-11, (909) 869-3235.

### Department Policy on Academic Disqualification

The Computer Information Systems Department may disqualify students majoring in Computer Information Systems at the end of any quarter if either of the following requirements are not met: (1) their overall GPA, Cal Poly Pomona GPA, or their major GPA is below 2.0 by 7 grade points or more or (2) more than one-third of the units taken during the past twelve-month period do not satisfy the degree requirement. Determination of the GPA in the major and proportion of courses taken to satisfy the degree requirements is the responsibility of the department.

Further, the department has an additional policy on satisfactory progress. Specifically, if students fail to complete a Computer Information Systems course required of all CIS majors with a grade of C or better, they will have an advising hold placed on their records. For this purpose, a "W" does not count as a try, but a "U" does. To release the hold, students must see the Department's Chair (i.e., Probationary student advisor). Students who do not achieve a grade of C or better in a required CIS course in three attempts will be strongly counseled to seek a more suitable major.

### ACCOUNTING PREPARATION FOR TRANSFER STUDENTS (see page 149)

### MICROCOMPUTER PROFICIENCY REQUIREMENT(see page 149)

#### CORE COURSES FOR MAJOR

Required of all business majors. A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Legal Environment of Business Transactions . . . . .FRL	201	(4)
Financial Accounting for Decision-Making I . . . . .ACC	207	(5)
Managerial Accounting for Decision-Making . . . . .ACC	208	(5)
Principles of Management . . . . .MHR	301	(4)
Principles of Marketing Management . . . . .IBM	301	(4)
Managerial Finance I . . . . .FRL	300	(3)
Managerial Finance II . . . . .FRL	301	(3)
Management Information Systems . . . . .CIS	310	(4)
Operations Management . . . . .OM	301	(4)
Managerial Statistics . . . . .OM	302	(4)
Strategic Management . . . . .MHR	410	(4)
or Strategic Management . . . . .OM	411	

#### CIS REQUIRED COURSES

Object-Oriented Programming . . . . .CIS	234	(4)
or Object-Oriented Programming . . . . .CIS	214*	(2)



Introduction to Object-Oriented .....			
Systems Analysis and Design .....	CIS	235	(4)
or Systems Analysis and Design .....	CIS	215	(2)
Business Telecommunications .....	CIS	267	(4)
Interactive Web Development .....	CIS	311	(4)
Information Systems Careers .....	CIS	328	(2)
Systems Development Project .....	CIS	466	(4)

**EACH STUDENT WILL SELECT 28 UNITS FROM THE FOLLOWING: SELECTION DEPENDS ON CAREER TRACK SELECTED AND ADVISOR CONSULTATION (28)**

Programming with C++ .....	CIS	284	(4)
Structured Systems Analysis .....	CIS	335	(4)
Client/Server Applications Development .....	CIS	338	(4)
Data Modeling .....	CIS	345	(4)
Local/Metro Area Networks .....	CIS	347	(4)
Object COBOL Programming .....	CIS	364	(4)
Rapid Systems Development .....	CIS	406	(4)
Advanced Object-Oriented			
Systems Analysis and Design .....	CIS	415	(4)
Wide Area and Voice Networks .....	CIS	417	(4)
Multimedia Applications on the Web .....	CIS	421	(4)
JAVA Programming for Business .....	CIS	424	(4)
Mobile Communications and Wireless Networks .....	CIS	427	(4)
Network Analysis and Design .....	CIS	457	(4)
Workgroup Computing .....	CIS	431	(4)
Information Systems Auditing .....	CIS	433	(4)
Managing Business Networks .....	CIS	437	(4)
Multivendor Inter/Intra Networkings .....	CIS	447	(4)
Executive Information Systems .....	CIS	451	(4)
Advanced C++ Programming .....	CIS	454	(4)
Network Analysis and Design .....	CIS	457	(4)
Web Site Development .....	CIS	461	(4)

**SUPPORT AND ELECTIVE COURSES**

**CAREER TRACK SUPPORT COURSES**

4 units from Business or Economics, with Career Track advisor approval.  
4 units from other than Business, Economics, Public Administration, and Statistics with Career Track advisor approval.

**BUSINESS AND ECONOMICS SUPPORT COURSES**

These courses are required of all CIS majors. If any of these courses are used for General Education, then the Restricted Electives or Unrestricted Electives will be increased by the same number of units (see curriculum sheet for the major).

Principles of Economics .....	EC	201	(4)
Principles of Economics .....	EC	202	(4)
Statistics with Applications .....	STA	120	(4)
Restricted Electives (cannot include courses in Business, Economics, Statistics, PLS 314, or PLS 318) .....			(4-16)

**GENERAL EDUCATION COURSES**

(Required of all students)

A total of 72 quarter units of General Education courses, are required for all majors in the College of Business Administration. See the list of approved courses under General Education Requirements in this catalog.

**Areas 1 through 4**

Select courses from approved list ..... (64)

**Area 5**

Multicultural Organizational Behavior ..... MHR 318 (4)  
Select one course from approved list (cannot include

courses in Business, Economics, Statistics, or PLS 318) ..... (4)

**CAREER TRACKS IN CIS**

The Computer Information Systems Department has established four career tracks in the major. These are: (1) Applications Software Development, (2) Business Systems Analysis, (3) Interactive Web Development, and (4) Telecommunications Analysis. Every CIS major must select one of these career tracks after taking CIS 328, and after having consulted with a CIS faculty advisor. The career track selected will dictate which upper division CIS electives the student will take, with the courses specified in a written contract with the CIS faculty advisor. The contract terms must be met in order for the student to graduate with a major in CIS.

Also, as noted above in the list of support courses, a total of two support courses (8 units) must be selected during consultation with a CIS career track faculty advisor. These two courses will also be itemized in the career track contract and must be taken in order to graduate with a major in CIS.

**Prerequisites for CIS Career Track Courses**

Students must have earned a grade of "C" (2.0) or better in each of the courses listed below before registering for any career track course. The courses are: CIS 234 or CIS 214, CIS 235 or CIS 215, CIS 267, CIS 305, CIS 311, CIS 328

**MICROCOMPUTER PROFICIENCY**

The College of Business Administration has established a requirement that all students with a major in any CBA department demonstrate microcomputer proficiency. In particular, the student must prove this proficiency before registering for any course with either an explicit or hidden microcomputer proficiency prerequisite. Microcomputer proficiency must be demonstrated by satisfying one of the following three alternatives: (1) CIS 101, (2) microcomputer proficiency skills tests in word processing and spreadsheet, or (3) an approved college course.

**MINOR IN BUSINESS COMPUTER PROGRAMMING**

The Computer Information Systems Department provides non-CIS majors with the opportunity to acquire programming expertise in the area of business applications program development by completing the requirements for Minor in Business Computer Programming as outlined below. The purpose of this minor is (1) to develop marketable skills for people with majors other than Computer Information Systems, (2) for those students majoring in technical fields that involve the use of the computer, and (3) for those students who wish to gain a much better understanding of the computer for personal use.

Students completing the Minor in Business Computer Programming are excused from taking Information Systems Careers (CIS 328) for courses in their minor that require CIS 328 as a prerequisite.

For more information or to enroll in the minor, please contact the CIS department Secretary in Building 98, Room C4-11, (909) 869-3235.

**COURSES FOR MINOR (24 units)**

Microcomputer proficiency .....			
Object-Oriented Programming .....	CIS	234	(4)
Systems Analysis and Design .....	CIS	235	(4)
Business Telecommunications .....	CIS	267	(4)
Interactive Web Development .....	CIS	311	(4)
Select two courses from the following:			

Programming with C++ .....	CIS	284	(4)
Client/Server Application Development .....	CIS	338	(4)
Object COBOL Programming .....	CIS	364	(4)

Rapid Systems Development . . . . .	CIS	406	(4)
JAVA Programming for Business . . . . .	CIS	424	(4)
Advanced C++ Programming . . . . .	CIS	454	(4)

### MINOR IN MANAGERIAL COMPUTING

The Computer Information Systems Department provides non-CIS majors with the opportunity to acquire expertise in object-oriented analysis and programming concepts as they are applied in managerial World Wide Web application development. Students need to complete the requirements for a Minor in Managerial Computing as outlined below. The purpose of the minor is (1) to develop marketable skills for people with majors other than Computer Information Systems and (2) to give students a much better understanding of World Wide Web application development.

Students completing the Minor in Managerial Computing are excused from taking Information Systems Careers (CIS 328) for courses in their minor that require CIS 328 as a prerequisite.

For more information or to enroll in this minor, please contact the CIS Department Secretary in Building 98, 4th floor, Room 11, (909) 869-3235.

### COURSES FOR MINOR (24 units)

Microcomputer proficiency			
Object Oriented Programming . . . . .	CIS	234	(4)
Introduction to Object-Oriented Systems Analysis and Design . . . . .	CIS	235	(4)
Business Telecommunications . . . . .	CIS	267	(4)
Interactive Web Development . . . . .	CIS	311	(4)

Select two courses from the following list:

Multimedia Applications on the Web . . . . .	CIS	421	(4)
Workgroup Computing . . . . .	CIS	431	(4)
Executive Information Systems . . . . .	CIS	451	(4)
Web Site Development . . . . .	CIS	461	(4)

### COURSE DESCRIPTIONS

#### CIS 101 Introduction to Microcomputing (4)

Introduction to Microcomputing using personal computers and personal productivity software; (1) Windows environment, (2) Word processing, (3) Spreadsheet, (4) Internet and World Wide Web. Problem solving using software packages adopted by the College of Business Administration. Credit/No Credit; 4 lectures/problem-solving.

#### CIS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. May be graded on CR/NC basis.

#### CIS 214 Object Oriented Programming (2)

Introduction to object-oriented programming for students who have a background in non object-oriented computer programming. Covers use of a development tool. Event-driven and graphical interface programming projects. 2 lectures/problem-solving. Prerequisite: microcomputer proficiency. Not offered in 1998/99.

#### CIS 215 Systems Analysis and Design (2)

Introduction to object oriented Systems Analysis and Design for those students who have a background in Structured Systems Analysis and Design. Covers use of a development tool. Class hierarchies, scripting,

and collaborations of objects. 2 lectures/problem-solving. Prerequisites: CIS 214 or CIS 234. Not offered in 1998/99.

#### CIS 234 Object-oriented Programming (4)

Introduction to computer programming of business information systems using an object-oriented development tool. Event-driven and graphical interface programming projects. 4 lectures/problem-solving. Prerequisite: microcomputer proficiency.

#### CIS 235 Introduction to Object-Oriented Systems Analysis and Design (4)

Introduction to traditional and object-oriented systems analysis and design approaches. Determination of user system requirements. User/computer interface design. Normalization and Entity/Relationship Diagrams. Implementation of system using tools from prerequisite courses. Class hierarchies, structures, and collaborations of objects. 4 lectures/problem-solving. Prerequisite: A minimum of "C" (2.0) in CIS 214 or CIS 234.

#### CIS 267 Business Telecommunications (4)

Telecommunications link components and functions, concentrators, multiplexors, telecom protocols, OSI model, telecom regulations, integrated traffic on WAN's and LAN's, network applications. 4 lectures/problem-solving. Prerequisites: A minimum grade of "C" (2.0) in CIS 234.

#### CIS 284 Programming with c++ (4)

Foundations of c and c++. Operators, functions, arrays, structures, files, and classes. Introduction to Windows programming. 4 lectures/problem-solving. Prerequisite: CIS 328.

#### CIS 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

#### CIS305 Intermediate Object-Oriented Systems Analysis and Design

Intermediate study of object-oriented systems analysis and design. Information requirements determination and feasibility examination. Entity/Relationship diagrams, Object Diagrams, and Class Diagrams. Structured Query Language and distributed databases with integrity and security issues. Client Server Computing. 4 lecture/problem solving. Prerequisite: A minimum grade of "C" (2.0) in CIS235.

#### CIS310 Management Information Systems (4)

Management and development of information systems in modern businesses from the customer and the MIS perspective. Information as a strategic asset. Acquisition, analysis, integration, presentation of internal and external information. Information management in international and multinational enterprises. Ethical, social impacts. 4 lectures/problem-solving. Prerequisites: ACC 204, MHR 301, and Microcomputer proficiency.

#### CIS 311 Interactive Web Development (4)

Design and development of business applications to use information on organizational intranets and the Internet. Event-driven programming to control external database/spreadsheet objects from the web. Design considerations for interactive user interfaces. Principles governing critical analysis of web-based content and graphical design. 4 lectures/problem-solving. Prerequisites: CIS 310 and a minimum grade of "C" (2.0) in (CIS 215 or CIS 235).

**CIS 328 Information Systems Careers (2)**

Career opportunities and specialties within Computer Information Systems. Job search preparation, strategies and techniques. Making good impressions during interviews and on the job. Career planning and enhancement. Individual or group investigation, research, studies, or surveys of selected problems. 2 units. Prerequisites: A minimum grade of "C" (2.0) in CIS 267, CIS 305, and CIS 311.

**CIS 335 Structured Systems Analysis (4)**

Application of structured analysis and design methods and tools to the development of information systems. Systems development using nonprocedural tools. 4 lectures/problem-solving. Prerequisites: micro-computer proficiency, CIS 328.

**CIS 338 Client/Server Applications Development (4)**

Distributed Database Architectures, design and implementation. Transaction processing, two-phase, time-stamp, optimistic concurrency control mechanisms. Client/Server architectures, applications development using GUI front ends. Distributed Database management. 4 lectures/problem-solving. Prerequisite: CIS 254 and CIS 267

**CIS 345 Data Modeling (4)**

Advanced data modeling concepts. Relation of data modeling to event modeling. Data modeling for object-oriented and expert systems. Enterprise-level modeling. 4 lectures/problem-solving. Prerequisites: CIS 328.

**CIS 347 Local Area Networks (4)**

Analysis of hardware and software used in the design of local area networks. Analysis of transmission media, systems architectures, and cost/benefit tradeoffs. Analysis of specific vendor LAN's. Interconnectivity issues. 4 lectures/problem-solving. Prerequisite: CIS 328.

**CIS 364 Object COBOL Programming (4)**

Object-oriented computer programming of complex business applications software using Object COBOL. Programming projects requiring graphical user interfaces and database updating. 4 lectures/problem-solving. Prerequisite: CIS 264.

**+CIS 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. May be graded on CR/NC basis.

**CIS 406 Rapid Systems Development (4)**

Rapid systems development methods and tools. Emphasis on the prototyping approach to systems development and human/ergonomic factors in designing user interfaces. Use of 4GLs, front/back-end CASE tools, code generators and similar rapid development tools. 4 lectures/problem-solving. Prerequisites: CIS 328 and CIS 338.

**CIS 415 Advanced Object-Oriented Analysis and Design (4)**

Comparison and evaluation of alternative methods for systems analysis and design. Automated tools and techniques for analysis and design of computer information systems. Tailoring system life cycle to project needs. Written reports and case studies. 4 lectures/problem-solving. Prerequisites: CIS 328.

**CIS 417 Wide Area/Voice Networks in Business (4)**

Hardware and software concepts regarding wide area and voice networks. Analog and digital systems and their interconnection. 4

lectures/problem-solving. Prerequisite: CIS 328.

**CIS 421 Multimedia Applications on the Web (4)**

Design, development, publishing multimedia applications for business. Considerations for creation of graphical, photographic, video, sound, animation, multimedia authoring, virtual reality applications suitable for publication on WWW or other electronic media. Principles supporting critical analysis of multimedia design and content. 4 lectures/problem-solving. Prerequisite: CIS 328.

**CIS 424 JAVA Programming for Business (4)**

JAVA programming, fundamental language structure, object-oriented features, typical development platform, and library of classes. Building Windows business applications as well as Web page JAVA applets. 4 lectures/problem-solving. Prerequisite: CIS 328.

**CIS 427 Mobile Communications and Wireless Networks**

Fundamentals of mobile telecommunications and wireless network technology, regulation, standards, and management. Analysis of wireless local and wide area networks. Evaluation of service alternatives. Examination of emerging issues. 4 lecture/problem-solving. Prerequisite: A minimum grade of "C" (2.0) in CIS 267, CIS 347, and CIS 417.

**CIS 431 Workgroup Computing (4)**

Design and management of inter- and intraorganizational group work through networked and WWW-based technologies. Design workgroup applications for social and task communication, collaboration and coordination, using current technologies. Critical analysis of effects of workgroup technologies on group interaction. 4 lectures/problem-solving. Prerequisites: CIS 428.

**CIS 433 Information Systems Auditing (4)**

Fundamentals of Information Systems (IS) auditing. Understanding IS Audits, risk assessment and concepts, and techniques used in IS audits. Includes case studies. 4 lectures. Prerequisite: ACC 419 or (CIS 328 and CIS 406).

**CIS 437 Network Management (4)**

Administering and tuning telecommunications networks. Analysis of network components, traffic, security, and failures in the network. An examination of regulatory and legal issues in the field. Analyzing and directing a telecommunications project. 4 lectures/problem-solving. Prerequisites: CIS 347 and CIS 417.

**CIS 441, 442 Internship in Information Systems (1-8) (1-8)**

Faculty-supervised on-the-job educational experiences in a real world data processing environment. Allocation of credit is dependent on the nature of the work done and the number of hours worked. Students usually receive pay for participation. Total credit limited to 8 units each. Prerequisite: permission of the internship coordinator.

**CIS 447 Multivendor Inter/Intra Networking**

Fundamentals of multivendor network standards. Hardware and software technologies, design, installation, types of services, performance monitoring and management of Intra and Extranets. Integrating heterogeneous networks, securing them with the firewalls and emerging issues. 4 lecture/problem-solving. Prerequisite: A minimum grade of "C" (2.0) in CIS 267, CIS 347, and CIS 417.



**CIS 451 Executive Information Systems (4)**

Application of computer-based information systems executives individually and as part of a workgroup of other managers and staff professionals, to discover business problems, develop solutions, and communicate action plans. 4 lectures/problem-solving. Prerequisite: CIS 328.

**CIS 454 Advanced C++ Programming (4)**

Using c++ to solve complex business problems that interact with relational databases. Use of c++ workbench to build a complete Windows application. 4 lectures/problem-solving. Prerequisite: CIS 284.

**CIS 457 Network Analysis and Design (4)**

Analysis of telecommunications networks by building network models, simulating the models, analyzing the results of the simulation, evaluating model costs, and selecting the best model within given constraints. 4 lectures/problem-solving. Prerequisites: CIS 347 and CIS 417.

**CIS 461 Web Site Development (4)**

Design of WWW sites with consistent graphical interface and business content. Requirements analysis, use of client and server-side web development software to develop interfaces to business databases. Programming script development, application implementation, incorporation of authoring tools and document viewing methodologies. 4 lectures/problem-solving. Prerequisite: CIS 328.

**CIS 466 Systems Development Project (4)**

Application of computer programming and implementation concepts to a comprehensive group project. Management planning, scheduling, and reporting required. Documentation to include programming, testing and users manuals. Oral and written presentations required for all team members. 4 lectures/problem-solving. Prerequisites: 3 track courses.

**CIS 499 Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.





## FINANCE, REAL ESTATE, AND LAW

Javad Kashefi, Chair

Richard J. Bergstrom	Eric J. McLaughlin
Michael Carney	Jeanne Lunsford
Michelle Chu	Majed Muhtaseb
Robert Enders	David L. Parry
"Phillip" G. Ghazanfari	Paul Sarmas
Hyung Ki Jin	Ahmad Sohrabian
Shady Kholdy	John B. Wyatt III
George H. Lentz	N. Gregory Young
Gilbert J. McKee	

The FRL Department seeks to prepare undergraduate students in Finance, Real Estate, and Law and MBA students for careers in finance, real estate, and contract management with up-to-date curricula and instructional methods. In addition, the FRL Department provides all other students within the College of Business Administration and throughout the university with a variety of introductory and specialized courses in finance, real estate, business law, and contract management. The department is also committed to enhancing the intellectual capital of its faculty and maintaining strong links with business/government through research, writing, consulting, and participation in academic and professional meetings, and other development activities.

Students select one of the three specialties which best meets their career objectives: Finance, Real Estate, or Business Law and Contract Management.

The Finance specialty offers courses on theory and methods of financial analysis, corporate financial management, the management of financial institutions, securities analysis, and multinational finance.

The Real Estate specialty emphasizes real estate brokerage, mortgage lending, residential and commercial appraising, property management, and real property investment/development.

The Business Law and Contract Management specialty helps prepare students for law school and for careers as contract administrators and contract cost/price analysts.

The Department offers four minors: Finance, Real Estate, Business Law, and Financial Management of Public and Private Contracts to both non-FRL majors and FRL majors. FRL majors may not count courses taken in group A of the major toward the minor.

The minor in real estate is formulated to qualify the student with the requisite courses to sit for the real estate broker's examination.

The minor in business law encompasses the study of the legal environment of business.

The minor in financial management of public and private contracts provides sufficient skills and understanding of the principles to enable students to successfully manage commercial contracts, apply contract cost/price techniques, and undertake contract negotiations.

Please contact the Department Chair in Building 66, Room 211 (909) 869-2350, or an FRL faculty advisor if you wish to explore any of the course offerings.

### COURSE REQUIREMENT FOR THE FINANCE, REAL ESTATE AND LAW PROGRAM

Before registering for any upper division non-corp, FRL courses, FRL majors must have earned a grade of "C" (2.0) or better in each of the prerequisite courses:

ENG 104, EC 201 and 202, ACC 207, 208, or ACC 214\*\*\*, STA 120, FRL 201, 300, and 301.

### ACCOUNTING PREPARATION FOR TRANSFER STUDENTS (see page 149)

### MICROCOMPUTER PROFICIENCY REQUIREMENT(see page 149)

### CORE COURSES FOR BUSINESS ADMINISTRATION MAJOR

Required of all business majors. A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Legal Environment of Business Transactions . . . . .FRL	201	(4)
Financial Accounting for Decision-Making . . . . .ACC	207	(5)
Managerial Accounting for Decision-Making . . . . .ACC	208	(5)
Principles of Management . . . . .MHR	301	(4)
Principles of Marketing Management . . . . .IBM	301	(4)
Managerial Finance I . . . . .FRL	300	(3)
Managerial Finance II . . . . .FRL	301	(3)
Management Information Systems . . . . .CIS	310	(4)
Operations Management . . . . .OM	301	(4)
Managerial Statistics . . . . .OM	302	(4)
Strategic Management . . . . .MHR	410	(4)
or Strategic Management . . . . .OM	411	

### FRL REQUIRED COURSES

Real Estate Principles . . . . .FRL	106	(4)
Financial Institutions . . . . .FRL	315	(4)
Investment Analysis . . . . .FRL	330	(4)
Corporate Finance Theory . . . . .FRL	367	(4)
Evaluation of Financial Policy. . . . .FRL	440	(4)
Undergraduate Seminar . . . . .FRL	463	(2)

### REQUIRED SPECIALTY (Choose one)

#### Finance

Legal Environment of Business Organizations . . . .FRL	302	(4)
Business Forecasting and Financial Planning. . . .FRL	363	(4)
Multinational Financial Management . . . . .FRL	453	(4)

#### Real Estate

Real Estate Appraisal. . . . .FRL	380	(4)
Real Estate Finance . . . . .FRL	383	(4)
Real Estate Law . . . . .FRL	384	(4)

#### Business Law and Contract Management

Legal Environment of Business Organizations . . . .FRL	302	(4)
Contract Administration . . . . .FRL	325	(4)
Government Regulation of Business . . . . .FRL	401	(4)

#### Other Courses to Complete Major

Select 16 units from GROUP A. . . . .	16	
Select 4 units from GROUP B. . . . .	4	

#### GROUP A (16 units):

Asset Protection and Insurance . . . . .FRL	270	(4)
Legal Environment of Business Organizations . . . .FRL	302	(4)
Financial Spreadsheet Analysis . . . . .FRL	308	(4)
Contract Administration . . . . .FRL	325	(4)
Contract Aspects Uniform Commercial Code . . . .FRL	326	(4)
Contract Case Study . . . . .FRL	327	(4)
Contract Cost/Price . . . . .FRL	328	(4)
International Financial Markets . . . . .FRL	353	(4)
Business Forecasting and Financial Planning . . . .FRL	363	(4)
Real Estate Appraisal . . . . .FRL	380	(4)

Real Estate Economics and Institutions . . . . .	FRL	381	(4)
Real Estate Finance . . . . .	FRL	383	(4)
Real Estate Law . . . . .	FRL	384	(4)
Real Estate Practices . . . . .	FRL	385	(4)
Real Estate Property Management . . . . .	FRL	386	(4)
Government Regulation of Business . . . . .	FRL	401	(4)
Legal Implications of Financial Transactions . . . . .	FRL	403	(4)
Legal Environment of Labor Relations . . . . .	FRL	406	(4)
Entrepreneurial Law . . . . .	FRL	407	(4)
Law for Accountants . . . . .	FRL	408	(4)
Legal Environment of Marketing . . . . .	FRL	419	(4)
Financing Small Business . . . . .	FRL	420	(4)
Legal Aspects of International Business . . . . .	FRL	426	(4)
Security Options . . . . .	FRL	431	(4)
Futures Markets . . . . .	FRL	432	(4)
Seminar in Portfolio Management . . . . .	FRL	433	(4)
Internship in Finance . . . . .	FRL	441-442	(1-4)
Multinational Financial Management . . . . .	FRL	453	(4)
Commercial Banking . . . . .	FRL	460	(4)
Senior Project . . . . .	FRL	461-462	(2)(2)
Risk Management and Insurance . . . . .	FRL	470	(4)
Real Estate Market Analysis . . . . .	FRL	483	(4)
Real Estate Investment Analysis . . . . .	FRL	486	(4)
Urban Land Development . . . . .	FRL	490	(4)

**GROUP B: (4 units)**

Intermediate Microeconomic Theory . . . . .	EC	311	(4)
Intermediate Macroeconomic Theory . . . . .	EC	313	(4)
International Trade Theory . . . . .	EC	404	(4)
International Finance . . . . .	EC	405	(4)
Introduction to Mathematical Economics . . . . .	EC	406	(4)
Public Finance . . . . .	EC	410	(4)
Comparative Economic Systems . . . . .	EC	412	(4)
Economic History of Europe . . . . .	EC	413	(4)
Labor Economics . . . . .	EC	414	(4)
Land Economics . . . . .	EC	419	(4)
Managerial Economics . . . . .	EC	424	(4)
Urban Economics . . . . .	EC	432	(4)

**SUPPORT AND ELECTIVE COURSES**

Required of all students. If any of these courses are used for General Education, then the Restricted Electives or Unrestricted Electives will be increased by the same number of units (see curriculum sheet for the major).

Freshman English II . . . . .	ENG	105	(4)
Statistics with Applications . . . . .	STA	120	(4)
Introduction to Calculus for Business . . . . .	MAT	125	(4)
Principles of Economics . . . . .	EC	201	(4)
Principles of Economics . . . . .	EC	202	(4)
Restricted Electives: [cannot include courses in Business, Economics, Statistics, PLS 314, or PLS 318] . . . . . (8-20)			

**GENERAL EDUCATION COURSES**

(Required of all students)

A total of 72 quarter units of General Education courses, Track A and Track B, are required for all majors in the College of Business Administration. See the list of approved courses under General Education Requirements in this catalog.

**Areas 1 through 4**

Select courses from approved list . . . . . (64)

**Area 5**

Multicultural Organizational Behavior . . . . . MHR 318 (4)  
Select one course from approved list [cannot include courses in Business, Economics, Public Administration, Statistics, or PLS 318]. . (4)

**MINORS**

Four minors are offered to both non-FRL majors and to FRL majors. FRL majors may not count courses taken in group A for the major toward the minor. Please contact the minor coordinator for more information.

**MINOR IN FINANCE**

Financial affairs play an important role in the efficiency and effectiveness of any organization. Knowledge and skill in finance enhance an individual's ability to function as a productive member of any organization and assist the organization to achieve its goals. Augmenting the skills of a non-finance business major with a minor in finance creates a synergetic effect. A Finance Minor complements the skills of a non-finance major, and thus improves an individual's potential in the job market. The Finance, Real Estate and Law Department offers a Minor in Finance that is available to non-finance majors. The requirements are listed below:

**REQUIRED COURSES**

Financial Institutions . . . . .	FRL	315	4
Investment Analysis . . . . .	FRL	330	4
International Financial Markets . . . . .	FRL	353	4
Sub Total . . . . .			12

**DIRECTED ELECTIVES**

Select 3 of the following courses:

Financial Spreadsheet Analysis . . . . .	FRL	308	4
Business Forecasting and Financial Planning . . . . .	FRL	363	4
Corporate Finance Theory . . . . .	FRL	367	4
Real Estate Finance . . . . .	FRL	383	4
Legal Implications of Financial Transactions . . . . .	FRL	403	4
Financing Small Business . . . . .	FRL	420	4
Security Options . . . . .	FRL	431	4
Futures Markets . . . . .	FRL	432	4
Seminar in Portfolio Management . . . . .	FRL	433	4
Evaluation of Financial Policy . . . . .	FRL	440	4
Commercial Banking . . . . .	FRL	460	4
Sub Total . . . . .			12

Please see one of the Finance Advisors to sign up for a Minor in Finance. Non-business majors should consult with one of these advisors to discuss course prerequisites.

Microcomputer proficiency must be demonstrated either (1) by credit for CIS 101, or (2) by passing 1 to 4 microcomputer skill tests, making up any tests not taken or not passed with CIS 101.

**MINOR IN REAL ESTATE**

This minor prepares the student for a real estate career and for the real estate broker's examination course requirements. The minor requires 28 units (7 courses) for non-FRL Business majors.

Required (including prerequisites):

Real Estate Principles . . . . .	FRL	106	(4)
Principles of Economics . . . . .	EC	201,208	(8)
Financial Accounting for Decision-Making . . . . .	ACC	207	(5)
Managerial Accounting for Decision-Making . . . . .	ACC	208	(5)

Legal Environment of Business Transactions . . . .	FRL	201	(4)
Managerial Finance I . . . . .	FRL	300	(3)
Managerial Finance II . . . . .	FRL	301	(3)
Real Estate Appraisal . . . . .	FRL	380	(4)
Real Estate Finance . . . . .	FRL	383	(4)
Real Estate Law . . . . .	FRL	384	(4)
Real Estate Practices . . . . .	FRL	385	(4)

Select 8 units from the following:

Real Estate Economics and Institutions . . . . .	FRL	381	(4)
Real Property Management . . . . .	FRL	386	(4)
Real Estate Market Analysis . . . . .	FRL	483	(4)
Real Estate Investment Analysis . . . . .	FRL	486	(4)
Urban Land Development . . . . .	FRL	490	(4)

#### MINOR IN BUSINESS LAW

This minor provides the student with an orientation of business and the law.

Required:

Legal Environment of Business Transactions . . . .	FRL	201	(4)
Legal Environment of Business Organizations . . .	FRL	302	(4)

Select 12 units from the following:

Law for Everyday Living . . . . .	FRL	101	(4)
Government Regulation of Business . . . . .	FRL	401	(4)
Legal Environment of Labor Relations . . . . .	FRL	406	(4)
Entrepreneurial Law . . . . .	FRL	407	(4)
Legal Aspects of International Business . . . . .	FRL	426	(4)

Select one of the following with approval of a business law advisor:

Labor Economics (EC 202)* . . . . .	EC	414	(4)
Real Estate Law (FRL 106)* . . . . .	FRL	384	(4)
Legal Environment of Marketing (IBM 301)* . . . .	FRL	419	(4)
Legal Implications of Financial Transactions . . . .	FRL	403	(4)
Contract Administration . . . . .	FRL	325	(4)

\*Course prerequisite

#### MINOR IN FINANCIAL MANAGEMENT OF PUBLIC AND PRIVATE CONTRACTS

This minor provides the student with a concept of contract administration. Prerequisites: FRL 301, OM 301, STA 120.

Contract Administration . . . . .	FRL	325	(4)
Contract Aspects of Uniform Commercial Code . .	FRL	326	(4)
Contract Case Study . . . . .	FRL	327	(4)
Contract Cost Price . . . . .	FRL	328	(4)
Legal Environment of Marketing . . . . .	FRL	419	(4)
Purchasing . . . . .	OM	434	(4)

#### COURSE DESCRIPTIONS

##### FRL 100 Personal Money Management (4)

Major financial problems of the household in allocating resources and planning expenditures. Budgeting, housing, consumer protection, insurance, the use of credit, savings, and investments. Not open to finance majors. 4 lecture discussions.

##### FRL 101 Law for Everyday Living (4)

Legal principles which underlie ordinary transactions such as buying a house or a television, writing a check, getting married, taking out an insurance policy, joining a union, lending a car to a friend, signing a lease, and hundreds of everyday activities. 4 lecture discussions.

##### FRL 106 Real Estate Principles (4)

This course satisfies educational requirements for real estate broker's license. Introduction to real estate brokerage and investments; the nature and classification of real property, and fundamental theories of urban growth, land utilization and property valuation. An overview of real estate finance, property management, and the development process. 4 lecture discussions. Prerequisite: ENG 104.

##### FRL 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

##### FRL 201 Legal Environment of Business Transactions (4)

Study of the adversary system, principles of American law, coverage of business-related torts and contracts, product liability, and real and personal property. Case analysis. 4 lecture presentations. Prerequisite: ENG 104.

##### FRL 270 Asset Protection and Insurance (4)

Introduction to corporate risk management and insurance. Institutional framework and analytical techniques for managing property and personnel loss exposures. Use of risk control and risk financing methods, including insurance, from viewpoint of business and family risk managers. 4 lectures/problem-solving.

##### FRL 299/299A/299L Special Topics for Lower Division Students (4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

##### FRL 302 Legal Environment of Business Organizations (4)

Legal requirements of formation, operation and financing of partnerships, corporations and other business organizations. Consideration of the agency relationships and responsibilities of involved parties. Discussion of the economic, political, and regulatory environment. Case analysis. 4 lectures/problem-solving. Prerequisite: FRL 201.

##### FRL 300 Managerial Finance I (3)

First of the two-course sequence in finance for College of Business Administration majors. Topics include the role of a financial manager; financial statement analysis; financial planning; time value of money, bond and stock valuation; investment analysis techniques; and methods of raising long-term funds. 3 units Lecture/Problem Solving.

##### FRL 301 Managerial Finance (3)

Second of the two-course s in finance for College of Business Administration majors. Topics include the risk-return tradeoff, methods of measuring risk, cash flow estimation, capital budgeting under uncertainty, capital structure, dividend policy; short-term financial management, derivatives and risk management, and international finance. 3 Lecture/Problem Solving.

##### FRL 308 Financial Spreadsheet Analysis (4)

Financial modeling techniques and analysis using electronic spreadsheets. Emphasis on corporate financial management: capital budgeting, debt capacity, financial planning, credit management. Case discussion. Individual projects. 4 lectures/problem-solving. Prerequisite: FRL 301.

**FRL 315 Financial Institutions and Markets (4)**

Focus on financial markets and institutional management from a microeconomics perspective. Relationship between financial institutions and financial markets and impact of government regulation and monetary policy. 4 lectures/problem-solving. Prerequisites: FRL 301 and EC 202.

**FRL 325 Contract Administration (4)**

Organization, procedures, and areas of application in contract administration. Designed to provide the student with knowledge and skills essential to accomplish the responsibility of contract administration. Provides a comprehensive approach to the interrelationship between contract administration and various functional disciplines. 4 lectures/problem-solving. Prerequisites: FRL 201 and FRL 301.

**FRL 326 Contract Aspects of the Uniform Commercial Code (4)**

Transition from common law background to statutory contract law. Formation of sales contract under the UCC. Insight regarding policy considerations, legal remedies, and the mechanical requirements. 4 lectures/problem-solving. Prerequisite: FRL 201.

**FRL 327 Contract Case Study/Practical Application (4)**

Review of current and past cases in government and private contracting, using the case study method. Combined class textbook and library assignments. Cases, selected by areas briefed, discussed and reviewed. 4 lectures/problem-solving. Prerequisites: FRL 201 and FRL 301.

**FRL 328 Contract Cost/Price Techniques-Negotiation (4)**

Cost/price techniques applicable to public and private prime/sub contracts including RFQ-RFP-IFB analysis, proposal preparation, estimating methodology, and pricing strategies. Analytical and econometric techniques in preparing contracts. 4 lectures/problem-solving. Prerequisites: FRL 201 and FRL 307.

**FRL 330 Investment Analysis (4)**

Introduction to the behavior of security markets and individual investment policy. Quantitative and qualitative aspects of risk and return associated with investment decisions. Fundamental, technical, and random-walk approaches to valuation. 4 lectures/problem-solving. Prerequisites: FRL 301 and EC 202.

**FRL 353 International Financial Markets (4)**

Institutional overview of structure and application function of international financial markets and their applications. International financial systems, capital flows, foreign exchange risk measurement and management, Eurocurrency markets, Asian currency markets, international capital markets, international banking, international debt crisis, and export-import financing. 4 lectures/problem-solving. Prerequisite: FRL 301.

**FRL 363 Business Forecasting and Financial Planning (4)**

Various forecasting techniques as they relate to finance and real estate issues. Smoothing methods, decomposition methods, correlation analysis, regression analysis, seasonal models, Box-Jenkins methodology, and managing the forecasting process. Use of microcomputer to aid calculations. Individual projects. 4 lectures/problem-solving. Prerequisites: FRL 301, OM 302, and MAT 125.

**FRL 367 Corporate Finance Theory (4)**

Capital budgeting under uncertainty, capital structure, cost of capital, and specialized financial decision tools. Emphasis on operational techniques through cases, problems, and computer applications. 4 lectures/problem-solving. Prerequisites: FRL 301.

**FRL 380 Real Estate Appraisal (4)**

Various approaches to value as applied to all real property, emphasizing urban properties. Value theory as related to practical applications, using specific problem-solving via the preparation of reports concerning residential and investment properties. 4 lecture discussions. Prerequisites: FRL 106, and one of the following: FRL 301, CE 301, or ETT 305.

**FRL 381 Real Estate Economics and Institutions (4)**

Economies of real estate markets, developments and operations. Foundations of private institutions that operate within and government institutions that oversee and control real estate marketing, financing, development and research. Satisfies educational requirement for real estate broker's license. 4 lecture discussions. Prerequisites: FRL 106, FRL 301.

**FRL 383 Real Estate Finance (4)**

Instruments of real estate financing and their use; analytic factors in financing and investment decision-making; analysis of the various institutions which are sources of real estate financing. Satisfies educational requirement for real estate broker's license. Case analyses. 4 lectures/problem-solving. Prerequisites: FRL 106 and FRL 301.

**FRL 384 Real Estate Law (4)**

Rights and liabilities surrounding the acquisition, possession, and transfer of real property: easements, deeds, zoning, mortgages, foreclosure, landlord and tenant relationships. Satisfies educational requirement for real estate broker's license. 4 lecture discussions. Prerequisites: FRL 106 and 201.

**FRL 385 Practices and Applications of Real Estate Law (4)**

Ethical and legal responsibilities of the real estate broker: listing agreements, structuring of transaction and escrow requirements. Analysis of common agreements, documents, and disclosure statements. Satisfies educational requirement for real estate broker's license. 4 lecture discussions. Prerequisites: FRL 380 and FRL 384.

**FRL 386 Real Property Management (4)**

General practices and legal aspects of property management. Establishing rental schedules, tenant billing, rent collection, lease clauses, lease negotiations, purchasing procedures related to repairs and maintenance, and property management accounts for apartments, office buildings, industrial properties, and shopping centers. 4 lecture discussions. Prerequisites: FRL 380.

**FRL 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. May be taken on a CR/NC basis.

**FRL 401 Government Regulation of Business (4)**

The study of the regulation of business, government. Antitrust, trade regulation, labor and employment law, privacy, safety, environmental and consumer legislation. 4 lectures/problem-solving. Prerequisite: FRL 201.



**FRL 403 Legal Implications of Financial Transactions (4)**

An analysis of the legal structure, rationale, and implication of commercial transactions involving secured transactions, negotiable instruments and credit. 4 lectures. Prerequisite: FRL 201.

**FRL 406 Legal Environment of Labor Relations (4)**

Application of labor and employment law in the United States. Legal rights and remedies available to labor unions, employees, and management. 4 lectures. Prerequisite: FRL 201.

**FRL 407 Entrepreneurial Law (4)**

A practical preventive law course emphasizing the legal consideration involved in small business planning, operation, and dissolution. Particular attention to liability of small business owners and managers, and the legal alternatives available to a financially-distressed business. 4 lectures. Prerequisite: FRL 302.

**FRL 408 Law for Accountants (4)**

Legal responsibilities of accountants; fundamental business law principles as applied in commercial transactions. The law of commercial paper, secured transactions, bankruptcy, agency, partnerships, corporations and securities. 4 lectures/problem-solving. Prerequisites: ACC 208 and FRL 201.

**FRL 419 Legal Environment of Marketing (4)**

Application of laws relevant to the marketing process and assessment of the legal problems growing out of marketing strategies. Hypothetical case analyses. 4 lecture discussions. Prerequisite: FRL 201 or IBM 301.

**FRL 420 Financing Small Business (4)**

Financial problems and strategies paramount to small firms. Various financing sources including venture capitals. Funding techniques and financial package evaluation. 4 lectures/problem-solving. Prerequisite: FRL 301.

**FRL 426 Legal Aspects of International Business (4)**

Legal factors affecting organizations involved in international business transactions. Sales, bills of exchange, patents, obligations and liabilities of cargo carriers, political risks, and credit insurance. 4 lecture discussions. Prerequisite: FRL 201.

**FRL 431 Security Options (4)**

Options market and the mechanics of options investing. Valuation models, conservative and aggressive strategies for different market environments, and their risk-reward characteristics, portfolio management, and computer simulation. 4 lectures/problem-solving. Prerequisite: FRL 330 and FRL 363.

**FRL 432 Futures Markets (4)**

Futures contracts on financial instruments such as government bonds, commercial paper, GNMA, foreign currencies, and market index futures contracts. Trading aspects and future markets of agricultural and industrial commodities. 4 lectures/problem-solving. Prerequisites: FRL 330 and FRL 363.

**FRL 433 Seminar in Portfolio Management and Capital Markets (4)**

Developing and valuating alternative portfolio selection models for individual and institutional use. Examination of non-traditional investments. 4 seminars. Prerequisites: FRL 330, FRL 363, FRL 431, and FRL 432.

**FRL 440 Evaluation of Financial Policy (4)**

A seminar course in finance utilizing comprehensive cases to simulate the role of the financial manager. 4 seminars. Prerequisite: FRL 307 and FRL 367.

**FRL 441, 442 Internship in Finance (1-4) (1-4)**

On-the-job training or internship with a business to gain new learning experience. Student submits periodic reports to faculty coordinator and receives one unit of credit for 120 hours of training. Four units of Internship in Finance can be applied to Group A. Total credit limited to 8 units in both classes. Prerequisite: permission of the FRL coordinator of internships.

**FRL 453 Multinational Financial Management (4)**

Foreign exchange markets, foreign exchange risk management, multinational working capital management, foreign investment analysis and multinational capital budgeting, international diversification, cost of capital and capital structure of the multinational firm, political risk management, and international taxation. 4 lectures/problem-solving. Prerequisite: FRL 301.

**FRL 460 Commercial Banking (4)**

Functional and operational aspects of commercial banks. Emphasis on the principles and practices used in asset management, liability management, and liquidity management. Group analysis using case problems and/or computer simulations. 4 lecture discussions. Prerequisite: FRL 315.

**FRL 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: senior standing. Required minimum of 120 hours.

**FRL 463 Undergraduate Seminar (2)**

Study and discussion by students of recent developments in the student's major field. 2 lectures. Prerequisites: FRL 106, 315, 330, and senior standing.

**FRL 470 Risk Management and Insurance (4)**

Insurance and risk management for corporations, government, and individuals. Application of risk retention, loss control and insurance methods to life, health, liability, and property risks. Social insurance, auto and workers compensation, employment benefits, and pensions. 4 lectures/problem-solving.

**FRL 483 Real Estate Market Analysis (4)**

Analyze and collect urban economic and real estate data to prepare market demand studies for use in real estate investment analysis and feasibility studies for development projects. Satisfies educational requirement for real estate broker's license. 4 lectures/problem-solving. Prerequisites: EC 201, EC 202, and FRL 380.

**FRL 486 Real Estate Investment Analysis (4)**

Techniques for analyzing real estate investments in post-development phase projects. Integration of market analyses, appraisal methods, real estate tax law and traditional financial analysis techniques to evaluate the risk-return characteristics of investment positions in real properties. Satisfies educational requirement for real estate broker's license. 4 lectures/problem-solving. Prerequisites: FRL 106 and FRL 383.

**FRL 490 Urban Land Development (4)**

Processes for developing real properties, emphasizing site selection techniques, land purchasing procedures, methods of conducting feasibility studies, including market studies, financial analysis, and building design. Satisfies educational requirement for real estate broker's license. 4 lectures/problem-solving. Prerequisites: FRL 380, FRL 383, and FRL 483 or 486.

**FRL 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.



## INTERNATIONAL BUSINESS

One of two majors offered in the International Business and Marketing Department is International Business. For other programs in the department, see Marketing Management.

Vernon R. Stauble, Chair, International Business and Marketing

Helena Czepiec, Coordinator

Dolores A. Barsellotti

Stephen Cosmas

James R. Hill

Patricia M. Hopkins

Jerry L. Kirkpatrick

Juanita P. Roxas

Robert W. Schaffer

Donna Tillman

### MISSION STATEMENT

The mission of the International Business and Marketing Department is to prepare students for specialized careers in either international business or marketing management. This preparation gives both undergraduate and graduate students practical learning experiences in such courses as international marketing, marketing management, professional selling, advertising, buyer behavior, market research, retailing, industrial marketing, brand management, and transportation and distribution management. In addition, the mission of the Department is to give non-majors a solid foundation in the application of business principles to the marketing of goods and services in international and domestic markets. To achieve excellence in both teaching and course content for an increasingly diverse and multinational student body, the Department's faculty undertakes programs of basic research, applied scholarship, and instructional development; it also forges and maintains strong links with the business community, both local and global.

This International Business major provides students a solid grounding in the principles of business management as well as interdisciplinary specialization in areas required to understand and react to today's globalized markets. The objectives of the major are twofold: to provide students with the business knowledge and skills essential for careers in international business; and to provide them with an understanding and appreciation of the culture, language, economics, politics, and history of other parts of the world, with particular emphasis on a geographic area in which the student has a special career interest. The curriculum requires completion of the business core which provides to all business majors a foundation in the theory and practice of modern business management. In addition, the International Business major requires completion of a minor in a functional area of business (e.g. accounting, finance, management, etc.) or, as an alternative to a minor in business, a concentration in International Studies directed electives or a foreign language. Each student completes a specialization in a geographic area of the world, and must demonstrate proficiency in a related foreign language. Each student is expected to complete at least one quarter of practical experience in international business through the internship program.

Each student should work closely with the program advisor in identifying career goals and selecting course work most appropriate for goal attainment. The International Business major involves the completion of requirements in each of the following seven areas:

1. Core Courses in Major required of all Business majors
2. International Business required courses
3. Support and Elective courses
4. Functional Specialization
5. Regional Area of Emphasis directed electives
6. General Education
7. Foreign Language

ACCOUNTING PREPARATION FOR TRANSFER STUDENTS (see page 149)

MICROCOMPUTER PROFICIENCY REQUIREMENT (see page 149)

### CORE COURSES FOR MAJOR

Required of all business majors. A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Legal Environment of Business Transactions . . . . .	FRL	201	(4)
Financial Accounting for Decision-Making . . . . .	ACC	207	(5)
Managerial Accounting for Decision-Making . . . . .	ACC	208	(5)
Principles of Management . . . . .	MHR	301	(4)
Principles of Marketing Management . . . . .	IBM	301	(4)
Managerial Finance I . . . . .	FRL	300	(3)
Managerial Finance II . . . . .	FRL	301	(3)
Management Information Systems . . . . .	CIS	310	(3)
Operations Management . . . . .	OM	301	(4)
Managerial Statistics . . . . .	OM	302	(4)
Strategic Management . . . . .	MHR	410	(4)
or Strategic Management . . . . .	OM	411	

Required for International Business:

Special Problems for Lower Division Students . . . . .	IB	200	(2)
Global Business Perspectives . . . . .	IBM	210	(4)
Introduction to International Business . . . . .	IBM/MHR	322	(4)
Principles of Economics . . . . .	EC	202	(4)
Economic Geography . . . . .	GEO	312	(4)
International Marketing . . . . .	IBM	414	(4)
International Financial Markets . . . . .	FRL	353	(4)
Legal Aspects of International Business . . . . .	FRL	426	(4)
Internship in International Business . . . . .	IBM	441	(4)
International Business Agreements and Negotiation . . . . .	IBM	436	(4)

### SUPPORT AND ELECTIVE COURSES

Required of all students. If any of these courses are used for General Education, then the Restricted Electives or Unrestricted Electives will be increased by the same number of units (see curriculum sheet for the major).

Principles of Economics . . . . .	EC	201	(4)
Principles of Economics . . . . .	EC	202	(4)
Statistics with Applications . . . . .	STA	120	(4)
Restricted Electives [cannot include courses in Business, Economics, Statistics, PLS 314, or PLS 318] . . . . .			(0-4)

Select 4 units not used in Functional Specialization: . . . . . 4

Market Analysis and Control . . . . .	IBM	320	(4)
International Accounting . . . . .	IBM/ACC	404	(4)
Assessing International Business Environments . . . . .	IB/MHR	332	(4)
Strategy in International Marketing . . . . .	IBM	415	(4)
International Exporting . . . . .	IBM	416	(4)
Policy for International Management . . . . .	IBM/MHR	422	(4)
International Business Cases: Operations . . . . .	IBM/OM	437	(4)
Money and Banking . . . . .	EC	308	(4)
International Trade Theory and Policy . . . . .	EC	404	(4)
Economic Development . . . . .	EC	411	(4)
Comparative Economic Systems . . . . .	EC	412	(4)

**FUNCTIONAL SPECIALIZATION**

Students may complete any minor or at least 20 units within an approved minor in the College of Business Administration or in a foreign language, international agricultural business management, economics, geography, anthropology, history, Latin American Studies, political science, or public administration. If a minor in a particular language is not available, students may complete 20 units in one foreign language, at least 12 of which must be at or above the 200 level. To specialize in finance, students may take 20 units from a list of courses approved by the FRL Department.

**REGIONAL AREA OF EMPHASIS**

Students must take 12 units of courses outside of the College of Business Administration in International Studies, with advisor approval.

**GENERAL EDUCATION COURSES**

(Required of all students)

A total of 72 quarter units of General Education courses, Track B, are required for all majors in the College of Business Administration. See the list of approved courses under General Education Requirements in this catalog.

**Areas 1 through 4**

Select courses from approved list ..... (64)

**Area 5**

Multicultural Organizational Behavior .....MHR 318 (4)

Select one course from approved list [cannot include courses in Business, Economics, Statistics, or PLS 318]. ..... (4)

**FOREIGN LANGUAGE (Proficiency)**

The student must demonstrate proficiency in reading, writing, and speaking a foreign language. The required level of proficiency is Intermediate Level. Ordinarily this level of proficiency is obtained in one year of language study beyond the CSU entry level requirements (Elementary Level proficiency). Four (4) units of course work in a foreign language can be used to fulfill the General Education, Category IIIc requirement.

**MINOR IN INTERNATIONAL BUSINESS**

Students from both business and non-business majors who have an interest in pursuing careers related to international business may complete the Minor in International Business. The purpose of the minor is to provide sufficient knowledge and expertise in international business for students to successfully apply the specialties of their fields to international careers.

To enroll in the minor or for more information about it, see the International Business Minor Advisor. Students are responsible for meeting the requirements of the minor program in effect when the formal Contract for the Minor in International Business is signed. The contract should be signed before coursework in the minor is begun.

The minor is comprised of required and directed elective courses. Most students already in the College of Business Administration will be able to take the required courses with at most one additional prerequisite course in addition to those required in their fields. Students from outside the College of Business Administration must complete a number of courses in Business and Economics before courses required in the International Business Minor can be taken, but may have satisfied the directed elective requirements through their degree major coursework.

**Required Courses:**

Global Business Perspectives .....	IBM	210	(4)
Introduction to International Business .....	IBM/MHR322		(4)
International Financial Markets .....	FRL	353	(4)
International Marketing Management .....	IBM	414	(4)
Legal Aspects of International Business .....	FRL	426	(4)

Select 4 units from the following:

Strategy in International Marketing .....	IBM	415
International Exporting .....	IBM	416
International Business Agreements and Negotiation .....	IBM	436
Assessing International Business Environments .....	MHR	332
Policy for International Management .....	MHR	422
International Business Cases: Operations .....	IBM/OM	437
International Trade Theory and Practice .....	EC	404

**Directed Electives:**

Select 12 units from the approved list in one of the following groups, or develop an individualized program with the approval of the International Business Minor Advisor.

(Group A) Language Skills (French, German, Russian, Spanish or other modern language)

(Group B) Regional Area of Emphasis (Area studies in Africa, Asia, Europe, Latin America, or the Middle East)

(Group C) Appropriate Theme or Depth Group (Note: Some of these also satisfy General Education Area 5 requirements)

(Group D) Survey of International Development (wide range of courses in development studies, anthropology, international agriculture, economic development, international relations, law, and international management)

**COURSE DESCRIPTIONS****IBM 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**IBM 210 Global Business Perspectives (4)**

Overview of global business decision-making with an emphasis on cultural differences. Social, cultural, environmental, and technological trends in international business and the effects of geography, history, language, and education on the performance of foreign operations. Case studies. 4 lecture discussions.

**IBM 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

**IBM/MHR 322 Introduction to International Business (4)**

Introduction to international business, trade, and foreign investment. Survey of cultural, political, social, and economic aspects of doing business abroad. Theories of international trade and economic development. 4 lecture discussions. (Also listed as MHR 322.)

**IBM/MHR 332 Assessing International Business Environment (4)**

Analysis of cultural, political, social, and economic aspects of doing business abroad. Study and application of methods in conducting risk vs.



opportunity analysis of countries, investments, projects, and trade. Case studies, student research projects, and presentations. 4 lectures/problem-solving. Prerequisite: IBM 322, also listed as MHR 332.

#### **IBM 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **IBM/ACC 404 International Accounting (4)**

Examination and discussion of accounting theories, techniques, procedures, accounting standards, regulations used in other nations. Examination of contemporary practices prevailing in different parts of the world. Emphasis on multinational corporations, and their needs and practices. 4 lectures/problem-solving. Prerequisite: ACC 302, also listed as ACC 404.

#### **IBM 414 International Marketing Management (4)**

Planning and organizing for international marketing operations. Distinctive characteristics, environmental influences, and emerging trends in overseas markets. Analysis of management practices and problems of adapting American marketing concepts and methods. 4 lecture discussions. Prerequisite: IBM 301.

#### **IBM 415 Strategy in International Marketing (4)**

Development of alternative methods and strategies in the decision areas of product development, promotional programs, distribution channel determination, and pricing. Opportunities, key issues, and applications to ensure a firm's survival and success in the international arena. 4 lectures/problem-solving. Prerequisite: IBM 414.

#### **IBM 416 International Exporting (4)**

Principles, strategies, and mechanics of exporting to foreign nations. Political, legal, cultural, and economic environments affecting export operations. Corporate programs and policies, involvement levels, financing, pricing promotion, and distribution strategies. Latin America, European Community, Pacific Rim specifics. Import trade mechanics. 4 lecture discussions. Prerequisite: IBM 414.

#### **IBM/MHR 422 Policy for International Management (4)**

Seminar in the application and development of policy for international business management. Analysis of international management practices and problems utilizing the case study approach. 4 seminars. Prerequisite: IBM 322 (MHR 322) or consent of instructor. (Also listed as MHR 422.)

#### **IBM 429 International Logistics (4)**

Integration of Cultural, functional and strategic aspects of international sourcing, financial aspects of sales; payments, role of government and intermediaries, infrastructure issues. Logistics as a tool for integrative international operations. 4 lecture/discussion Pre-requisite: IBM 301.

#### **IBM436 International Business Agreements and Negotiation (4)**

Integrating perspectives from various fields of study contributing to international agreements and the negotiating process. Exploring insights and applications related to business agreements, diplomacy, negotiating strategies in marketing/selling situations. 4 lectures/problem-solving. Prerequisite: IBM414.

#### **IBM/OM 437 International Business Cases: Operations (4)**

Case studies in international operations management; manpower and work flow, production planning and control, operations management strategy, cultural considerations, and ethics. Use of computer software. 4 lectures/problem-solving. Prerequisites: OM 301 (Also listed as OM 437.)

#### **IBM 441, 442 Internship in Marketing (1-8) (1-8)**

Faculty-supervised on-the-job educational experience in the real-world marketing management environment. Allocation of unit credit is dependent upon the nature of the work done, the level of responsibility, and the number of hours worked. Total internship credit limited to 16 units. Prerequisite: permission of departmental internship coordinator.

#### **IBM/OM 455 Just-In-Time Production (4)**

Comparison of different production environments. Detailed coverage of successful techniques used in world class manufacturing: just-in-time, total quality management, total preventive maintenance, group technology, plant layout, and time and motion study. 4 lectures/problem-solving. Prerequisite: OM 301, also listed as OM 455.

#### **IBM 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: senior standing. Required minimum of 120 hours. Non-Marketing majors only.

#### **IBM 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

For a complete list of remaining courses in this major, please refer to the catalog listings under the appropriate departments.

## MANAGEMENT AND HUMAN RESOURCES

Peggy J. Snyder, Chair

Stanley C. Abraham	William B. Relf
Robert W. Allen	Percy G. "Jerry" Rogers
James C. Bassett	R. Richard Sabo
Deborah V. Brazeal	Shiori Sakamoto
Lady A. Hanson	Nirmal K. Sethia
Kathleen Harcharik	Mansour Sharifzadeh
Stephen C. Iman	Shanthi Srinivas
Carol L. Jones	Lynn H. Turner
LianLian Lin	Gail Waters
Thomas H. Patten, Jr.	Warren C. Weber
Christian F. Poulson, II	Cheryl Wyrick

### MISSION STATEMENT

The department's mission is consonant with and supportive of the College of Business Administration mission statement. With its special emphases on teaching undergraduates and focusing on applied research and instructional development, the MHR Department also seeks prominence within domestic and international communities in teaching and life-long learning.

The teaching strengths of the department's faculty, which are embedded in the courses, include the capacity for critical thinking, skills for working with people, ability to respond creatively to changes, making ethical choices, managing diversity, strategic management, and applying the theories and concepts learned to design practical and innovative solutions. These strengths address leading-edge knowledge and education.

This major provides students with a sound background in general management and the opportunity for emphasis in one of several areas: general management, entrepreneurship and small business management, human resources management, and business education.

Department advisors strive to provide programs that meet the educational needs of students who have the following career goals:

1. General manager in a private or public organization of any size.
2. Manager of a small or medium-sized business. (This program is designed specifically for people who plan to own and operate their own businesses.)
3. Human resources or personnel manager in a private or public organization.
4. Businesses teacher in a secondary or post-secondary school.

All department programs are designed to provide maximum flexibility in selecting an area of specialty. For example, a freshman can pursue the department curriculum for two years before making a career goal decision. In fact, after two years of study, the student can change to any of the business administration majors without loss of academic credits. It is important that students entering Cal Poly Pomona for the first time seek the help of an advisor to ensure that their individual programs are in their own best interest.

Students interested in fulfilling California State credential requirements for secondary school teachers of business subjects must also coordinate their curriculum with a School of Education advisor.

**ACCOUNTING PREPARATION FOR TRANSFER STUDENTS** (see page 149)

**MICROCOMPUTER PROFICIENCY REQUIREMENT** (see page 149)

### CORE COURSES FOR MAJOR

Required of all business majors. A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Legal Environment of Business Transactions . . . . .FRL	201	(4)
Financial Accounting for Decision-Making . . . . .ACC	207	(5)
Managerial Accounting for Decision-Making . . . . .ACC	208	(5)
Principles of Management . . . . .MHR	301	(4)
Principles of Marketing Management . . . . .IBM	301	(4)
Managerial Finance I . . . . .FRL	300	(3)
Managerial Finance II . . . . .FRL	301	(3)
Management Information Systems . . . . .CIS	310	(4)
Operations Management . . . . .OM	301	(4)
Managerial Statistics . . . . .OM	302	(4)
Strategic Management . . . . .MHR	410	(4)
or Strategic Management . . . . .OM	411	

### MHR REQUIRED COURSES

Entrepreneurship and Intrapreneurship . . . . .MHR	306	(4)
Human Resources Management . . . . .MHR	311	(4)
Multicultural Organizational Behavior . . . . .MHR	318	(4)
Communication for Management . . . . .MHR	324	(4)
Emerging Issues in Management . . . . .MHR	452	(4)

Select four (4) units from:

Internship in Business Management . . . . .MHR	441-2	(1-4)
OR Senior Project . . . . .MHR	461-2	(2+2)

### OTHER COURSES TO COMPLETE MAJOR

One career-goal elective program selected with approval of advisor. . . . . (32)

### SUPPORT COURSES

If any of these courses are used for General Education, then the Restricted Electives or Unrestricted Electives will be increased by the same number of units (see curriculum sheet for the major).

Principles of Economics . . . . .EC	201	(4)
Principles of Economics . . . . .EC	202	(4)
Statistics with Applications . . . . .STA	120	(4)
Non-Business courses in support of career-goal restricted elective program, selected with approval of advisor. Cannot include courses in Business, Economics, Statistics or PLS 314, PLS318 . . . . . (14-18)		

### GENERAL EDUCATION COURSES

(Required of all students)

A total of 72 quarter units of General Education courses are required for all majors in the College of Business Administration. See the list of approved courses under General Education Requirements in this catalog.

#### Areas 1 through 4

Select courses from approved list . . . . . (64)

#### Area 5

Select two courses from approved list cannot include courses in Business, Economics, Statistics, or . . .PLS 318. (8)

**MINORS IN MANAGEMENT AND HUMAN RESOURCES**

The Management and Human Resources Department offers the following minors. The purpose of these minors is to develop marketable skills in one's chosen field. Also, those students majoring in fields such as engineering or science may wish to develop adjunct skills that may prove to be complementary to their major course of study. Please see the Minors Coordinator, Management and Human Resources Department, if you are interested in enrolling in one of these minors. Students should formally enroll in the minor before taking any courses in the minor. See Department Chair for details.

**MINOR IN GENERAL MANAGEMENT**

This minor provides non-MHR majors with an orientation to management in organizations.

Financial Accounting for Decision-Making . . . . .	ACC	207	(5)
Principles of Management . . . . .	MHR	301	(4)
First-line Management . . . . .	MHR	313	(4)
Multicultural Organizational Behavior . . . . .	MHR	318	(4)
Introduction to International Business . . . . .	MHR	322	(4)
Communication for Management . . . . .	MHR	324	(4)

Electives—Select three courses from the following list:

Management for Non-for-Profit Organizations . . .	MHR	319	(4)
Advanced Communication for Management . . . .	MHR	325	(4)
Training and Development . . . . .	MHR	405	(4)
Strategies for Men and Women in Management .	MHR	406	(4)
Managing Career Development . . . . .	MHR	412	(4)
Emerging Issues in Management . . . . .	MHR	452	(4)

**MINOR IN HUMAN RESOURCES MANAGEMENT**

This minor provides non-MHR students with an opportunity to develop their capability to manage other employees and provides introductory background in the human resource/personnel field.

Human Resources Management . . . . .	MHR	311	(4)
Organizational Behavior . . . . .	MHR	318	(4)
Training and Development . . . . .	MHR	405	(4)
Employee Compensation Plans . . . . .	MHR	413	(4)
Human Resource Information management . . . .	MHR	415	(4)
or Employee Benefits and Services . . . . .	MHR	416	(4)
or Management Union Relations . . . . .	MHR	421	(4)
Advanced Organizational Behavior . . . . .	MHR	438	(4)
Strategies for Men and Women in Management .	MHR	406	(4)
Managing Career Development . . . . .	MHR	412	(4)
Emerging Issues in Management . . . . .	MHR	452	(4)

**MINOR IN ENTREPRENEURSHIP AND SMALL BUSINESS MANAGEMENT**

This minor is to provide non-MHR majors with an introductory background needed to start and operate a small business.

Financial Accounting for Decision-Making . . . . .	ACC	207	(5)
New Venture Creation . . . . .	MHR	306	(4)
Entrepreneur and Business Growth . . . . .	MHR	308	(4)
Entrepreneurial Strategies . . . . .	MHR	408	(4)
Entrepreneurship in a Changing Society . . . . .	MHR	414	(4)
Creativity and Innovation . . . . .	MHR	426	(4)

and any three courses (12 Units) from the following:

**General Courses:**

Real Estate Principles . . . . .	FRL	106	(4)
Legal Environment of Business Transactions . . .	FRL	201	(4)
Principles of Marketing Management . . . . .	IBM	301	(4)

Marketing for Small Business Organizations . . . .	IBM	404	(4)
Introduction to International Business . . . . .	MHR	322	(4)

**People-oriented Courses:**

Principles of Management . . . . .	MHR	301	(4)
Organizational Behavior . . . . .	MHR	318	(4)
Advanced Organizational Behavior . . . . .	MHR	438	(4)
Emerging Issues in Management . . . . .	MHR	452	(4)

**Finance/Accounting Courses:**

Legal Environment of Business Transactions . . .	FRL	201	(4)
Managerial Accounting for Decision-Making II . .	ACC	208	(5)
Financial Statement Analysis . . . . .	ACC	226	(4)

**COURSE DESCRIPTIONS****MHR 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**MHR 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**MHR 301 Principles of Management (4)**

Survey of the history of management and review of significant management literature. Practical applications of management theories to problems in planning, organizing, and controlling business activity. Ethical considerations. 4 lecture discussions.

**MHR 306 New Venture Creation (4)**

New venture creation and entrepreneurship as viable career options. Entrepreneurial management in emergent companies. Ethics and value-based corporate cultures. Learning to be entrepreneurial and start a business. Recognizing and developing business ideas and opportunities. Creating a business plan. 4 lecture presentations.

**MHR 308 Entrepreneur and Business Growth (4)**

Managerial philosophies and capabilities needed for rapidly developing a business. Identifying the growth industries of the nineties, with special attention to the Southern California economy. Finding and developing new products and services. Managing the problems of growing companies. 4 lecture presentations.

**MHR 311 Human Resources Management (4)**

Establishment of human resources objectives and requirements in the organization. Recruiting, testing, interviewing, screening, and selection of employees. Employee counseling, training, development, promotion, recreation, insurance, and retirement programs. Case studies. 4 lecture discussions. Prerequisite: MHR 301.

**MHR 313 First-line Management (4)**

Analysis of the unique position of the supervisor in complex organizations; the application of theory and practice in solving problems and ethical considerations at the first level of management. 4 lectures/problem-solving.

**MHR 318 Multicultural Organizational Behavior (4)**

Introductory experiences in the basics of organizational behavior. Organizational socialization, teamwork leadership, group dynamics, problem-solving, and ethics as they apply to the manager in a multicultural economic and political environment. 4 lecture discussions.

**MHR 319 Management of Not-for-Profit Organizations (4)**

Methods, theory, and institutional knowledge for managing not-for-profit organizations. Problems and issues in policy, organization, program, personnel, and budget unique to not-for-profit organizations. 4 lecture discussions. Prerequisite: MHR 318.

**MHR 322 Introduction to International Business (4)**

Introduction to international business and foreign investment. Survey of cultural, political, social, and economic aspects of doing business abroad. Theories of international trade and economic development. 4 lecture discussions. (Also listed as IBM 322.)

**MHR 324 Communication for Management (4)**

Basic communications objectives of organizations. Types of communication used for decision-making, their nature, capabilities, and limitations. Using computers for communications. Practice in improving written communications, using the approved style manual. Presentations. 4 lectures/problem-solving. Prerequisite: ENG 104 and microcomputer proficiency Level 1.

**MHR 325 Advanced Communication for Management (4)**

Advanced communications applications for managers. Practice in writing situational letters/reports. Conducting meetings and conferences. Interpersonal techniques of listening, interviewing. Advanced use of computers for presentations. Case studies. Employee and media interviews. Multicultural and ethical considerations. Research methods. 4 lectures/problem-solving. Prerequisite: MHR 324

**MHR 332 Assessing International Business Environments (4)**

Analysis of cultural, political, social, and economic aspects of doing business abroad. Study and application of risk-versus-opportunity analysis of countries, investments, projects, and trade. Case studies, student research projects, and presentations. 4 lectures/problem-solving. Prerequisite: MHR 322, also listed as IBM 332.

**MHR 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**MHR 405 Training and Development (4)**

Theory and applications of employee training and development. How rapid changes in technology, market conditions, and business practices make training a growing management function. Determining training needs, selecting methods, planning programs, and evaluating results. 4 lectures/problem-solving.

**MHR 406 Strategies for Men and Women in Management (4)**

Attitudes regarding male/female roles in management positions discussed in seminar and small group format. Current literature, popular and scholarly, reviewed and evaluated. Three short papers required on current issues. 4 seminars.

**MHR 408 Entrepreneurial Strategies (4)**

Unique strategies of the entrepreneur in mid-sized venture companies. Structuring venture deals, spin-offs, turnaround or "starting anew," valuation, merger-acquisition criteria, the search and acquisition processes, negotiation, business consolidation, and cash-flow management. 4 lectures/problem-solving.

**MHR 409 Business Education Management (4)**

Methods and techniques for stimulating enthusiasm for learning in teaching business courses. Course and lesson design, and presentations for office education courses in keyboarding, word processing, computer applications, etc. Preparation for becoming professional business educators. 4 lectures/problem-solving.

**MHR 410 Strategic Management (4)**

Seminar in strategy formulation and implementation. A capstone experience integrating all business functions and requiring evaluation of strategic outcomes from ethical as well as economic viewpoints. Consideration of Total Quality Management. Case and computer simulation analysis. 4 seminars. Prerequisite: completion of College of Business Administration core.

**MHR 411 Human Resources Staffing, Planning, Recruiting and Selection**

Theory and practical applications in organizational planning, recruiting and selection processes and systems used in staffing organizations. This course will cover multiple tools, techniques and activities important to matching organizational human resources requirements and specifications with applicant abilities and motivations. 4 lecture presentations. Prerequisites: MHR 311.

**MHR 412 Managing Career Development (4)**

Career development issues such as the assessment of potential career tracks, transition from academia, career strategies and obstacles, personal and organizational value conflicts, dual career marriage and the price of success. 4 lecture presentations. Prerequisites: MHR 318

**MHR 413 Employee Compensation Plans (4)**

The goals and external/internal organizational considerations that affect planning and administering compensation in organizations. Evaluation of race and sex discrimination in pay, and comparable job worth. Job evaluation, performance appraisal systems, and gainsharing. 4 lecture presentations. Prerequisite: MHR 311.

**MHR 414 Entrepreneurship in a Changing Society (4)**

The unique position of the entrepreneur with regard to government regulation, economics, politics, the environment, and other external forces. Anticipating changes in such regulations and policies and spotting the entrepreneurial opportunities and niches that are inevitably created. 4 lectures/problem-solving.

**MHR 415 Human Resource Information Management (4)**

Emerging approaches to the management of human resources information in hiring, compensation/benefits, skills inventory, employee records, and training. Automated and manual systems compared. Student presentations on proposed and operational human resource information systems. Microcomputer exercises and 4 lectures/problem-solving. Prerequisite: MHR 311.



**MHR 416 Employee Benefits and Services (4)**

In-depth examination of policy and design of important economic security plans for protecting employees against on-the-job accidents; prepayment, health maintenance, and preferred provider coverages; structure and implementation of pre-retirement and retirement plans administered by human resource managers. 4 lecture presentations. Prerequisite: MHR 311.

**MHR 417 Total Quality Management Implementation**

Implementing continuous improvement of processes and systems in organizations. Strategies for developing management and employee commitment to involvement. Developing and maintaining team-based improvement efforts. Case studies, small group projects, and presentations. 4 lectures/problem-solving. Prerequisite: OM 401.

**MHR 421 Management Union Relations (4)**

Development of management-union relations in the United States: the continuously changing roles and relationships of labor, management, and government through collective bargaining, arbitration, and legislation. Review of trends affecting productivity and the labor force. 4 lecture discussions. Prerequisite: senior standing.

**MHR 422 Policy for International Management (4)**

Seminar in the application and development of policy for international business management. Analysis of international management practices and problems using the case study approach. 4 seminars. Prerequisite: MHR 322, also listed as IBM 422.

**MHR 426 Creativity and Innovation (4)**

Exploring and increasing creativity and innovation in individuals and in groups. Managing technology and research. The role of creativity and innovation in entrepreneurial, growth, and high-tech organizations. Organizational structures/cultures as inhibitors and facilitators of innovation. 4 seminars. Prerequisite: junior standing.

**MHR 438 Advanced Organizational Behavior (4)**

Application of human processes used to achieve goals in the organization. Group experiences whereby students gain insights into their own leadership styles, integrate their styles with managerial functions and the organization. Case studies, problem-solving exercises, and complex organizational simulations. 4 lectures/problem-solving. Prerequisite: MHR 318.

**MHR 441, 442 Internship in Business Management (1-8) (1-8)**

On-the-job training in business management involving new, collegiate-level learning experiences. Experiences as possible basis for senior projects. Prerequisite: consent of internship coordinator.

**MHR 450 Leadership**

Experiences and discussions involving the complexity of leadership. A study and survey of the history and progression of leadership research for gaining awareness of the challenges of leadership. A non-traditional approach to learning leadership concepts by simulating actual experiences. 4 lecture discussions.

**MHR 452 Emerging Issues in Management (4)**

Exploration of contemporary issues; cases and problems facing management in multicultural and international environments. Examination of the environment of business in a global economy with specific emphasis on business-government relations, ethics, and managing for the future. 4 lecture presentations. Prerequisite: senior standing.

**MHR 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Prerequisite: senior standing. Required minimum of 120 hours.

**MHR 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: consent of instructor.

## MARKETING MANAGEMENT

One of two majors offered in the International Business and Marketing Department is Marketing Management. For other programs in the department, see International Business.

Vernon R. Stauble, Chair, International Business and Marketing

Dolores A. Barsellotti	Sharyne Merritt
W. R. Berdine	Juanita P. Roxas
Frederick L. Capossela	Robert W. Schaffer
Stephen C. Cosmas	James E. Swartz
Helena Czepiec	Charles L. Taylor
James R. Hill	Andrew J. Thacker
Patricia M. Hopkins	Donna Tillman
Jerry L. Kirkpatrick	Debbora T. A. Whitson
Edwin D. Klewer	

### MISSION STATEMENT

The mission of the International Business and Marketing Department is to prepare students for specialized careers in either international business or marketing management. This preparation gives both undergraduate and graduate students practical learning experiences in such courses as international marketing, marketing management, professional selling, advertising, buyer behavior, market research, retailing, industrial marketing, brand management, and transportation and distribution management. In addition, the mission of the Department is to give non-majors a solid foundation in the application of business principles to the marketing of goods and services in international and domestic markets. To achieve excellence in both teaching and course content for an increasingly diverse and multinational student body, the Department's faculty undertakes programs of basic research, applied scholarship, and instructional development; it also forges and maintains strong links with the business community, both local and global.

The marketing management major is designed to give students an understanding of the factors both within the firm and in the external environment that affect the development and implementation of plans to serve the firm's markets and to attain the firm's economic goals. Emphasis is placed on determining market needs and decision-making concerning the product, pricing, promotion and distribution strategies required to meet those market needs.

Through proper selection of courses, with advisor approval, each student will develop and complete an individualized program of courses that will prepare him or her for a specialized career field within the field of marketing management. The specialized fields from which the student will choose are: (1) advertising, (2) international marketing, (3) marketing research, (4) marketing to professional buyers, (5) retail management, (6) transportation and distribution management, (7) product/brand management, and (8) industrial marketing.

### ACCOUNTING PREPARATION FOR TRANSFER STUDENTS (see page 149)

### MICROCOMPUTER PROFICIENCY REQUIREMENT (see page 149)

### CORE COURSES FOR MAJOR

Required of all business majors. A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Legal Environment of Business Transactions . . . . .FRL	201	(4)
Financial Accounting for Decision-Making . . . . .ACC	207	(5)
Managerial Accounting for Decision-Making . . . . .ACC	208	(5)
Principles of Management . . . . .MHR	301	(4)
Principles of Marketing Management . . . . .IBM	301	(4)

Managerial Finance I . . . . .FRL	300	(3)
Managerial Finance II . . . . .FRL	301	(3)
Management Information Systems . . . . .CIS	310	(4)
Operations Management . . . . .OM	301	(4)
Managerial Statistics . . . . .OM	302	(4)
Strategic Management . . . . .MHR	410	(4)
or Strategic Management . . . . .OM	411	

### MARKETING MAJOR REQUIRED COURSES

Career Analysis . . . . .IBM	200	(2)
Marketing Strategy . . . . .IBM	302	(4)
Marketing Analysis and Control . . . . .IBM	320	(4)
Marketing Research I . . . . .IBM	408	(4)
International Marketing . . . . .IBM	414	(4)
Buyer Behavior . . . . .IBM	411	(4)
Marketing Problems . . . . .IBM	421	(4)
Undergraduate Seminar . . . . .IBM	463	(2)
Plus a minimum of 28 units of courses with advisor approval . . . . .		(28)

### SUPPORT AND ELECTIVE COURSES

Required of all students. If any of these courses are used for General Education, then the Restricted Electives or Unrestricted Electives will be increased by the same number of units (see curriculum sheet for the major).

Principles of Economics . . . . .EC	201	(4)
Principles of Economics . . . . .EC	202	(4)
Elementary Statistics with Applications . . . . .STA	120	(4)
Restricted electives (cannot include courses in Business, Economics, Statistics, PLS 314, or PLS 318) . . . . .		(14-22)

### GENERAL EDUCATION COURSES

(Required of all students)

A total of 72 quarter units of General Education courses, Track B, are required for all majors in the College of Business Administration. See the list of approved courses in the "General Education Requirements" section of this catalog.

### Areas 1 through 4

Select courses from approved list . . . . . (64)

### Area 5

Multicultural Organizational Behavior . . . . .MHR 318 (4)

Select one course from approved list (cannot include courses in Business, Economics, Statistics, or PLS 318). . . . . (4)

### QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Marketing. A full description of this minor is included in the "University Programs" section of this catalog.

### MINOR IN MARKETING MANAGEMENT

Students enrolled in other academic programs, especially those outside of the College of Business Administration, may broaden their intellectual base and increase their opportunities for employment by completing an academic minor in Marketing Management. This minor is designed to supplement student studies in other major fields. Many non-business

majors find opportunities for application of the knowledge and academic preparation they have obtained in their major field in the marketing of goods, services, and ideas where a knowledge and understanding of marketing principles and practices is a prerequisite for success.

It is possible for students majoring in most other fields to complete the minor in marketing management within the normal requirements of their degree through careful planning and scheduling of their required courses.

The attainment of a minor in Marketing Management is accomplished by appropriate selection, timely scheduling and satisfactory completion of specifically designated courses and electives totaling a minimum of 32 quarter units as outlined below:

Completion of the following courses is required:

Principles of Marketing Management	IBM	301	(4)
Marketing Strategy	IBM	302	(4)
Buyer Behavior	IBM	411	(4)
Financial Accounting for Decision-Making	ACC	207	(5)
Principles of Economics	EC	201	(4)

Select 12 additional units from the following list of courses:

Professional Selling	IBM	208	(4)
Promotional Strategies	IBM	307	(4)
Retail Management	IBM	308	(4)
Business Logistics	IBM	309	(4)
Field Sales Management	IBM	310	(4)
Transportation Systems and Traffic Management	IBM	319	(4)
Marketing Analysis and Control	IBM	320	(4)
Marketing of Services	IBM	316	(4)
(4)Direct Marketing	IBM	326	(4)
Sales Promotion	IBM	327	(4)
Special Problems for Upper Division Students	IBM	400	(2)
Product and Brand Management	IBM	402	(4)
Marketing in the Internet	IBM	403	(4)
Advertising Management	IBM	405	(4)
Ethical Issues in Marketing	IBM	406	(4)
Industrial Marketing	IBM	407	(4)
Marketing Research I	IBM	408	(4)
Marketing Research II	IBM	409	(4)
Marketing for Small Business Organizations	IBM	410	(4)
International Marketing	IBM	414	(4)
Strategy in International Marketing	IBM	415	(4)
International Exporting	IBM	416	(4)
Legal Environment of Marketing	FRL	419	(4)
Marketing Problems	IBM	421	(4)
Management of Marketing Channels	IBM	431	(4)
Evaluating Advertising Effectiveness	IBM	433	(4)
Advanced Professional Selling	IBM	435	(4)
International Business Agreements and Negotiations	IBM	436	(4)
Competitive Marketing Simulation	IBM	438	(4)
Logistics Strategy Planning, Decisions and Control	IBM	439	(4)
Advertising Media Analysis and Planning	IBM	443	(4)
Retailing Problems	IBM	447	(4)
Industrial Marketing Problems	IBM	449	(4)

### MINOR IN FASHION MERCHANDISING

This interdisciplinary minor is designed for students who seek careers in the fashion industry. The minor provides students with a background in both fashion and business to better prepare them to seek employment in manufacturing or retailing. The minor in Fashion Merchandising is administered jointly by the Department of International Business and Marketing and College of Agriculture.

The attainment of a minor in Fashion Merchandising is accomplished by appropriate selection, timely scheduling and satisfactory completion of specifically designated courses and electives totaling a minimum of 36 quarter units as follows:

Completion of the following courses is required:

Apparel Design Analysis	AMM	210	(4)
Fashion Industry	AMM	101	(4)
Apparel Importing and Exporting	ABM	331	(4)
Principles of Marketing Management	IBM	301	(4)
Marketing Internship	IBM	441/2	(4)
Select two courses from Group A			(8)
Select two courses from Group B or C			(8)

#### GROUP A

Culture, People, and Dress	AMM	108	(4)
Fashion Promotion	AMM	230	(4)
Apparel Product Analysis	AMM	301/301A(2/2)	

#### GROUP B

Professional Selling	IBM	208	(4)
Retail Management	IBM	308	(4)
Retailing Problems	IBM	447	(4)

#### GROUP C

Introduction to International Business	MHR	332	(4)
International Marketing Management	IBM	414	(4)
International Marketing of Food and Fiber Products	IA/ABM	330	(4)
Strategy in International Marketing	IBM	415	(4)

### MINOR IN LOGISTICS

The Logistics Minor, offered by the International Business and Marketing Department, is the only program of its kind in the California State University system. The Logistics Minor was developed to allow Business Administration majors or students majoring in non-business programs to gain the knowledge and skills needed to gain entry-level employment in the field of transportation, warehousing, logistics, planning, materials management, and physical distribution. In addition to the job opportunities that are available in the domestic arena, openings also exist in the international arena. Demand greatly exceeds supply both nationally and internationally for logistics managers.

Students from any major may participate in the minor in Logistics. Core courses in a student's major (Column 1 of the Degree Requirements Evaluation Worksheet) which are required in this minor must be replaced with substitute courses on the basis of individual petitions. For example, an Operations Management major would have to substitute another course for OM 332 in order to complete a Minor in Logistics because OM 332 is a required core course for all Operations Management students.

For more information, students should contact the chair of the International Business and Marketing Department, Building 94, Room 236, Extension 2436.

Completion of the following courses is required:

#### Prerequisites:

Elementary Statistics with Applications	STA	120	(4)
Principles of Marketing Management	IBM	301	(4)
Operations Management	OM	301	(4)
Managerial Statistics	OM	302	(4)

#### Core Requirements (16 units)

Business Logistics	IBM	309	(4)
Transportation Systems and Traffic Management	IBM	319	(4)

Production Management . . . . .	OM	332	(4)
Logistics Strategy and Planning, Decisions and Control . . . . .	IBM	439	(4)

Select 12 additional units from the following list of courses:

Each elective must be outside the student's major department.

Management Science I . . . . .	OM	315	(4)
Decision Support and Expert Systems . . . . .	OM	350	(4)
Advanced Managerial Statistics . . . . .	OM	380	(4)
Total Quality Management . . . . .	OM	401	(4)
Forecasting Methods for Management . . . . .	OM	415	(4)
Material Requirements Planning . . . . .	OM	430	(4)
Materials and Inventory Management . . . . .	OM	433	(4)
Purchasing Management . . . . .	OM	434	(4)
Facilities Planning for Manufacturers . . . . .	OM	450	(4)
Operations Management in Services . . . . .	OM	453	(4)
Industrial Marketing . . . . .	IBM	407	(4)
International Marketing . . . . .	IBM	414	(4)
International Exporting . . . . .	IBM	416	(4)
Management of Marketing Channels . . . . .	IBM	431	(4)
Total core and elective units required: . . . . .		28	

#### **COURSE DESCRIPTIONS - The following IBM courses were formerly offered under the Marketing (MKT) prefix**

##### **IBM 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

##### **IBM 201 The Consumer, Marketing, and Society (4)**

Critical analysis of business/economic institutions, policies, and marketing practices as they affect consumer needs. Assisting individuals to become informed and effective buyers/consumers. Historical development of political and economic institutions as they impact individual consumers in multicultural environments. 4 lecture discussions.

##### **IBM 208 Professional Selling (4)**

Persuasive personal communication on behalf of products, concepts, services. Individual counseling on oral presentations by students. 4 lectures/problem-solving.

##### **IBM 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: Permission of instructor.

##### **IBM 301 Principles of Marketing Management (4)**

Principles, concepts, and institutions involved in facilitating the exchange of goods and services. Analysis of markets, the marketing environment, and the marketing variables of product, price, promotion, and distribution. Introduction to marketing strategy and international marketing. Ethical issues. Computer applications. 4 lecture discussions.

##### **IBM 302 Marketing Strategy (4)**

Analysis, planning, implementation and control of marketing strategy. Target market, product, distribution, promotion, and pricing decisions necessary to accomplish the firm's objectives. Emphasis on application of analytical techniques to improve decision-making in a dynamic marketplace. 4 lecture discussions. Prerequisite: IBM 200, 301.

##### **IBM 307 Promotional Strategies (4)**

Fundamentals of marketing communication. Promotional strategy development: advertising messages and media, personal selling, sales promotion, publicity, packaging, branding, and display. Promotional budgets. Development of communication strategies for new product, industrial, retail, and services marketing. 4 lecture discussions. Prerequisite: IBM 301.

##### **IBM 308 Retail Management (4)**

Examination and evaluation of changing concepts of retailing from a management viewpoint. Philosophy of modern management and measures of retail productivity. Individual student field projects. 4 lectures/problem-solving. Prerequisite: IBM 301.

##### **IBM 309 Business Logistics (4)**

Coordination and administration of materials management and physical distribution activities for optimum logistical performance relative to cost and customer service. Integration of transportation, warehousing, inventory, and related logistical activities. Case analysis and discussion of problems in logistical support. 4 lecture discussions.

##### **IBM 310 Field Sales Management (4)**

Analysis of the field sales manager as a professional marketing tactician in a marketing-oriented firm. Emphasis on both theoretical and applied approaches to effectively managing a field sales force. 4 lecture discussions.

##### **IBM 316 Marketing of Services (4)**

Concepts, practices, and development of strategies involved in marketing of services. External environmental and internal control factors as applied to professional, financial, educational, entertainment, health care, governmental, religious, research, media, and other organizations, institutions, and/or agencies. 4 lecture discussions. Prerequisite: IBM 301.

##### **IBM 319 Transportation Systems and Traffic Management (4)**

Analysis of competitive alternative modes, systems, rates, services, and regulations as prerequisite to transport purchase decisions. Organization, operations, and management of the firm's traffic department. Impact of present and proposed transportation and environmental developments on industrial and carrier operations. 4 lecture discussions..

##### **IBM 320 Market Analysis and Control (4)**

Market identification and diagnosis. Market analysis based on available data; applications for planning and control. Extensive use of computer models, with emphasis on current microcomputer software application packages. 4 lectures/problem-solving. Prerequisites: IBM 301, STA 120.

##### **IBM 326 Interactive Marketing (4)**

Role of interactive marketing in marketing strategy. Investigation of various forms and uses of interactive marketing as employed by manufacturers, wholesalers, retailers, politicians, not-for-profit and service organizations. 4 lecture discussions. Prerequisite: IBM 307.

##### **IBM 327 Sales Promotion (4)**

Role of sales promotion in marketing strategy. Study of numerous incentives designed to increase sales or achieve other specific marketing objectives directed toward sales force, intermediaries, and consumers. Design of sales promotion plans. 4 lecture discussions. Prerequisite: IBM 307.



**IBM 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**IBM 402 Product and Brand Management (4)**

Planning, implementation, and control of marketing strategy for a specific product, product line, or brand. Analysis of market needs and the macro-environment; developing marketing plans involving product, price, promotion, and distribution decisions to market a specific product or brand. 4 lecture discussions. Prerequisite: IBM 302.

**IBM 403 Marketing on the Internet (4)**

Study of the Internet, its culture and procedures from a marketing perspective. Using the Internet for customer contact, customer service, order-taking, and marketing research. Promotion and distribution considerations. Issues in the creation of successful WWWsites. On-line experience and projects with real organizations. 4 lectures/problem-solving. Prerequisite: IBM 301.

**IBM 405 Advertising Management (4)**

Strategic aspects of planning, implementing, and controlling advertising programs from the perspectives of producers and distributors of goods, services, and nonprofit organizations. Study of socioeconomic, legal, and consumer issues affecting advertising decisions in a marketing context. 4 lecture discussions. Prerequisite: IBM 307.

**IBM 406 Ethical Issues in Marketing (4)**

The morality and immorality of modern marketing practices. Ethical theories as applied to such marketing-related issues as bribery, marketing to countries engaging in morally questionable practices, deceptive advertising, and invasion of privacy. 4 lectures/problem-solving. Prerequisites: IBM 301.

**IBM 407 Industrial Marketing (4)**

Study of the environment in which industrial products are marketed to industrial firms, governments and institutions. Emphasis on industry structure, government and industrial buying behavior as each affects product, pricing, promotion and distribution decisions. Analysis of specific case problems. 4 lectures/problem-solving. Prerequisite: IBM 301.

**IBM 408 Marketing Research I (4)**

Theoretical and analytical foundations of marketing research. Topics covered include analysis of internal and external secondary data, marketing software packages, approaches to primary research, and research applications to marketing problems. 4 lectures/problem-solving. Prerequisites: IBM 320 and OM 302.

**IBM 409 Marketing Research II (4)**

The research process as an aid to decision-making in marketing. Application of techniques in research design, data collection, sampling, computer-aided data analysis, and report writing to contemporary marketing research problems. 4 lectures/problem-solving. Prerequisite: IBM 408.

**IBM 410 Marketing for Small Business Organizations (4) (formerly MKT 404)**

Methods by which a small business organization with limited resources can analyze the profit opportunities within its market area. Special emphasis on developing and evaluating a written marketing plan for a small business organization. 4 lectures/problem-solving. Prerequisite: IBM 301.

**IBM 411 Buyer Behavior (4)**

Various factors that affect the consumer during the pre-purchase, purchase, and post-purchase decision-making process. Emphasis upon a thorough understanding of the consumer to facilitate the development of effective marketing strategy. 4 lecture discussions. Prerequisite: IBM 301.

**IBM 414 International Marketing Management (4)**

Planning and organizing for international marketing operations. Distinctive characteristics, environmental influences, and emerging trends in overseas markets. Management practices and problems of adapting American marketing concepts and methods. 4 lecture discussions.. Prerequisite: IBM 301.

**IBM 415 Strategy in International Marketing (4)**

Alternative methods and strategies in the decision areas of product development, promotional programs, distribution channel determination, and pricing. Opportunities, key issues, and applications to ensure a firm's survival and success in the international arena. 4 lectures/problem-solving. Prerequisite: IBM 414.

**IBM 416 International Exporting (4)**

Principles, strategies, and mechanics of exporting to foreign nations. Political, legal, cultural, and economic environments affecting export operations. Corporate programs and policies, involvement levels, financing, pricing, promotion, and distribution strategies. Latin America, European Community, Pacific Rim specifics. Import trade mechanics. 4 lecture discussions. Prerequisite: IBM 414.

**IBM 421 Marketing Problems (4)**

Application of marketing theory to contemporary marketing problems. Emphasis on the techniques of successful marketing decision-making. A problems approach to developing student's ability to integrate all major areas of marketing. 4 lectures/problem-solving. Prerequisites: IBM 408.

**IBM 429 International Logistics (4)**

Integration of cultural, functional and strategic aspects of global logistics. Ocean, air and surface carriers and systems, international sourcing, financial aspects of sales and payments, roles of government and intermediaries, infrastructure issues. Logistics as a tool for integrative international operations. 4 lecture/discussion. Prerequisite: IBM 301

**IBM 431 Management of Marketing Channels (4)**

Development, design, selection, and administration of marketing channel systems. Sources and resolution of channel conflicts. Channel relationships, communication, functional performance, and strategy planning. Analysis of selected case problems. 4 lecture discussions. Prerequisites: IBM 302.

**IBM 433 Evaluating Advertising Effectiveness (4)**

Development of criteria to analyze the strategic and creative elements of advertising campaigns. Application of criteria to judge effective versus ineffective advertising in all major media: magazine, newspaper, outdoor, radio, and television. Production of a 30-second television commercial. 4 lectures/problem-solving. Prerequisites: IBM 307, IBM 411.

**IBM 435 Advanced Professional Selling (4)**

Analysis of the sales representative as a professional marketing tactician in a market-oriented firm. Emphasis on applied and theoretical approaches utilized to effectively manage a sales territory. Analysis of sales representatives in different industries. 4 lectures/problem-solving.

**IBM436 International Business Agreements and Negotiation (4)**

Integrating perspectives from various fields of study contributing to international agreements and the negotiating process. Exploring insights and applications related to business agreements, diplomacy, and negotiation of strategies in marketing/selling situations. 4 lectures/problem-solving. Prerequisite: IBM414.

**IBM 438 Competitive Marketing Simulation (4) - (Formerly MKT 437)**

Interactive computer marketing simulation designed to reflect business situations and provide practice in making managerial decisions in marketing strategy. Competitive approach requires development of marketing strategy, implementation of marketing tactics, and design of an advertising program. 4 lectures/problem-solving. Prerequisite: IBM 301.

**IBM 439 Logistics Strategy Planning, Decisions and Control (4)**

Planning and policy development for logistics strategy to maximize efficiency in material operations and with suppliers and customers. Development of cost and performance standards, controls, and measurements to enhance decision-making. Designing integrated logistical systems. 4 lectures/problem-solving. Prerequisite: IBM 309.

**IBM 441, 442 Internship in Marketing (1-8) (1-8)**

Faculty-supervised on-the-job educational experience in the real-world marketing management environment. Allocation of unit credit is dependent upon the nature of the work done, the level of responsibility, and the number of hours worked. Total internship credit limited to 16 units. Prerequisite: permission of departmental internship coordinator.

**IBM 443 Advertising Media Analysis and Planning (4)**

Principles and practices of advertising and media analysis and planning. Strengths and weaknesses of media alternatives, budgeting procedures, media-client planning, and buying interaction, negotiation with media sales personnel. 4 lectures/problem-solving. Prerequisites: STA 120 and IBM 307.

**IBM 447 Retailing Problems (4)**

Application of marketing theory to contemporary retailing problems. Identification of potential markets and development of effective research techniques in retail organizations. Integration of current marketing plans and strategies with the techniques of successful retail decision-making. 4 lectures/problem-solving. Prerequisite: IBM 308.

**IBM 449 Industrial Marketing Problems (4)**

Application of marketing theory to contemporary industrial/organizational marketing problems. Integration of the techniques of successful decision-making. 4 lectures/problem-solving. Prerequisite: IBM 407.

**IBM 463 Undergraduate Seminar (2)**

Development and refinement of skills and strategies necessary to obtain and enhance employment. Student presentation and discussion of problems and opportunities pertinent to career growth and success as related to personal and family life. 2 meetings. Prerequisite: senior standing.

**IBM 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

## TECHNOLOGY AND OPERATIONS MANAGEMENT

Abolhassan Halati, Chair

William J. Cosgrove  
Mostafa El Agizy  
John E. Knox  
Joyce I. Kupsh  
Ralph H. Miller  
Charles E. Pinkus

Mei Qi  
P. Rama Ramalingam  
Rhonda L. Rhodes  
Leonard E. Ross  
James M. Salvate

The operations function of a business is responsible for planning, coordinating, and supervising the production and distribution of the services and goods provided by the organization. The student of Technology and Operations Management will learn the concepts and skills needed to manage the operations function and to help business achieve continuous improvement in productivity and in the quality of services and goods produced.

### MISSION STATEMENT

The Technology and Operations Management Department aims to provide an education to its students that will enable them to become successful managers in the business world now and into the 21st century. Through its curriculum, the department concentrates on helping students develop competencies in critical thinking, technical and business integration skills.

To prepare students for managerial positions in the 21st century, the department focuses on the role of technology and scientific management methods. Heavy emphasis is placed on the study of computer applications for helping managers plan, analyze information, make decisions, and communicate.

### SPECIALIZATIONS

The major prepares the graduate for careers managing service and manufacturing operations in small and large companies, national and international businesses, not-for-profit institutions, and government. Students majoring in operations management are provided a broad background to the field, after which they choose one of the following areas within which to specialize:

Production Operations Management  
Service Operations Management

The Production Operations Management area of emphasis focuses on manufacturing operations, although many of the skills learned are applicable in a non-manufacturing environment. The production function of an organization includes a number of career specialties such as: production planning and control, purchasing, materials management, inventory control, project and program management, quality control, facilities design and layout, work methods improvement, production systems analysis, the scheduling of production processes, and the delivery of goods and services.

The Service Operations Management area of emphasis focuses on the improvement of service (non-manufacturing) organizations through the understanding of business strategies, processes, technology, and change. The subjects which make up the core of this area are: operations analysis and problem-definition, computer-aided decision-making, project management, quality control, forecasting, capacity planning, and scheduling. Heavy emphasis is placed on the design, presentation, and communication of information using the computer. Through careful selection of electives, this area of emphasis allows the student to combine the study of service operations with a sub-specialization in another area, such as facilities management, financial

management, logistics, management science, marketing, production management, project management, small business management, and telecommunications.

There are elective courses within each of these specializations. A department advisor will help students choose electives that are compatible with their career interests.

The department sponsors student chapters of the American Production and Inventory Control Society, the American Society for Quality Control, and the International Facilities Management Association. Students are encouraged to join these organizations to learn more about the practice of operations management.

### ACCOUNTING PREPARATION FOR TRANSFER STUDENTS (see page 149)

### MICROCOMPUTER PROFICIENCY REQUIREMENT (see page 149)

### CORE COURSES FOR MAJOR

Required of all business majors. A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

Legal Environment of Business Transactions . . . . .	FRL	201	(4)
Financial Accounting for Decision-Making . . . . .	ACC	207	(5)
Managerial Accounting for Decision-Making . . . . .	ACC	208	(5)
Principles of Management . . . . .	MHR	301	(4)
Principles of Marketing Management . . . . .	IBM	301	(4)
Managerial Finance I . . . . .	FRL	300	(3)
Managerial Finance II . . . . .	FRL	301	(3)
Management Info Systems . . . . .	CIS	310	(4)
Operations Management . . . . .	OM	301	(4)
Managerial Statistics . . . . .	OM	302	(4)
Strategic Management . . . . .	MHR	410	(4)
or Strategic Management . . . . .	OM	411	

### OPERATIONS MANAGEMENT COURSES

Required of all Operations Management majors:

Management Science I . . . . .	OM	315	(4)
Production Management . . . . .	OM	332	(4)
Project Design and Development . . . . .	OM	460	(4)
Undergraduate Seminar . . . . .	OM	463	(2)
Senior Project . . . . .	OM	461/462	(2/2)

### Specialization Electives

A minimum of nine courses (36 units) are to be selected from the OM courses listed below. The requirements depend upon the specialization chosen.

The list of approved courses may be obtained from a Technology and Operations Management Department advisor. Upper-division courses from other departments may be selected with the approval of an advisor.

Information Design and Presentation . . . . .	OM	310	(4)
Management Science II . . . . .	OM	316	(4)
Practicum in Production Management . . . . .	OM	333	(4)
Telecommunications and Office Automation . . . . .	OM	340	(4)
Decision Support and Expert Systems . . . . .	OM	350	(4)
Advanced Managerial Statistics . . . . .	OM	380	(4)
Total Quality Management . . . . .	OM	401	(4)
Forecasting Methods for Management . . . . .	OM	415	(4)
Multivariate Business Analysis . . . . .	OM	416	(4)
Applied Resource Allocation . . . . .	OM	417	(4)

Simulation of Service Operations . . . . .OM	419	(4)
Material Requirements Planning . . . . .OM	430	(4)
Production and Inventory Management . . . . .OM	432	(4)
Materials and Inventory Management . . . . .OM	433	(4)
Purchasing Management . . . . .OM	434	(4)
Quality Management . . . . .OM	435	(4)
Project Management . . . . .OM	436	(4)
International Business Cases: Operations . . . . .OM	437	(4)
Internship in Operations Management . . . . .OM	441/2	(1-8)
Facilities Planning for Management . . . . .OM	450	(4)
Operations Management in Services . . . . .OM	453	(4)
Just-in Time Production . . . . .OM	455	(4)

### SUPPORT AND ELECTIVE COURSES

Required of all OM majors. If any of these courses are used for General Education, then the Restricted Electives or Unrestricted Electives will be increased by the same number of units (see curriculum sheet for the major).

Principles of Economics . . . . .EC	201	(4)
Principles of Economics . . . . .EC	202	(4)
Statistics with Applications . . . . .STA	120	(4)
Restricted electives, (cannot include courses in Business, Economics, Statistics, PLS 314, or PLS 318) . . . . . (16-24)		
Unrestricted electives . . . . .		(0)

### GENERAL EDUCATION COURSES

(Required of all students)

A total of 72 quarter units of General Education courses are required for all majors in the College of Business Administration. See the list of approved courses under General Education requirements in this catalog.

#### Areas 1 through 4

Select courses from approved list . . . . . (64)

#### Area 5

Multicultural Organizational Behavior . . . . .MHR 318 (4)  
Select one course from approved list (cannot include  
courses in Business, Economics, Statistics, or PLS 318) . . . . . (16-24)

### SPECIAL POLICIES

Operations Management majors are strongly encouraged to complete STA 120 by the end of their sophomore year and to complete OM 301 and OM 302 by the end of the first quarter of their junior year because one or more of these courses are prerequisite to each of the department's required or specialization courses.

### MINORS

#### OPERATIONS MANAGEMENT MINOR

The Operations Management Minor was developed to allow other Business Administration majors or students majoring in non-business programs to gain the knowledge and skills necessary to effectively use operations management techniques in both manufacturing and service organizations. This program of study should enhance the employment opportunities for students, as well as improve their productivity and career growth potential.

#### Requirements

Prerequisites (12 units)

Elementary Statistics With Applications . . . . .STA	120	(4)
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Operations Management . . . . .OM	331	(4)
Managerial Statistics . . . . .OM	302	(4)

#### Core Requirements (16 units)

Production Management . . . . .OM	332	(4)
Material Requirements Planning . . . . .OM	430	(4)
Quality Control . . . . .OM	435	(4)
Operations Management in Services . . . . .OM	453	(4)

#### Directed Electives (8 units) (Select 2 Courses):

Production and Inventory Management . . . . .OM	432	(4)
Materials and Inventory Management . . . . .OM	433	(4)
Purchasing Management . . . . .OM	434	(4)
Project Management . . . . .OM	436	(4)
Just in Time Production Techniques . . . . .OM	455	(4)
Total Core and Elective Units Required. . . . .	24	

### QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Operations Management. A full description of this minor is included in the "University Programs" section of this catalog.

### TOTAL QUALITY MANAGEMENT MINOR

The Total Quality Management (TQM) Minor may be taken by students having any major in the University. It is particularly appropriate for students majoring in Operations Management. The minor is intended to allow students to gain the knowledge and skills necessary for effective application of quality management techniques in manufacturing, service, and not-for-profit organizations. The Total Quality Management Minor will help fill the need for graduates, especially from business and engineering, who are trained in the concepts, techniques, tools, and methods of analysis used for the continuous improvement of product, service, and process quality. Computer-based approaches are used wherever they are available and appropriate. A full description of this minor is included in the "University Programs" section of this catalog.

### COURSE DESCRIPTIONS

#### OM 103 Business and Its Environment (4)

American business system in its economic, social, political, national, and international environment. Coverage of the major activities of business and the key institutions influencing its service to society. Participation in a computerized competitive business simulation. 4 lectures/problem-solving. Prerequisite: passing score on ELM and a score on EPT to qualify for ENG 104.

#### OM 200 Special Problems for Lower Division Students (1-4)

Individual or group investigation, research, studies, or surveys of selected problems. A variable number of units, from 1 to 4, is allowed in any quarter. Maximum total credit is limited to 4 units.

#### OM 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter.



Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

#### **OM 301 Operations Management (4) (formerly OM331)**

Fundamental concepts of operations management including: productivity, total quality management (TQM), production planning, forecasting, just-in-time systems, inventory management, scheduling, purchasing and project management. Computer applications in operations management. 4 lectures/problem-solving. Prerequisite: STA 120 or equivalent, and microcomputer proficiency.

#### **OM 302 Managerial Statistics (4) (formerly OM314)**

Statistical techniques for auditing, analyzing surveys, market analysis, forecasting and risk analysis, using point and confidence interval estimation, two-sample hypothesis testing, one- and two-way Chi square testing, simple and multiple regression, time series analysis, and decision analysis. Use of microcomputers. 4 lectures/problem-solving. Prerequisite: STA 120 or equivalent, and microcomputer proficiency.

#### **OM 310 Information Design and Presentation (4)**

Design and presentation of business information used in decision-making. Using current technology to develop dynamic messages for oral presentations and written reports. Planning, strategy, display diagrams, graphs, designing visuals, color, meeting environment, delivering with confidence, and conducting meetings. 4 lectures/problem-solving. Prerequisite: microcomputer proficiency.

#### **OM 315 Management Science I (4)**

Introduction to deterministic quantitative decision analysis, modeling, and problem-solving. Linear programming: model formulation, applications, simplex, transportation, assignment, transshipment, and integer models; sensitivity analysis, duality; application of computers. 4 lectures/problem-solving. Prerequisite: STA 120 or equivalent, and microcomputer proficiency.

#### **OM 316 Management Science II (4)**

Introduction to probabilistic quantitative analysis tools and techniques for modeling, solving problems, and business decision-making. Decision theory, decision analysis with multiple criteria, introduction to stochastic processes; Markovian processes, and computer simulation. 4 lectures/problem-solving. Prerequisite: OM 302.

#### **OM 332 Production Management (4)**

Application of quantitative methods to problems in production and operations management, including facility location, design of operations and work systems, job simplification, queuing systems, scheduling, motion and time study. 4 lectures/problem-solving. Prerequisite: OM 301, or concurrent enrollment in OM 301.

#### **OM 333 Practicum in Production/Operations Management (4)**

Integrates OM theories and methodologies and applies these to a simulated firm. Use of computer packages. Discussion of ethical considerations. 4 lectures/problem-solving. Prerequisite: OM 332.

#### **OM 340 Telecommunications and Office Automation (4)**

Telecommunications in automated office systems. Decision-making in the operations management environment by processing text, data, image, or voice communication. Electronic mail, databases, teleconferencing, facsimile, voice message systems, intelligent copiers, and related areas. Classroom applications involving communication by

means of quantitative and qualitative electronic reports. 4 lectures/problem-solving. Prerequisite: OM 310.

#### **OM 350 Decision Support and Expert Systems (4)**

Computer-based information systems for semi-structured business problems; database, dialogue management, and model-base subsystems; design and implementation of decision support and expert systems; introduction to artificial intelligence and expert systems. 4 lectures/problem-solving. Prerequisite: microcomputer proficiency.

#### **OM 380 Advanced Managerial Statistics (4)**

Application of advanced statistical methods for business problems. Parametric analysis and inference including one- and two-way analysis of variance, post hoc comparisons, multiple regression, dummy variables. Nonparametric techniques, including one-, two-, and three-way chi square. Use of computers. 4 lectures/problem-solving. Prerequisite: OM 302.

#### **OM 400 Special Problems for Upper Division Students (1-4)**

Individual or group research, studies, or surveys, of selected problems. A variable number of units from one to four is allowed in any quarter. Maximum total credit is limited to 4 units.

#### **OM 401 Total Quality Management (4)**

The TQM process, its planning, and implementation. Theories of leading TQM proponents. TQM tools and methods including concurrent engineering, benchmarking, quality function deployment, and statistical process control. Development and implementation of the improvement process. Use of computers. 4 lectures/problem-solving. Prerequisite: STA 120, or STA 309, or equivalent, and microcomputer proficiency.

#### **OM 411 Strategic Management (4)**

Simulated experience in integration of the business functions utilizing computer-based management games; develops concepts of management strategy and policy for competitive excellence and ethical operations; total quality management. Cases in management strategy. Analytical techniques as applied to business cases. 4 seminars. Prerequisite: completion of College of Business Administration core requirements.

#### **OM 415 Forecasting Methods for Management (4)**

Analysis of time series data. Forecasts for use in business decisions. Smoothing, decomposition, multiple regression, Box-Jenkins, autocorrelation, moving average, autoregression, ARMA, and ARIMA methods. Comparison and selection of suitable forecasting methods for a given application. Use of computer packages. 4 lectures/problem-solving. Prerequisite: OM 302.

#### **OM 416 Multivariate Business Analysis (4)**

Application of multivariate statistical methods to problems in business. Advanced techniques of analysis and inference including multiple regression, multiple discriminant analysis, multivariate analysis of variance, canonical correlation analysis, factor analysis. Use of computer packages. 4 lectures/problem-solving. Prerequisite: OM 380.

#### **OM 417 Applied Resource Allocation (4)**

Resource allocation and planning models. Applications of linear and nonlinear programming models. Sensitivity analysis, goal programming, integer programming, dynamic programming, parametric programming, quadratic programming. Use of mathematical programming computer

software. Applications of models to case studies. 4 lectures/problem-solving. Prerequisite: OM 315.

#### **OM 419 Simulation of Service Operations (4)**

Computer simulation of service operations, Monte Carlo method, probabilistic simulation modeling, random number generation, model calibration and validation, output analysis, simulation software languages. 4 lectures/problem-solving. Prerequisite: OM 302.

#### **OM 430 Material Requirements Planning (4)**

Concepts of material requirements planning. Elements, processing logic, lot sizing and updating the system. System records and files, product definition, interfaces, implementation, and operating considerations. Case studies. 4 lectures/problem-solving. Prerequisite: OM 301.

#### **OM 432 Production and Inventory Management (4)**

Management of production systems. Techniques of master production scheduling, short- and medium-range planning, aggregate inventory management, distribution resource planning, production activity control, scheduling and sequencing, shop floor control. Priority and input-output control. 4 lectures/problem-solving. Prerequisite: OM 301.

#### **OM 433 Materials and Inventory Management (4)**

Materials management in manufacturing and service organizations. Demand forecasting, deterministic and probabilistic inventory systems; Distribution Requirements Planning for multi-level inventory systems; in-process inventory management and inventory simulation. 4 lectures/problem-solving. Prerequisite: OM 301 and OM 302.

#### **OM 434 Purchasing Management (4)**

Examines activities directed to securing the materials, supplies, equipment and services required for the proper and efficient functioning of a business, including related planning and policy issues. 4 lectures/problem-solving. Prerequisite: OM 301.

#### **OM 435 Quality Management (4)**

Organization and economics of the quality assurance function. Analysis of quality management and technical systems. Quantitative techniques of reliability, statistical process control and acceptance sampling for quality control. 4 lectures/problem-solving. Prerequisite: OM 301 and OM 302.

#### **OM 436 Project Management (4)**

Study of CPM (critical path method), PERT (program evaluation and review technique) and other techniques for planning sequences of responsibilities to accomplish complex projects. Monitoring allocation of resources within rigid time and cost constraints. Use of computers. 4 lectures/problem-solving. Prerequisite: OM 301.

#### **OM 437 International Business Cases: Operations (4)**

Case studies in multinational operations management. Manpower and work flow, production planning and control, operations management strategy, cultural considerations and ethics. Use of computer software. 4 lectures/problem-solving. Prerequisite: OM 301. (Also listed as IBM 437.)

#### **OM 441, 442 Internship in Operations Management (1-8)**

On-the-job training in business management involving new, collegiate-level learning experiences. Experiences may be useful as a basis for senior projects. A maximum of 8 units may be applied to the 44 unit directed elective requirement. Total credit limited to 8 units each course. Prerequisite: consent of internship coordinator.

#### **OM 450 Facilities Planning for Managers (4)**

Principles and methods of facilities planning as applied to the selection and location of facilities, equipment, and work stations. Includes both industrial and service applications. 4 lectures/problem-solving. Prerequisite:

#### **OM 453 Operations Management in Services (4)**

Introduction to fundamental concepts of operations management in services. Design and scheduling of personnel activities. Service location problems. Vehicle scheduling and routing. Utilization of service capacity. Quality control in service operations. Management information systems. 4 lectures/problem-solving. Prerequisite: OM 301.

#### **OM 455 Just-In-Time Production (4)**

Comparison of different production environments. Detailed coverage of successful techniques used in world-class manufacturing: Just-in-time, total quality management, total preventive maintenance, group technology, plant layout, and time and motion study. 4 lectures/problem-solving. Prerequisite: OM 301. (Also listed as IBM 455.)

#### **OM 460 Project Design and Development (4)**

Problem solving in a business environment. Problem identification and selection. Preparation of project proposals, including problem statement, data collection procedures, selection of analysis techniques. Types of projects (laboratory, field, survey, ex post facto). Ethical issues. Presentation of summary proposals. 4 seminars. Prerequisites: OM 301, OM302, and a minimum of one OM directed elective.

#### **OM 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Required minimum of 120 hours. Prerequisite: senior standing.

#### **OM 463 Undergraduate Seminar (2)**

Study and discussion by students of recent developments in the students' major field; presentation of senior project status reports. 2 seminars. Prerequisite: OM 460 and co-registration in OM 461 and 462.

#### **OM 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.



ENGINE





LEARNING

## COLLEGE OF ENGINEERING

Carl E. Rathmann, Interim Dean

David L. Clark, Interim Associate Dean

Elhami T. Ibrahim, Director, Graduate Studies

Engineering is a dynamic profession which provides the expertise to meet the technical challenges facing the nation. Cal Poly Pomona's College of Engineering has a well-earned reputation of helping to meet these challenges by graduating engineers and engineering technologists who are prepared to contribute significantly to industry and who are ready for graduate studies. The emphasis on a strong theoretical background coordinated with early and significant laboratory experiences continues to make the program unique in engineering education. The College of Engineering provides study opportunities to undergraduate and graduate students in eight engineering disciplines, offering programs leading to Bachelor of Science degrees in Aerospace, Chemical, Civil, Electrical, Industrial, Manufacturing, Materials, and Mechanical Engineering, and the Bachelor of Science in Engineering Technology, Construction Engineering Technology, and Electronics and Computer Engineering Technology. In addition, the graduate division offers individualized programs leading to Master of Science degrees in Electrical Engineering and Master of Science in Engineering with specializations in each of the engineering disciplines. All of the undergraduate engineering curricula, except the recently established one in Materials Engineering, are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). The programs in Engineering Technology are accredited by the Technology Accreditation Commission of ABET. The programs each require 202 units for the Bachelor of Science degree. The Master of Science degrees require an additional 45 or 46 units.

Each engineering curriculum is designed to give the student both an understanding of the fundamental principles of engineering as an applied science and the practical expertise to apply these principles to actual situations. In keeping with ABET criteria, each engineering program incorporates these curricular areas into the educational experience: mathematics and basic sciences; engineering sciences and engineering design; and humanities and social sciences. Engineering programs must demonstrate that their graduates have: a) an ability to apply knowledge of mathematics, science, and engineering, b) an ability to design and conduct experiments, as well as to analyze and interpret data, c) an ability to design a system, component, or process to meet desired needs, d) an ability to function on multi-disciplinary teams, e) an ability to identify, formulate, and solve engineering problems, f) an understanding of professional and ethical responsibility, g) an ability to communicate effectively, h) the broad education necessary to understand the impact of engineering solutions in a global and societal context, i) a recognition of the need for, and an ability to engage in life-long learning, j) a knowledge of contemporary issues, k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Practice in all forms of communication is interwoven throughout the curriculum. While communication through mathematics is fundamental to engineering, the ability to clearly express oneself both orally and in writing must accompany the precision of mathematics and engineering drawings.

All of the engineering degree programs require an exceptionally strong aptitude in calculus and physics. Studies in mathematics are required at the undergraduate level through the calculus and differential equations, while the basic science requirement includes courses in physics, chemistry, and biology.

The engineering sciences have their roots in mathematics and the basic sciences, but carry knowledge further toward creative application. These studies provide a bridge between mathematics/basic sciences and engineering practice, and include mechanics, thermodynamics, electrical and electronic circuits, materials science, and transport phenomena.

Engineering design is the methodical procedure by which a system, component, or process is devised to meet a recognized need. It is an open-ended decision-making process in which the basic sciences, mathematics, and engineering sciences are applied through a process of synthesis and analysis to create the desired entity. This component of our curricula is particularly strong at Cal Poly Pomona and emphasizes student creativity, development and use of design methodology, formulation of design problem statements and specifications, consideration of alternative solutions, feasibility, and optimality considerations.

Studies in the humanities and social sciences serve not only to meet the objectives of a broad education, but also to meet the requirements of the engineering profession. In the interest of making engineers and technologists fully aware of their social responsibilities and better able to consider related factors in the decision-making process, this portion of the curricula includes coursework in communication skills, history, economics, fine arts, literature, sociology and related electives as part of the university's comprehensive General Education program. Students in all majors are urged to consider the Interdisciplinary General Education (IGE) program as a valuable means of satisfying many of the General Education requirements of the degree. Students participating in this eight quarter-sequence have the unique opportunity to become active members of a learning community.

It is important to distinguish between Engineering and Engineering Technology. Engineering Technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the craftsman and the engineer. The engineering technologist is more specialized than the engineer, focusing on a technical specialty within an engineering discipline. Compared to the engineering curricula, there is less emphasis on basic science and mathematics and engineering science and more emphasis on skills and knowledge of existing technology related to design support; production; and equipment selection, modification, and service. Studies for the bachelor's degree in Engineering Technology include coursework in: mathematics and basic sciences; technical sciences, specialties, and electives; and social sciences/humanities and communication.

Unlike the more traditional engineering curricula which initiate engineering coursework in the junior year, Cal Poly Pomona's program demands that students take computer programming and engineering orientation courses in the freshman year, and that mathematics, basic science, and general education courses begin concurrently. Throughout their educational programs students become adept at using both the university's computing facilities and the College's computer-aided engineering laboratory facilities as part of their regular coursework. Specific features of the curricula reflect the input of the Industrial Advisory Boards, composed of leaders in local industry as well as selected faculty members. Many of the engineering science and engineering design courses have laboratory components. Study of the ethical issues that confront those in the practice of engineering and the need for professional registration are an important part of the curriculum. In addition, many students pass the Engineer in Training Examination (EIT) before they graduate. As a result of this "learn by doing" environment, graduates of the College continue to be in great demand by industry in southern California, helping Cal Poly Pomona fulfill its mission of service to the people of California.

Departments host chapters of national professional societies and/or honor societies appropriate to their disciplines. Honor societies include Tau Beta Pi (engineering), Tau Alpha Pi (technology), Sigma Gamma Tau (aerospace), Omega Chi Epsilon (chemical), Chi Epsilon (civil), Eta Kappa Nu (electrical), Alpha Pi Mu (industrial), and Pi Tau Sigma (mechanical). In addition, chapters of the following cross-disciplinary organizations are active: the Institute of Robotics Engineers; Society of Women Engineers; National Society of Black Engineers; Society of Hispanics in Science and Engineering; and the American Indian Science and Engineering Society.

### A Partnership in Engineering Education

Recognizing that the professional education of students is a partnership of faculty, staff, administrators and students, the college has identified the responsibilities and obligations needed for this partnership to succeed. Each student of the college is expected to obtain a personal copy of the college's "Engineering Orientation Handbook" from the student's department office and to be cognizant of the information discussed therein. That document is not meant as a substitute for the personal advising of students which can occur only in face-to-face discussions, but it should help promote an understanding of the fundamental operating tenets that an engineering education at Cal Poly Pomona incorporates.

All constituencies of the College of Engineering should know and understand both the academic policies of the college as explained in that document and the academic policies of the University as explained in the University Catalog. In many cases, the policies of the College of Engineering are rather strict interpretations of University policy, in keeping with the high standards expected by the faculty, students and the engineering profession, as a whole, of themselves.

Students in the college are expected to bring to this partnership a willingness to learn and demonstrate their mastery of the subject material, an appropriate attitude regarding the seriousness of their studies, and an appreciation of the value of their education. Throughout their academic careers in the college, they should acquire not only the expertise that can be learned in a classroom, but also an esteem for the profession, a maturity of manner, a respect for colleagues, and a credo to guide both personal and professional behavior. These qualities are what makes a graduate of the Cal Poly Pomona's College of Engineering desirable.

Faculty are expected to bring to the partnership the experiences of having been students themselves and then having practiced in the profession, acquiring the expertise that only practice can perfect, and an eagerness to enthusiastically share this expertise with students. The faculty are committed to seeing students succeed. Excellence in the teaching/learning enterprise is the primary goal of the faculty. It is the faculty of the College of Engineering that is primarily responsible for developing and maintaining an environment supportive of learning for each student and for encouraging each student to reach for and achieve the highest goals possible. Faculty members provide academic advising of worth, maintain the announced office hours, teach the stated content of each course and evaluate student performance fairly and consistently.

The College of Engineering expects its students to display the intent and motivation to graduate and to achieve their stated degree objectives as optimally as possible. Operationally, the college has the same goals and offers the most expensive undergraduate curricula in the university as optimally as possible. It is only with the students, faculty and staff working hard together in the partnership, and with mutual respect, that the common goal of excellence in preparation for the engineering profession can be achieved.

### Preparation For The Engineering Culture

Professional engineering practice has evolved through a millennia-long technological tradition and, as is true of other professions, now consists of a set of standardized characteristics and modes of behavior; it is a culture in an anthropological sense. This "Engineering Culture" has as its particular responsibility not only the maintenance and development of technical knowledge for the larger society, but also the codes of conduct and practice for the application of that knowledge within the larger society. It has its own language, its own operating principles, its own beliefs and its own ethics, all of which are extensions of those of the larger society. The members of this culture assume the responsibility for the welfare of the larger society in matters technological, and are characterized by their advanced and unique analytical and constructive abilities.

The College of Engineering at California State Polytechnic University, Pomona has as its primary mission the preparation of students for entry into the engineering culture. The College recognizes the credo of the professional engineer and, as part thereof, that society's safety and well-being demand that engineering professionals practice their craft with diligence. As educators, the faculty know that professional diligence mirrors personal diligence. Accordingly, the faculty of the College of Engineering, while subscribing to the academic policies of the university, also feel dutybound to expect their students and themselves to answer to the set of high academic standards corresponding to those of the engineering culture.

Hence, for a student within the College of Engineering to successfully complete the curriculum efficiently, with pride and with maturity, the student must not only have mastered technical knowledge and skills, but also must have been diligent in attending to the details of his/her individual progress through the program. The student must satisfy the bureaucratic details of his/her own program in a timely, well-planned manner. The student has the responsibility for his/her own progress and is expected to serve as his/her own primary advocate. Furthermore, an engineering student is expected to be mature enough to accept and to deal with the consequences of his/her own actions and inactions.

Some students who complete their engineering studies discover that their professional interests lie elsewhere and redirect their career objectives. There are numerous examples indicating that an engineering education remains an excellent preparation for all areas of professional practice because of the analytical and critical reasoning abilities that are instilled and because of the principled behavior that engineering demands. Thus the policies of the College of Engineering are intended to provide a framework for developing appropriate modes of conduct no matter what career a student pursues.

### Student Success Center

The Student Success Center serves multiple roles concurrently. It is the college repository for articulation agreements with the community colleges; it is the source of information regarding the college's academic policies and procedures (i.e. dropping classes, general academic petitions, withdrawing from the university, changing majors, disqualification and readmission, and Open University); it is intended to be the point of contact for extra-college inquiries. Over and above these purposes, the Center is intended to provide at least one person available to listen and talk with students, and to advocate for them if necessary. The Center exists to make students' lives easier as they progress toward graduation and to help faculty help students to become more responsible for their actions/inactions. Please note that the faculty and departments retain principal responsibility for academic advising and that the Center is a supplement, not an alternate, to the faculty-based advising system.



### MEP Maximizing Engineering Potential

The MEP is an academic community of over 650 American Indian, African American, and Latino students in engineering and computer science interested in achieving at the highest level both academically and professionally. A special three-quarter orientation course (EGR 110, 111/A, and 112L) helps the transition to campus. Members receive priority consideration for the Academic Excellence Workshops. Specially selected faculty advisors help assure the students' successful completion of the regular program of studies. Professional engineers and computer scientists serve as actively involved role models while providing practical information about career opportunities. The MEP Study Center provides a friendly environment in which the students can study together, talk with MEP staff, secure tutorial assistance, and find out about special MEP and club activities, field trips, summer job opportunities and scholarships.

### Academic Excellence Workshops

Academic Excellence Workshops, administered through MEP, are supplements to certain foundation courses in chemistry, mathematics, physics, and engineering and are open by invitation only. Participants in MEP and SEES in the College of Science receive priority consideration. The Workshop program promotes technical excellence in the subject area while also developing communications skills and building an academic community under the guidance of a trained facilitator. An invitation to participate should be regarded as an honor and a unique opportunity.

### Engineering Interdisciplinary Clinic

The Engineering Interdisciplinary Clinic (EIC) performs fixed-price contract applied research for outside agencies, corporations and

utilities. Interdisciplinary teams of students, faculty and company liaisons utilize problem analysis, effective communications and cooperative teamwork to provide quality solutions to actual technical problems faced by the public and private sectors. The EIC is dedicated to providing an innovative capstone experience for the EIC students that integrates theoretical and experiential education in preparation for their engineering careers. The intent of the EIC experience is to enhance the personal, intellectual and professional development of students and faculty while providing quality solutions responsive to the technological needs of industry and society.

### Engineering Transfer Credit Policy

The Evaluations Office will no longer automatically give students credit for courses in which they have received a "C-" or less even if those courses articulate with core or support courses for the major. Students must request credit for those courses through the General Academic Petition process. The Evaluations Office will give credit for "C-" (or below) transfer courses only with an approved petition. Specific details about this policy are available from academic advisors and from engineering department offices.

### General Education Requirements in the College of Engineering

Because of the high-unit nature of all curricula in the College of Engineering, the pattern of General Education course requirements is different than the "standard" pattern discussed earlier. The following table summarizes the GE requirements for each curriculum in the College of Engineering. Specific details are available from academic advisors and from department offices.





## 1997-98 General Education Requirements College of Engineering

	Area 1	Area 2		Area 3		Area 4	Area 5
<b>ARO</b>	ENG 104 (4) COM 204 (4) ENG 105 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>MAT 317, 318 (3,3)</u>	3a. Elective* (4) 3b. <u>PHL 201 (4)</u> 3c. UD or LD Elective* (4)	3d. <u>EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. <u>PSY 201 (4)</u>	PLS 201 (4) HST 202 (4)	<u>ECE 353/355L (3/1)</u> <u>ECE 354/356L (3/1)</u>
<b>CME</b>	ENG 104 (4) COM 100 or COM 204 (4) ENG 105 or PHL 202(4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>CHM 121L, CHM 122L (1,1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>CHM 316 (3)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EGR 403 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>CHM 311, 312 (3,3)</u> <u>UD MTE Elect. (4)</u>
<b>CE</b>	ENG 104 (4) COM 204 (4) CE 361 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>PHY 152L, 153L (1,1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>IME 301 (3) or STA 309 (3)</u>	3a. Elective (4) 3b. Elective (4) 3c. UD or LD Elective (4)	3d. <u>CE 301 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. <u>PSY 201 (4)†</u>	PLS 201 (4) HST 202 (4)	<u>GSC 321 (4)</u> <u>MHR 318* (4)</u>
<b>ECE</b>	ENG 104 (4) COM 204 (4) ECE 311 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>PHY 152L (1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>ECE 302 (4)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC 201 or EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>EGR 402 (4)</u> <u>EGR 403 (4)</u>
<b>ET</b>	ENG 104 (4) COM 204 (4) ENG 105 or PHL 202 (4)	2a. <u>MAT 130 (4)</u> 2b. <u>PHY 121/141L (4)</u> <u>PHY 142L, 143L (1,1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>STA 309 (3)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC 201 or EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. <u>PSY 201 (4)†</u>	PLS 201 (4) HST 202 (4)	<u>EIT 305 or ETC 301 (4)</u> <u>EGR 402 or MHR 318* (4)</u>
<b>IE and MFE</b>	ENG 104 (4) COM 204 (4) ENG 105 or PHL 202 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>PHY 152L, 153L (1,1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>IME 301 (3) or STA 309 (3)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC 201 or EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>EGR 402 (4)</u> <u>EGR 403 (4)</u>
<b>ME</b>	ENG 104 (4) COM 204 (4) ME 231 (4)	2a. <u>MAT 114 (4)</u> 2b. <u>CHM 121/121L (3,1)</u> <u>CHM 152L (1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>ME 330 (4)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC 201 or EC 202 (4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>EGR 403 (4)</u> <u>ECE 333/383L (4)</u>
<b>MTE</b>	ENG 104 (4) COM 100 or COM 204 (4) ENG 105 or PHL 202(4)	2a. <u>MAT 114 (4)</u> 2b. <u>PHY 131/151L (4)</u> <u>CHM 121L (1)</u> 2c. <u>BIO 110 (3)</u> 2d. <u>CHM 305 (3)</u>	3a. Elective* (4) 3b. Elective* (4) 3c. UD or LD Elective* (4)	3d. <u>EC201 or EC202(4)</u> 3e. & 3f. <u>SOC/PLS 390 (4)</u>	3g. Elective* (4)	PLS 201 (4) HST 202 (4)	<u>EGR403 (4)</u> <u>UD BUS Elect. (4)</u>

• All programs in the College of Engineering are nationally accredited by the Accreditation Board for Engineering and Technology (ABET) and engineering curricula are required to satisfy both ABET national requirements and, concurrently, CSU general education requirements. In order to achieve this, underlined courses double-count in satisfying both major and general education requirements. All coursework can be satisfied through course substitution via a General Academic Petition, or via articulation as appropriate. All non-underlined coursework can, in addition, be satisfied via GE certification from a community college. • Because of ABET requirements in the life sciences, degree credit for any course other than BIO 110 (Area 2c) requires a General Academic Petition. • (\*) denotes a course that could be used to satisfy the Cal Poly Pomona requirement in American Cultural Perspectives. • † indicates that PSY 201 is a prerequisite for MHR 318 in Area 5.

## COLLEGE OF ENGINEERING MINORS

### ENERGY ENGINEERING MINOR

John R. Biddle, Chair, Mechanical Engineering  
 William E. Mortensen, Aerospace Engineering  
 A. George Stoll, Chemical and Materials Engineering  
 Donald G. Wells, Civil Engineering  
 Alexander E. Koutras, Electrical and Computer Engineering  
 John D. O'Neil, Industrial and Manufacturing Engineering  
 George F. Engelke, Mechanical Engineering

The purpose of this minor is to provide students in the programs of the College of Engineering and the Physics department of the College of Science a flexible, interdisciplinary program of study in the emerging and important field of energy engineering. The minor is designed to encourage engineering study and applied research directed toward society's energy needs. The multidisciplinary scope of the minor includes study of all energy sources (fossil, solar, geothermal, nuclear and others), energy conversion and transfer systems, efficient energy utilization (including conservation strategies) and environmental implications.

There is an increasing need for technically qualified and informed graduates in the utilization and development of new sources of energy for society. Currently there are many courses in the various engineering disciplines related to this field. By having these courses offered together in a minor program, the graduate will be able to emphasize this important technical area and be better able to accept meaningful technical positions in energy industries.

Completion of the following courses is required:

Thermodynamics . . . . .	ME	301	(4)
or Chemical and Materials Engineering			
Thermodynamics I . . . . .	CHE	302	(4)
or Thermal Physics . . . . .	PHY	333	(4)
Energy Management . . . . .	ME	306	(4)
Alternative Energy Systems . . . . .	ME	307	(4)

The remainder of the 24 units required for the minor will be selected from:

Air Pollution Control . . . . .	ARO	418	(4)
Solid Waste Management . . . . .	CE	457	(3)
Chemical Engineering Thermodynamics II . . . . .	CHE	303	(3)
Pollution Abatement . . . . .	CHE	432/433L	(4)
Ocean Engineering . . . . .	EGR	430	(4)
Capital Allocation Theory . . . . .	EGR	403	(4)
Control Systems Engineering . . . . .	ECE	309	(4)
Thermodynamics . . . . .	ME	302	(4)
Solar Thermal Engineering . . . . .	ME	407	(4)
Nuclear Engineering . . . . .	ME	408	(4)
Kinetic Theory/Statistical Thermodynamics . . . . .	ME	409	(4)
Energy and the Environment . . . . .	PHY	340	(4)
Advanced Nuclear Physics . . . . .	PHY	404	(4)
Production Engineering I . . . . .	MFE	324L	(3)
Production Engineering II . . . . .	MFE	325L	(3)
Industrial Engineering Design . . . . .	IE	429L	(4)
Industrial Engineering Systems . . . . .	IE	437	(3)

### ILLUMINATION ENGINEERING MINOR

David L. Clark, Chair, Electrical and Computer Engineering  
 Kamran Abedini, Industrial and Manufacturing Engineering  
 George F. Engelke, Mechanical Engineering

The purpose of the minor in Illumination Engineering is to help meet the need for advanced lighting expertise in the state of California, both for professionals in the field and engineers who want to provide advanced expertise so sorely needed. Lighting is a significant part of the energy being used in the state. Training engineers with expertise in lighting will provide a healthy basis for the myriad of lighting applications where energy efficient designs and technologies are important. The minor is designed to be appropriate for students in the physical sciences and engineering and engineering technology. The required course in area V is an approved elective in all engineering disciplines.

Completion of one course from each of Areas I through IV and two courses from Area V is required with a minimum unit requirement of 24 units.

#### AREA I (Human Factors)

Fundamentals of Human Factors			
Engineering/Laboratory . . . . .	IE	225/225L	(3/1)

#### AREA II (Optics/Light)

General Physics/Laboratory . . . . .	PHY	234/254L	(3/1)
Applied Optics . . . . .	PHY	344	(4)

#### AREA III (Energy Conservation)

Energy Management . . . . .	ME	306	(4)
Applied Heating and Air Conditioning . . . . .	ETM	334	(4)

#### AREA IV (Lighting Design)

Interior Design II . . . . .	HE	320/320A	(3/3)
Stage Lighting . . . . .	TH	332/332L	(2/1)

#### AREA V (Lighting Technology)

Illumination Engineering (required) . . . . .	ECE	490/490L	(4/1)
Lamp Design/Manufacture . . . . .	MTE	490/490L	(4)
Lighting Controls/Design . . . . .	ECE	492	(4)
Luminaries Design/Manufacture . . . . .	IE	490/490L	(3/1)

### MATERIALS SCIENCE AND ENGINEERING MINOR

Julie M. Schoenung, Chair, Chemical and Materials Engineering  
 William E. Mortensen, Aerospace Engineering  
 Ronald L. Carlyle, Civil Engineering  
 John Palmer, Electrical and Computer Engineering  
 John D. O'Neil, Industrial and Manufacturing Engineering  
 Hassan M. Rejali, Mechanical Engineering

Materials Science and Engineering is the discipline that is concerned with studying the relationships among the properties and performance of materials to their structures. The College of Engineering provides a minor in Materials Science and Engineering to the student who satisfactorily completes the 24-unit requirement within his/her major curriculum. The minor is appropriate for all engineering and science majors.

The goal of the materials scientist is to understand and improve the properties of materials while that of the materials engineer is to apply this knowledge in the production, selection and utilization of materials. Since engineers or scientists are called upon to work with new ideas and materials, the broadly trained graduate has an ability to respond to such a challenge.

Students pursuing this minor are particularly encouraged to become active in the student chapters of ASM International and SAMPE.

Completion of the following courses is required:

Materials Science and Engineering . . . . .	MTE	207	(3)
or Engineering Materials. . . . .	ME	225	(4)

Materials Science and Engineering Lab . . . . .	MTE	317L	(1)
or Materials Science and Selection Lab . . . . .	ME	350L	(1)
Strength of Materials . . . . .	ME	218	(3)
or Introduction to Structural Mechanics . . . . .	ARO	326	(4)
Strength of Materials Lab . . . . .	ME	220L	(1)
or Aerospace Structures Lab . . . . .	ARO	357L	(1)
Chemical and Materials Engineering			
Thermodynamics I . . . . .	CHE	302	(4)
or Thermodynamics . . . . .	ME	301	(4)
MTE electives . . . . .	MTE	XXX	(11-12)

### OCEAN ENGINEERING MINOR

George F. Engelke, Chair, Mechanical Engineering  
 Christopher L. Caenepeel, Chemical and Materials Engineering  
 Donald G. Wells, Civil Engineering  
 Dennis Fitzgerald, Electrical and Computer Engineering

Ocean Engineering is a cross-disciplinary field dealing with all aspects of the marine environment. Subjects emphasized include marine structures, marine vehicles, marine chemistry, marine ecology, coastal and marine engineering. The Ocean Engineering minor has access to the research facilities of the CSU Ocean Studies Institute (OSI) and the 80-foot Research Vessel YELLOWFIN. Cal Poly Pomona facilities include a fleet of general purpose and instrumented craft, and the Fluids Laboratory.

The minor in Ocean Engineering is available to any engineering student. Some engineering majors may be able to acquire much of this minor within the framework of their normal degree requirements through careful substitution of certain requirements.

The attainment of a minor in Ocean Engineering is accomplished by appropriate selection, timely scheduling, and satisfactory completion of certain required and elective-type courses, totaling a minimum of 24 units, as outlined below:

Completion of the following courses is required:

Introduction to Ocean Engineering . . . . .	EGR	230	(2)
Ocean Electronics . . . . .	ECE	434	(4)
Ocean Engineering . . . . .	EGR	430	(4)
Oceanography . . . . .	GSC	335	(4)
Introduction to Marine Biology . . . . .	BIO	220	(4)
or Marine Ecology . . . . .	BIO	442	(5)

The remainder of the 24 units required for the minor will be selected from:

Coastal Engineering . . . . .	CE	455	(4)
Underwater Sound . . . . .	EGR	437	(4)
Special Problems for UD Students . . . . .	EGR	400	(1-2)
Special Topics . . . . .	EGR	499	(1-4)
Corrosion Chemistry . . . . .	CHM	446	(4)
or Corrosion and Material Degradation . . . . .	MTE	401	(3)
Coastal Processes . . . . .	GSC	338	(4)
Welding Fabrication and Design . . . . .	MTE	337	(3)
Skin and Scuba Diving . . . . .	PE	231	(3)

### Departments, Majors, Minors, and Degrees

#### GRADUATE STUDIES

Elhami T. Ibrahim, Director, Master of Science in Engineering, Master of Science in Electrical Engineering

#### AEROSPACE ENGINEERING

William E. Mortensen, Bachelor of Science in Aerospace Engineering

#### CHEMICAL AND MATERIALS ENGINEERING

Julie M. Schoenung, Chair, Bachelor of Science in Chemical Engineering, Bachelor of Science in Materials Engineering

#### CIVIL ENGINEERING

Y. Cheng, Chair, Bachelor of Science in Civil Engineering

Options in General Civil Engineering, Environmental Engineering, and in Surveying Engineering

#### ELECTRICAL AND COMPUTER ENGINEERING

Y. Cheng, Chair, Bachelor of Science in Electrical Engineering

#### ENGINEERING TECHNOLOGY

Gerald K. Herder, Interim Chair, Bachelor of Science in Engineering Technology, Bachelor of Science in Construction Engineering Technology, and Bachelor of Science in Electronics and Computer Engineering Technology.

#### INDUSTRIAL AND MANUFACTURING ENGINEERING

Abdul B. Sadat, Chair, Bachelor of Science in Industrial Engineering, Bachelor of Science in Manufacturing Engineering

#### MECHANICAL ENGINEERING

George F. Engelke, Chair, Bachelor of Science in Mechanical Engineering

#### ENERGY ENGINEERING MINOR

John R. Biddle, Chair, Energy Engineering Committee

#### ILLUMINATION ENGINEERING MINOR

David L. Clark, Chair, Illumination Engineering Committee

#### MATERIALS SCIENCE AND ENGINEERING MINOR

Julie M. Schoenung, Chair, Materials Science and Engineering Committee

#### OCEAN ENGINEERING MINOR

George F. Engelke, Chair, Ocean Engineering Committee

### College of Engineering Courses

All students in engineering and engineering technology curricula must satisfy ENG 104 prior to enrolling in any 300-level or higher course in the College of Engineering.

All EGR 500- and 600-level courses are listed in the graduate section of this catalog.

#### EGR 101L Laboratory Safety Orientation (1) (CR/NC)

Individualized introduction to the laboratories and shops of the College of Engineering and to the use and care of the equipment. Discussions and demonstrations of responsible and safe conduct. Discussion of fasteners, pipe and tube fittings, and electrical wiring. Safety test must be passed prior to credit being awarded. Credit is not applicable to a degree in the College of Engineering. 3 hours laboratory.

#### EGR 102L Laboratory Practices and Procedures (2) (CR/NC)

Instruction tailored to the needs of the individual student and includes safe practices and procedures. Intended for students requiring

mechanical skills not acquired through the standard curricula. Projects require the use of laboratory and/or shop facilities. Credit is not applicable to a degree in the College of Engineering. 3 hours laboratory. Prerequisite: EGR 101/101L or consent of the instructor.

### **EGR 110 Engineering Orientation (3)**

Introduction to the resources of the College of Engineering; the expectations of the departments and the college; elementary problem-solving, including dimensional analysis; time management and study techniques required by technical majors. The first of a three-course sequence. Priority to students in the MEP. 3 lectures/problem-solving.

### **EGR 111/111A Engineering Career Exploration (1/1)**

Introduction to the fields and career opportunities in engineering and computer science; expectations of first professional position; resume writing and interviewing techniques. Development of different engineering projects; building, testing, evaluating, and making presentations on results. The second of a three-course sequence. Priority given to students in the MEP. 1 hour lecture, 1 two-hour activity.

### **EGR 112L MEP Engineering Career Exploration II (1)**

Introduction to the work environment in engineering and computer science; site visits. The third of a three-course sequence. Priority given to students in the MEP. 1 three-hour lab.

### **EGR 120 Introduction to Engineering (4)**

Role of engineers in society; career opportunities in engineering; use of mathematics and the physical sciences to solve engineering problems; the design process; use of computers in engineering applications. 4 lecture discussions. Prerequisite: high school course in College Algebra.

### **EGR 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### **EGR 230 Introduction to Ocean Engineering (2)**

Instruction in boat safety, nautical Rules of the Road, coastal navigation, and boat handling; operation in coastal ocean waters using Cal Poly Pomona's trailerable boats with 3D sonar systems and other equipment. 2 lectures/problem-solving. Prerequisite: consent of instructor.

### **EGR 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: consent of instructor.

### **EGR 301 The Search for Solutions (4)**

A study of the development of society using technology as the prime indicator of the maturing of civilizations. Expansion of the theme that technology has been and continues to be central to society's advances, satisfying life-support demands, and allowing the arts to develop. Discussion of the growth of technology and factors guiding its future growth. 4 lecture discussions. Prerequisites: completion of General Education Area 2a, b, and c requirements.

### **EGR 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### **EGR 402 Ethics and Engineering Decision-Making (4)**

Team-taught. Explores the ethics of engineers: values, ethical theory and practice, moral reasoning, morality in law and codes, professional standards and societies. Case studies. Open only to engineering majors, others as space permits with the consent of the instructors. 4 lecture discussions. Prerequisites: senior standing and satisfaction of the GWT.

### **EGR 403 Capital Allocation Theory (4)**

Economic theory of capital budgeting decisions. Current and relevant views of engineering economists used to present a unified theory of capital allocation appropriate to private, public and governmental entities. Quantitative analytical methods in formulating business decision models. Integrated application of economic and operations analysis to managerial problem-solving and decision-making processes. Study of effects of inflation and tax consequences on economic decisions. 4 one-hour lecture discussions. Prerequisites: EC 201 or EC 202, or consent of instructor, at least junior standing.

### **EGR 430 Ocean Engineering (4)**

The engineering major is acquainted with the wide variety of physical and other factors involved when carrying out engineering tasks associated with the marine environment. Working cruises are made in the 80-foot R/V YELLOWFIN. Topics covered include: ocean and harbor wave actions; ocean basins, currents, and tides; ocean chemistry and physical characteristics; marine biology and fouling; wave and wind loads; ocean energy sources; deep ocean mining and drilling; navy ship systems, surface craft, remotely operated vehicles; marine corrosion, preservation; icing, thermal factors; shock, vibration; human factors; engineering requirements and documentation. 4 lectures/problem-solving. Prerequisite: upper division standing in the College of Engineering or consent of the instructor.

### **EGR 437 Underwater Sound (4)**

Principles of underwater sound propagation and reception. The sonar equation. Transducer design and calibration. 4 lectures/problem-solving. Prerequisite: upper division standing and permission of the instructor.

### **EGR/SCI 460 Problems in Oceanographic Studies (3-5)**

Course offered in conjunction with the CSU Ocean Studies Institute (OSI). Topics vary each term. May be repeated as needed. Prerequisites: upper division standing and permission of instructor required.

### **EGR 461, 462, 463 Engineering Interdisciplinary Clinic I, II, III (3), (3), (3)**

Collaborative efforts among the College of Engineering and external clients. Interdisciplinary teams of students, faculty, consultants, and client liaisons develop a project plan that must be implemented. Project results are reported to clients in formal and written reports. Credit for the entire sequence EGR 461, 462, and 463 substitutes for senior project and seminar. Prerequisites: consent of both the EIC director and the student's department chair.

### **EGR 470, 471, 472, 473 Cooperative Education (2-4 each)**

Four quarters of full-time industry work experience of a nature that relates academic engineering theory to practice. Prerequisite: junior standing and approval of department co-op coordinator.

### **EGR 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: permission of instructor.



## AEROSPACE ENGINEERING

William E. Mortensen, Chair

Ali R. Ahmadi

Gabriel G. Georgiades

Traditionally the aerospace engineer has been involved with the design and development of high speed vehicles such as aircraft, missiles and spacecraft. In recent years this list has evolved to include ocean vessels and high speed land vehicles as well. The extreme environments in which these vehicles operate have dictated the construction of the most complex engineering systems devised by man and require integration and application of such disparate fields as fluid mechanics and thermodynamics, structural mechanics, control system theory and vehicle dynamics. Often the aerospace engineer is confronted with problems which cannot be fully defined but, in spite of this, which require imaginative and sophisticated solutions.

This accredited program prepares students for careers in aerospace engineering by emphasizing analysis and problem solving; exposure to open-ended problems and design issues and fostering teamwork; communications skills, and individual professionalism. It provides students with a comprehensive education that includes in-depth instruction in aerodynamics, aircraft and spacecraft structures, flight mechanics, orbital mechanics, flight propulsion, and design of aerospace systems. The basic concepts taught in these areas are illustrated and reinforced by applications taken from current industrial practice. The advanced engineering (applied mechanics, computer applications, systems analysis) techniques, which have been pioneered by the aerospace industry, are a mainstay of the program. The linking of theoretical and practical knowledge is exemplified in facilities available for experimental studies which include subsonic and supersonic wind tunnels, environment simulation equipment, and a flight structures laboratory.

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

Graduates of the program are prepared to do productive work in their first job as well as to grow with their profession. The Department is aiming to educate those who will succeed at entry level positions in the Aerospace industry and succeed at national graduate programs.

Aerospace engineering students are encouraged to become active in the student branch of the American Institute of Aeronautics and Astronautics, a national society organized for the advancement of aerospace knowledge. Qualified students are invited to join the student chapter of Sigma Gamma Tau, the aerospace engineering honor society.

### CORE COURSES FOR MAJOR

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

Introduction to Aerospace Engineering I	ARO	101L	(1)
Introduction to Aerospace Engineering II	ARO	102L	(1)
Introduction to Aerospace Engineering III	ARO	103L	(1)
Aerospace Engineering Computer Graphics/Lab	ARO	127/L	(2)

Fundamentals of Systems Engineering	ARO	201L	(1)
Fundamentals of Aeronautics	ARO	202L	(1)
Fundamentals of Astronautics	ARO	203L	(1)
Fluid Mechanics	ARO	301	(4)
Subsonic Aerodynamics	ARO	305	(4)
Astronautics	ARO	309	(3)
Gas Dynamics	ARO	311	(3)
Aerospace Propulsion Systems	ARO	312	(4)
Aerospace Feedback Control Systems	ARO	322/L	(4)
Introduction to Structural Mechanics	ARO	326	(4)
Aerospace Structural Mechanics	ARO	327	(3)
Aerospace Structural Analysis and Design	ARO	329	(3)
Fluid Mechanics/Heat Transfer Lab	ARO	351L	(1)
Aerodynamics and Propulsion Lab	ARO	352L	(1)
Aerospace Structures Laboratory	ARO	357L	(1)
Heat, Mass and Moment Transfer	ARO	401	(4)
High-Speed Aerodynamics	ARO	404	(3)
Aerovehicle Stability and Control	ARO	405	(4)
Dynamics of Aerospace Systems	ARO	406	(4)
Senior Project	ARO	461	(2)
Senior Project	ARO	462	(2)
Introduction to Vehicle Design	ARO	491	(3)
Vehicle Design I Lab	ARO	492L	(2)
Vehicle Design II Lab	ARO	493L	(2)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Thermodynamics	ME	301	(4)
Advisor Approved Electives			(16)

### SUPPORT AND ELECTIVE COURSES

(Required of all students)

General Chemistry	CHM	121/L	(4)
General Chemistry	CHM	122/L	(4)
Analytic Geometry and Calculus II	MAT	115	(4)
Analytic Geometry and Calculus III	MAT	116	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
Materials Science	MTE	207	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Laboratory	PHY	152L	(1)
General Physics Laboratory	PHY	153L	(1)

### GENERAL EDUCATION COURSES

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3, and 4 available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

#### Area 1:

Freshman English I	ENG	104	(4)
Freshman English II	ENG	105	(4)
Advocacy and Argument	COM	204	(4)

#### Area 2:

<u>Analytical Geometry and Calculus</u>	MAT	114	(4)
<u>Laplace Transforms and Fourier Series</u>	MAT	317	(3)
<u>Mathematical Analysis of Engineering Problems</u>	MAT	318	(3)
Life Science	BIO	110	(3)
<u>General Physics</u>	PHY	131/151L	(4)

#### Area 3:

Area 3A Elective+			(4)
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Introduction to Philosophy .....	PHL	201	(4)
Area 3C Elective+ .....			(4)
Principles of Economics .....	EC	202	(4)
* Political Sociology .....	SOC/PLS390		(4)
General Psychology .....	PSY	201	(4)

**Area 4:**

Introduction to American Government .....	PLS	201	(4)
United States History .....	HST	202	(4)

**Area 5:**

<u>Computer Electronics I</u> .....	ECE	353/355L	(4)
<u>Computer Electronics II</u> .....	ECE	354/356L	(4)

\*Course counted in multiple categories

+One course of these indicated must satisfy the American Cultural Perspectives requirement.

All underlined courses satisfy both major and GE requirements.

**COURSE DESCRIPTIONS**

All students in engineering and engineering technology curricula must satisfy ENG 104 prior to enrolling in any 300-level or higher course in the College of Engineering.

**ARO 101L Introduction to Aerospace Engineering I (1)**

Aircraft theme. History of aircraft development; characteristics of current aircraft. Contributions of aerospace engineering to society. Generation of lift. Stress in aircraft structures. Preliminary aircraft sizing. 1 three-hour laboratory. Corequisite: MAT 114 or mathematics course preliminary to MAT 114.

**ARO 102L Introduction to Aerospace Engineering II (1)**

Spacecraft theme. History of spacecraft development; characteristics of current spacecraft. The role of the aerospace engineer in industry, government and the university. Trajectories and orbits. Spacecraft structures and materials. Satellite configuration. 1 three-hour laboratory. Corequisite: MAT 114 or mathematics course preliminary to MAT 114.

**ARO 103L Introduction to Aerospace Engineering III (1)**

Propulsion theme. History of aircraft engine and rocket development; characteristics of current aircraft and rocket engines. Ethical factors, standards and expectations in aerospace engineering. Generation of thrust. Structure of propulsion systems. Materials for propulsion systems. Propulsion system performance. 1 three-hour laboratory. Corequisites: MAT 114 or mathematics course preliminary to MAT 114.

**ARO 127/L Aerospace Engineering Computer Graphics/Laboratory (1/1)**

Computer-aided graphics and engineering design fundamentals. Projection Theory, sectional and auxiliary views, dimensioning, tolerancing and fastening devices. Airplane general arrangement, layout, and inboard profile drawings. Use of AUTOCAD. 1 lecture-problem solving session; 1 three-hour laboratory.

**ARO 201L Fundamentals of Systems Engineering (1)**

History and purpose of systems engineering. Needs analysis; consideration of social, economic and environmental factors. System-design process. Role of the engineer in system design. Program planning and control. Engineering documentation. System-design exercise. 1 three-hour laboratory. Prerequisites: MAT 116, PHY 132/152L. Corequisite: PHY 133/153L.

**ARO 202L Fundamentals of Aeronautics (1)**

Aircraft manufacturing methods. Aerodynamic drag. Aircraft controls and piloting techniques. Aircraft performance. Aeroelasticity concepts. Preliminary aircraft structural design. 1 three-hour laboratory. Prerequisite: ARO 101L. Corequisite: MAT 115.

**ARO 203L Fundamentals of Astronautics (1)**

Spacecraft manufacturing methods. Spacecraft mission analysis. Spacecraft guidance and control techniques. Booster design. Boost and reentry trajectory simulation. Problems of hypersonic flight. 1 three-hour laboratory. Prerequisite: ARO 102L. Corequisite: MAT 116.

**ARO 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lectures/problem-solving, laboratory, or a combination. Prerequisite: permission of instructor.

**ARO 301 Fluid Mechanics (4)**

Properties of the continuum. Control volume and control surface concepts. Inertial and noninertial systems. Potential flow theory. Development and application of the Navier-Stokes equations. Boundary layer theory. 4 lectures/problem-solving. Prerequisites: MAT 216, ME 215. Corequisite: MAT 318.

**ARO 305 Subsonic Aerodynamics (4)**

Chordwise and spanwise wing-loading. Pressure, induced, and skin friction drag. Drag polars. Blade element theory. Helicopter rotor aerodynamics. Fuselage aerodynamics. Performance (energy methods); steady flight, accelerated flight, take-off and landing. 4 lectures/problem-solving. Prerequisite: ARO 301.

**ARO 309 Astronautics (3)**

Space Environment. Mission design environment. Propulsion. Spacecraft attitude control. Thermal control. Configuration and structural design of space vehicles. 3 lectures/problem-solving. Prerequisite: ME 215.

**ARO 311 Gas Dynamics (3)**

Thermodynamic processes. One-dimensional flow, area change, friction heat addition. Normal and oblique shock waves. Nozzle and diffuser theory. Boltzmann distribution; microscopic description of gases; microstates; partition function; properties of high temperature gases. 3 lectures/problem-solving. Prerequisite: ARO 301.

**ARO 312 Aerospace Propulsion Systems (4)**

Systems analysis of the fuel burning performance of aircraft powerplants. Aerothermodynamics of inlets, combustors and nozzles. Cycle analysis. Turbomachines. Emphasis on turboprop, turbojet, turbofan, and ramjet. 4 lectures/problem-solving. Prerequisite: ARO 311.

**ARO 322/L Aerospace Feedback Control Systems/Laboratory (3/1)**

Mathematical models of systems. Feedback control systems: characteristics, performance, stability. Root locus method. Frequency response methods. Stability in the frequency domain. Time domain analysis. Design and compensation of aerospace feedback control systems. 3 lectures/problem-solving; 1 three-hour laboratory. Prerequisite: MAT 317.

**ARO 326 Introduction to Structural Mechanics (4)**

Vector statics for equilibrium. Engineering material properties, elasticity,

environmental effects. Uniaxial, two- and three-dimensional states of stress and strain. Shear and moment diagrams, beam flexural and shear stresses. 4 lectures/problem-solving. Prerequisites: ME 214, MAT 116.

#### **ARO 327 Aerospace Structural Mechanics (3)**

Flexural loading, elastic curve deflections, statically indeterminate beams, plastic analysis, theories of failure fatigue design, column and instability theory. Applications to aerospace structures. 3 lectures/problem-solving. Prerequisite: ARO 326.

#### **ARO 328 Aerospace Structures (4)**

Aerospace structural analysis in the design process. Semi-monocoque structures. Energy methods in structural analysis. 4 lectures/problem-solving. Prerequisite: ARO 327.

#### **ARO 329 Aerospace Structural Analysis and Design (3)**

Work and energy methods. Numerical analysis and introduction to the finite element method. Thin plate theory and structural stability. Elastic and aeroelastic instabilities. Design of Aerospace structures. 3 lectures/problem-solving. Prerequisite: ARO 327.

#### **ARO 351L Fluid Mechanics and Heat Transfer Laboratory (1)**

Selected experiments concerning the fundamentals of incompressible fluid mechanics and conduction, convection, and radiation heat transfer. 1 three-hour laboratory. Prerequisites: ARO 301, 305. Corequisite: ARO 401.

#### **ARO 352L Aerodynamics and Propulsion Laboratory (1)**

Selected experiments in low-speed aerodynamics, gas dynamics, high-speed aerodynamics and propulsion using subsonic and supersonic wind tunnels. 1 three-hour laboratory. Prerequisites: ARO 305, ARO 311. Corequisite: ARO 312, ARO 404.

#### **ARO 357L Aerospace Structures Laboratory (1)**

Experimental stress analysis, strain gages and photoelasticity. 1 three-hour laboratory. Prerequisite: ARO 327.

#### **ARO 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **ARO 401 Heat, Mass and Momentum Transfer (4)**

Transport properties. Transfer of momentum and energy in laminar and turbulent boundary layers. Energy transfer by conduction, convection and radiation. Heat exchangers. Solar radiation. Mass transfer, molecular diffusion. 4 lectures/problem-solving. Prerequisite: ARO 301.

#### **ARO 402 Numerical Methods (4)**

Numerical methods in engineering. Algorithms. Interpolating polynomials, difference formulas, numerical differentiation and integration. Matrix methods. Non-linear systems. Solution of differential equations. Applications to engineering problems. 4 lectures/problem-solving. Prerequisite: MAT 216, working knowledge of high-level computer language.

#### **ARO 404 High-Speed Aerodynamics (3)**

Effects of compressibility; two-dimensional and conical supersonic flow fields; similarity concepts; solution of wave equations; shock expansion theory. 3 lectures/problem-solving. Prerequisite: ARO 311.

#### **ARO 405 Aerospace Vehicle Stability and Control (4)**

Airplane equations of motion. Stability derivatives. Static Stability. Airplane controls. Dynamic stability. Transfer functions. Airplane response and simulation. Flying qualities. 4 lectures/problem-solving. Prerequisites: ARO 305, 322.

#### **ARO 406 Dynamics of Aerospace Systems (4)**

Three-dimensional vector dynamics of aerospace systems; linear and angular momentum; Lagrangian dynamics; method of Euler; introduction to space vehicle motion. 4 lectures. Prerequisites: ME 215, MAT 318.

#### **ARO 407 Flight Dynamics (4)**

Three dimensional rigid body motion methods of Newton and Lagrange. Euler transformations. Performance analysis of aircraft, missiles and spacecraft. 4 lectures/problem-solving. Prerequisites: ARO 305, 406, MAT 317.

#### **ARO 408 Introductory Finite Element Structures (4)**

Matrix operations. Stiffness and flexibility methods. Finite element properties. Computer applications. 4 lectures/problem-solving. Prerequisite: ARO 327.

#### **ARO 409 Astrodynamics (4)**

Space environment. Kepler's laws of motion and satellite orbits, orbital transfers. Space vehicle motion, de-spinning of satellites. Performance and optimization of single and multistage rocket. 4 lectures/problem-solving. Prerequisite: ARO 406.

#### **ARO 412 Wing Theory (4)**

Potential flow theory. Complex mappings; Kutta-Joukowski transformation. Chordwise pressure distributions; thin airfoil theory. Sectional force and moment coefficients. Symmetric and asymmetric spanwise loading; basic and additional lift effects. Twist. Wing force and moment coefficients. High lift devices. 4 lectures/problem-solving. Prerequisite: ARO 305.

#### **ARO 414 Rocket Propulsion Systems (4)**

Principles of rocket propulsion. Combustion chemistry. Liquid-fuel rocket engines. Solid-fuel rocket engines. Electrical propulsion. 4 lectures/problem-solving. Prerequisite: ARO 311.

#### **ARO 418 Air Pollution Control (4)**

Application of engineering concepts to atmospheric pollution problems. Combustion. Reaction kinetics. Diffusion. Atmospheric emissions; particulate, gaseous. Atmospheric boundary layer. Plume rise. Photochemical smog. Control concepts. Air quality modeling. 4 lectures/problem-solving. Prerequisites: ARO 301, ME 301.

#### **ARO 419 Computational Fluid Dynamics (4)**

Development of numerical techniques for the solution of partial differential equations that arise in fluid mechanics gas dynamics and heat transfer; classification of equations, methods of solutions; examples. 4 lectures/problem-solving. Prerequisite: ARO 301 and a working knowledge of a high-level computer language and graphics. Corequisite: ARO 311.

#### **ARO 420 Introduction to Engineering Management (4)**

Elements of management. Organization of corporations, engineering groups, and government agencies. Utilization of marketing and internal research funds. Program management. Participative management.

Managing technical personnel. Career enhancement. 4 lectures/problem-solving.

#### **ARO 421 Helicopter Aerodynamics(4)**

The development of rotary-wing aircraft and the helicopter. Review of blade element/momentum theory; hovering and vertical flight theory; autorotation; performance in forward flight. 4 lectures/problem-solving. Prerequisite: ARO 305.

#### **ARO 422 Advanced Aerospace Control Systems (4)**

Review of classical controls. Control system design. Compensators. Nonlinear systems. Describing functions. 4 lectures/problem-solving. Prerequisite: ARO 322.

#### **ARO 426 Aerospace Surface Systems (4)**

Aerospace fundamentals of high speed surface systems. Station-to-station concepts. Air cushion and tubeflight systems. Airload determination. Drag reduction. Propulsion systems and braking. Guideway considerations. Stability and control. 4 lectures/problem-solving. Prerequisite: ARO 301.

#### **ARO 427 Aeroacoustical Noise (4)**

Scales and units of noise measurement. Sources and characteristics of aircraft noise. Traffic and vehicular noise. Airport noise. Noise abatement; aircraft, road vehicles, airports, highways. Sonic boom effects. 4 lectures. Prerequisite: ME 301.

#### **ARO 431 Intermediate Finite Element Structures (4)**

Structural dynamics, structural stability and advanced elements in the finite element method. Basic theory will be augmented strongly by computer applications. 4 lectures/problem-solving. Prerequisite: ARO 408.

#### **ARO 435L Experimental Techniques in Aerodynamics (2)**

Test plan formulation. Pressure, temperature and force measurement. Test section calibration and correction. Subsonic and supersonic wind tunnel applications. 2 three-hour laboratories. Prerequisites: ARO 305, 311.

#### **ARO 436 Mechanics of Composite Materials (4)**

Mechanical behavior of composite materials. Stress/strain relations in anisotropic materials. Strength criteria and stiffness. Interlaminar stresses. Systems applications. Bending, buckling and vibration of laminated plates. 4 lectures/problem-solving. Prerequisite: ARO 327.

#### **ARO 461, 462 Senior Project (2) (2)**

Selection and completion of an aerospace engineering project, including a literature search and use of one or more of the following approaches: theoretical, computational or experimental. Project results presented in a final, formal individual report. Project to be arranged by the student with an appropriate Aerospace Engineering faculty member who is the project supervisor. Minimum of 120 hours total time. Prerequisite: consent of Instructor.

#### **ARO 491 Introduction to Vehicle Design (3)**

Design philosophy. Ethics. Environmental considerations. Trade-off studies. Manufacturing, facilities, cost. Aircraft, spacecraft, ground vehicles. 3 lectures/problem-solving. Prerequisites: ARO 305, ARO 309, ARO 329, ARO 404. Corequisite: ARO 405.

#### **ARO 492L Vehicle Design Laboratory I (2)**

Conceptual and preliminary design of vehicles. Design trade-offs in multidisciplinary systems. Verbal and written presentations of system design. 2 three-hour laboratories. Prerequisite: ARO 491.

#### **ARO 493L Vehicle Design Laboratory II (2)**

Completion of ARO 492L design project. Preparation of final report on the project together with an oral briefing to an industrial review panel. 2 three-hour laboratories. Prerequisite: ARO 492.

#### **ARO 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: consent of instructor.



## CHEMICAL AND MATERIALS ENGINEERING

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The Department of Chemical and Materials Engineering is actively pursuing outcomes assessment to evaluate its effectiveness in promoting student learning and achieving its educational goal and objectives. The department welcomes input on the following statement of our educational goal and objectives.

The goal of the Chemical and Materials Engineering Department is to prepare baccalaureate graduates with the skills necessary to contribute through their professional careers to a highly technical society that is global in scope. The Philosophy of the Chemical and Materials Engineering Department is to provide a strong theoretical foundation coupled with practical application of that knowledge, which is consistent with the missions of the College of Engineering and the University.

The educational objectives of the Chemical Engineering and Materials Engineering Programs are to develop the abilities of our students.

- A. to solve chemical or materials engineering problems through the application of engineering fundamentals and the use of engineering tools;
- B. to understand practical aspects of engineering including the abilities to design and conduct experiments and to analyze and interpret both experimental and production data;
- C. to apply their theoretical and practical knowledge to the design of engineering systems, components, and processes;
- D. to function as practicing engineers including the ability to communicate effectively, work collaboratively, learn independently, and act ethically in their professional duties; and
- E. to understand contemporary issues and the impact of engineering solutions on society.

### CHEMICAL ENGINEERING

Chemical Engineering is the branch of engineering that embraces the development and application of industrial processes which involve chemical and physical changes of material. These processes must be accomplished in a competitive economy and in an environmentally safe manner to create products which are useful and essential to the modern world. Chemical Engineering includes the design, development, and production of many products such as fuels and petrochemicals, plastics, fibers, paper, foods, building materials and pharmaceuticals. A chemical engineering degree is also good preparation for careers in pollution prevention or waste minimization.

This accredited program blends the basic sciences with engineering science and design to focus upon the design, development and engineering of industrial processes and plants. Students are well prepared upon graduation to begin either their professional career or a program of graduate study.

The chemical engineering curriculum in addition to a sound foundation in general education includes basic courses in chemistry, physics, mathematics, and materials, electrical, industrial, and mechanical

engineering. In addition, coursework in the major includes computer programming, engineering statistics, material and energy balances, transport phenomena, unit operations and processes, thermodynamics, kinetics, reactor design, and pollution abatement. The design aspect of chemical engineering is present throughout the curriculum and culminates in the senior-level, three-quarter capstone design sequence. Senior project opportunities enable students to develop essential planning, experimenting and reporting skills in subjects of their choice. Extensive laboratory and computerized test facilities exist for process and materials investigations, as well as complete pilot plant scale equipment for extended development and confirmatory studies.

Students desiring to major in Chemical Engineering should have a particularly high aptitude for science and mathematics, and first-time college students should have taken substantial college preparatory courses in these disciplines in high school including one year of chemistry. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly Pomona. The community college student planning to transfer into this department should consult a school counselor or this department to determine which courses meet the program requirements.

Chemical and Materials Engineering students are encouraged to become active in the student chapters of the American Institute of Chemical Engineers, ASM International and SAMPE. Qualified students are invited to join the student chapter of Omega Chi Epsilon, the chemical engineering honor society.

### CORE COURSES FOR MAJOR

Required of all students. A 2.0 cumulative GPA is required in core courses in order to receive a degree in the major.

Introduction to Chemical and Materials Engineering			
Engineering	.CHE	131L	(1)
Computer Programming	.CHE	132/142L	(3)
Chemical and Materials Engineering			
Data Treatment	.CHE	133	(2)
Stoichiometry I	.CHE	201/211L	(3)
Stoichiometry II	.CHE	202/212L	(3)
Applied Mathematics in Chemical and Materials Engineering			
Materials Engineering	.CHE	301	(3)
Chemical and Materials Engineering			
Thermodynamics I	.CHE	302	(4)
Chemical Engineering			
Thermodynamics II	.CHE	303	(3)
Kinetics and Reactor Design Chemical Engineering			
Engineering	.CHE	304	(4)
Computer Applications Laboratory	.CHE	310L	(1)
Momentum Transport	.CHE	311	(4)
Energy Transport	.CHE	312/322L	(4)
Mass Transport	.CHE	313/333L	(4)
Unit Operations I	.CHE	425/435L	(4)
Process Control	.CHE	426	(3)
Unit Operations II and Process Control Laboratory	.CHE	436L	(1)
Pollution Abatement and Hazardous			
Materials Management	.CHE	432/433L	(4)
Chemical Processes	.CHE	441/451L	(4)
Chemical Process Synthesis and Design I	.CHE	442/452L	(4)
Chemical Process Synthesis and Design II	.CHE	443/453L	(4)
Senior Project	.CHE	461	(2)
Senior Project	.CHE	462	(2)
Undergraduate Seminar	.CHE	463	(2)
Chemical Engineering Electives	.CHE	4XX	(3)

**SUPPORT COURSES**

General Chemistry	CHM	121	(3)
General Chemistry	CHM	122	(3)
General Chemistry	CHM	123	(3)
Physical Chemistry	CHM	313	(3)
++ Organic Chemistry	CHM	314/317L	(4)
++ Organic Chemistry	CHM	315/318L	(4)
Elements of Electrical Engineering	ECE	231/251L	(4)
Analytic Geometry/Calculus II	MAT	115	(4)
Analytic Geometry/Calculus III	MAT	116	(4)
Calculus of Several Variables I	MAT	214	(3)
Calculus of Several Variables II	MAT	215	(3)
Differential Equations	MAT	216	(4)
Vector Statics	ME	214	(3)
Strength of Materials	ME	218	(3)
Materials Science and Engineering	MTE	207/317L	(4)
General Physics	PHY	132/152L	(4)
General Physics	PHY	133/153L	(4)

**GENERAL EDUCATION COURSES**

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3, and 4 available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

**Area 1:**

Select from approved list (12)

**Area 2:**

Analytic Geometry and Calculus	MAT	114	(4)
General Chemistry Laboratory	CHM	121L	(1)
General Chemistry Laboratory	CHM	122L	(1)
++ Organic Chemistry	CHM	316	(3)
Life Science	BIO	110	(3)
General Physics	PHY	131/151L	(4)

++ Community College course credit in Organic Chemistry which has been approved by the Department of Chemistry will be accepted for these courses.

**Area 3:**

3A Elective+			(4)
3B Elective+			(4)
3C Elective+			(4)
3D Elective or Capital Allocation Theory	EGR	403	(4)
*3E and 3F Political Sociology	SOC/PLS	390	(4)
3G Elective.			(4)

**Area 4:**

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

**Area 5:**

Physical Chemistry	CHM	311	(3)
Physical Chemistry	CHM	312	(3)
MTE upper division elective	MTE	xxx	(4)

\*Course counted in multiple categories

+One course of those indicated must satisfy the American Cultural Perspectives requirement.

**MATERIALS ENGINEERING**

Recent studies have identified advanced materials as a key technology critical to the stability of the U.S. economy. The development of more

efficient engines, faster computers, and lighter aircraft that can travel at faster speeds is dependent on our abilities to improve currently available materials and to develop novel materials. Advances in materials also find immediate application in consumer products such as automobiles, sports equipment, home appliances, and medical implants. Furthermore, new and improved materials permit product differentiation in the market place. As a result, materials engineering is an enabling technology, which opens wider the window for possible advances in other fields, and is vital to remaining competitive in the world economy.

The curriculum for the Materials Engineering program has been developed with specific goals in mind, as stated in the Mission Statement:

The Materials Engineering program will educate and prepare students to become professionals who combine an understanding of engineering materials with the engineering design process. The curriculum will expose students to a broad spectrum of basic and engineering science disciplines. Materials processing, testing, and selection will be taught in the context of product design and implementation. Through integration and participation with industry, students will achieve an understanding of how products are developed, manufactured, and commercialized.

The focus of this program is on the processing, application, selection, and use of materials, or materials engineering design. Students are well prepared upon graduation to begin their professional career or a program of graduate study.

The materials engineering curriculum, in addition to a sound foundation in general education, includes basic courses in chemistry, physics, mathematics, and electrical, industrial, manufacturing, and mechanical engineering. Advanced courses in science and business are an integral part of the program. Coursework in the major includes computer programming, engineering statistics, material and energy balances, transport phenomena, thermodynamics, and kinetics, as well as material science, metallurgy, polymers, ceramics, composites, corrosion, fracture, and materials joining. The design aspect of materials engineering is present throughout the curriculum and culminates in the senior-level, two-quarter capstone materials selection and design sequence. Elective courses in physical metallurgy, materials characterization, and advanced electronic materials are also offered. The materials engineering laboratories include facilities for metallography, heat treating, mechanical properties testing, particle size analysis, and advanced materials processing.

Students desiring to major in Materials Engineering should have a particularly high aptitude for science and mathematics, and first time college students should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus, one year of college physics (with laboratory), and one year of college chemistry (with laboratory) prior to beginning the program at Cal Poly Pomona. The community college student planning to transfer to this department should consult a school counselor or this department to determine which courses meet the program requirements.

Materials Engineering students are encouraged to become active in the student chapters of ASM International and SAMPE.

**CORE COURSES FOR MAJOR**

Required of all students. A 2.0 cumulative GPA is required in core courses, in order to receive a degree in the major.

Introduction to Chemical and Materials Engineering	CHE	131L	(1)
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Computer Programming	CHE	132/142L	(3)
Chemical and Materials Engineering			
Data Treatment	CHE	133	(2)
Stoichiometry I	CHE	201/211L	(3)
Stoichiometry II	CHE	202/212L	(3)
Undergraduate Seminar	CHE	463	(2)

#### Transport Sequence (Pattern A or B) (15)

Pattern A:			
Applied Math in Chemical Engineering	CHE	301	(3)
Chemical and Materials Engineering			
Thermodynamics	CHE	302	(4)
Momentum Transport	CHE	311	(4)
Energy Transport	CHE	312/322L	(4)
or			
Pattern B:			
Vector Dynamics	ME	215	(4)
Thermodynamics	ME	301	(4)
Fluid Mechanics	ME	311	(3)
Heat Transfer	ME	415	(4)

Materials Engineering in Industry	MTE	205L	(1)
Materials Science & Engineering	MTE	207	(3)
Materials Science and Engineering Laboratory	MTE	317L	(1)
Advanced Science of Materials	MTE	327/L	(4)
Mechanical Metallurgy	MTE	320/L	(4)
Kinetic Processes in Materials	MTE	338	(3)
Materials Joining and Laboratory	MTE	337/L	(3)
Polymer Engineering and Laboratory	MTE	303L	(4)
Ceramic Materials and Laboratory	MTE	407/L	(4)
Corrosion and Materials Degradation	MTE	401	(3)
Materials Selection and Design I	MTE	420/L	(3)
Materials Selection and Design II	MTE	430/L	(3)
MTE upper division electives	MTE	4XX	(8)
Approved technical elective			(4)
Fracture and Failure Analysis	MTE	422	(3)

#### SUPPORT COURSES

Engineering Graphics I	MFE	126/L	(3)
General Chemistry	CHM	121	(3)
General Chemistry	CHM	122/L	(4)
General Chemistry	CHM	123/L	(4)
Analytical Geometry and Calculus II	MAT	115	(4)
Analytical Geometry and Calculus III	MAT	116	(4)
Calculus of Several Variables I	MAT	214	(3)
Calculus of Several Variables II	MAT	215	(3)
Differential Equations	MAT	216	(4)
General Physics	PHY	132	(3)
General Physics Laboratory	PHY	152L	(1)
General Physics	PHY	133	(3)
General Physics Laboratory	PHY	153L	(1)
Vector Statics	ME	214	(3)
Strength of Materials	ME	218	(3)
Strength of Materials Laboratory	ME	220L	(1)
Elementary Electrical Engineering	ECE	231/251L	(4)
Elements of Physical Chemistry	CHM	305	(3)

#### GENERAL EDUCATION COURSES

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3, and 5 available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

#### Area 1: (12 units)

Select from approved list (12)

#### Area 2: (16 units)

Analytical Geometry and Calculus I	MAT	114	(4)
General Physics	PHY	131	(3)
General Physics Laboratory	PHY	151L	(1)
General Chemistry Laboratory	CHM	121L	(1)
Life Science	BIO	110	(3)
Elements of Physical Chemistry	CHM	304/304A	(4)

#### Area 3: (24 units)

3A Elective			(4)
3B Elective			(4)
3C Elective			(4)
Principles of Economics	EC 201 or 202		(4)
Political Sociology***	SOC/PLS 390		(4)
3G Elective			(4)

\*\*\*Course counted in multiple categories and satisfies two requirements.

#### Area 4: (8 units)

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

#### Area 5: (8 units)

Capital Allocation Theory	EGR	403	(4)
Upper Division Business/MHR Elective			(4)

#### CHEMICAL ENGINEERING COURSE DESCRIPTIONS

All students in engineering and engineering technology curricula must satisfy ENG 104 prior to enrolling in any 300-level or higher course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

#### CHE 131L Introduction to Chemical and Materials Engineering (1)

An introduction to chemical and materials engineering. Use of the personal computer to facilitate better professional communication. 1 three-hour laboratory.

#### CHE 132/142L Computer Programming with Chemical and Materials Engineering Applications/Laboratory (2/1)

Introductory course in structured programming covering computer systems, flowcharts, Input/Output, arrays, data files and subroutines. Students will master programming by solving chemical and materials engineering problems in areas such as stoichiometry, fluid mechanics, heat and mass transfer. 2 lectures/problem-solving, 1 three-hour computational laboratory.

#### CHE 133 Chemical and Materials Engineering Data Treatment (2)

Introductory course in elementary statistics using data from Chemical Engineering experiments. Statistical and linear analysis heavily dependent on computer methods. 2 lectures/problem-solving. Prerequisite: CHE 132/142L.

#### CHE 201/211L Stoichiometry I/Laboratory (2/1)

Material balances for physical and chemical processes. Use of process flow diagrams for plant mass balance calculations. Solving multicomponent mass balance, simple and multiple mixing or separation problems, and chemical reaction problems including recycle and equilibrium. Practice in report writing and oral presentation of chemical process concepts. 2 lecture/problem solving, 1 three-hour computational laboratory. Prerequisites: CHE 132, 142L, CHM 123, MAT 115.

**CHE 202/212L Stoichiometry II/Laboratory (2/1)**

Energy balances for physical and chemical processes. Equilibrium stage concept, process flow diagrams and process simulators for plant energy balance calculations. Practice in report writing and oral presentation of chemical process concepts. 2 lecture/problem solving, 1 three-hour computational laboratory. Prerequisites: C- or better in CHE 201/211L.

**CHE 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**CHE 301 Applied Mathematics in Chemical and Materials Engineering (3)**

A study in the application of derivative and integral concepts to solving chemical and materials engineering problems. Use of first-order ordinary differential equations to solve transient materials and energy balances. Phase equilibrium concepts for solving binary distillation and liquid-liquid extraction problems. 3 lectures/problem-solving. Prerequisites: CHM 123, MAT 216, C- or better in CHE 202/212L.

**CHE 302 Chemical & Materials Engineering Thermodynamics I (4)**

Macroscopic thermodynamics, the study of energy and its transformations, as it applies to the field of materials in the gaseous, solid and liquid state. First and second law, property relationships, equilibrium, electrochemistry, solutions and mixing, phase rule and phase diagrams. An introduction to microscopic thermodynamics or statistical thermodynamics, as it applies to the understanding of the macroscopic properties and behaviors of solids. 4 lectures/problem-solving. Prerequisites: MTE 207, PHY 132, C- or better in CHE 202/212L and MAT 215. Corequisite: CHM 304/304A or CHM 311.

**CHE 303 Chemical Engineering Thermodynamics II (3)**

Phase equilibria of ideal and non-ideal systems. Concepts of fugacity, activity, and activity coefficient. Calculation of thermodynamic properties from laboratory data. Enthalpy changes of mixing. Heat engines, heat pumps, steam power plant, refrigeration cycles. Chemical reaction equilibria. Thermodynamic design of process involving phase equilibria. 3 lectures/problem-solving. Prerequisites: CHE 302.

**CHE 304 Kinetics and Reactor Design (4)**

Chemical reaction kinetics of homogeneous and heterogeneous systems. Analysis of kinetic data. Reactor design, including batch, mixed flow, and plug flow reactors. 4 lectures/problem-solving. Prerequisites: CHE 303. CHE 310L

**CHE 310L - Chemical Engineering Computer Applications Laboratory (1)**

Introduction to software applications solving chemical engineering problems. Introduction to process simulators with applications to unit operations of chemical engineering. 1 three-hour computational laboratory. Prerequisites: CHE 302, C- or better in MAT 215.

**CHE 311 Momentum Transport (4)**

Basic course in fluid mechanics with emphasis on real fluids and applications to unit operations of chemical engineering, including topics in dimensional analysis, fluid properties, kinematics, and dynamics of fluid flow, friction, boundary conditions, and piping design. 4 lectures/problem-solving. Prerequisites: ME 214, ENG 104 or ENG 102 and 103, C- or better in MAT 215, 216, and CHE 301. Corequisite: CHE 302.

**CHE 312/322L Energy Transport/Laboratory (3/1)**

Heat transfer with application to the unit operations of chemical engineering, including topics in energy transfer by conduction, convection and radiation, and heat exchanger design. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisites: CHE 133, 302, 311 and a score of 6 or better on GWT.

**CHE 313/333L Mass Transport/Laboratory (3/1)**

Mass transfer and its application to the unit operations of chemical engineering, including topics in molecular diffusion, convective diffusion, simultaneous heat and mass transfer, and process design of distillation and absorption towers. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: CHE 312/322L, 303.

**CHE 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: permission of instructor.

**CHE 425/435L Unit Operations I/Laboratory (3/1)**

Treatment of mass, momentum and heat transport viewed with the traditional unit operations emphasis. Multicomponent and multiphase systems are considered, with some problems involving design. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: all required CHE 300-level courses.

**CHE 426 Process Control (3)**

Introduction to theory, design, and application of automatic control systems to chemical and physical processes. 3 lectures/problem-solving. Prerequisites: all required CHE 300-level courses.

**CHE 427/437L Unit Operations II/Laboratory (3/1)**

A continuation of the unit operations approach to mass, momentum and heat transfer with emphasis on collaborative design. 3 lectures. 1 three-hour laboratory. Prerequisites: all required CHE 300-level courses, CHE 425/435L.

**CHE 432/433L Pollution Abatement and Hazardous Materials Management/Laboratory (3/1)**

Identification and development of solutions to problems created in the environment by modern industry. Topics in air pollution, water pollution, and solid waste. Group project involving a comprehensive study and preliminary design, including cost analysis. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CHE 312 & CHM 316, Corequisite CHE 313.

**CHE 436L - Unit Operations II and Process Controls Laboratory (1)**

Experimental study of chemical engineering unit operations and their control using pilot scale equipment. Typical systems studied include those involving heat transfer, distillation, absorption, humidification, power generation, and chemical reactions. 1 three-hour laboratory. Prerequisites: CHE 426, CHE 425/435L.

**CHE 441/451L Chemical Processes Synthesis and Design/Laboratory (3/1)**

Introduction to process design methodology. On-site study of selected process industries. Design problems related to process industries visited. Basic engineering economics including cost estimating. Emphasis in on use of process simulators. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: all required CHE 300-level courses, CHM 312, 315, 318L. Corequisite: CHE 425/435L.



**CHE 442/452L Chemical Process Synthesis and Design II/Laboratory (3/1)**

Design of major equipment common to most chemical industries. Emphasis on how equipment fits together and their interaction integrated process. Optimization strategies and process design. Use of process simulators. 3 lectures/problem-solving and 1 three-hour computational laboratories. Prerequisites: All required CHE 300-level courses, CHE 425/435L. CHE 441/451L.

**CHE 443/453L Chemical Process Synthesis and Design III/Laboratory (3/1)**

Team project to perform process design and cost estimating of a complete plant. Emphasis on team effort, effective communication, plant design procedure, plant management and control. Use of process simulators. 3 lectures/problem-solving, 1 three-hour computational laboratory. Prerequisites: all required CHE 300-level courses, CHE 425/435L, CHE 441/451L and CHE 442/452L.

**CHE 461, 462 Senior Project (2), (2)**

Formal encounter with a professional assignment, simulating the graduate chemical engineer at work and culminating in a final engineering report. Emphasis will be placed on engineering design. Prerequisites: all required CHE 300-level courses, CHM 312, 315, 318L, GPA (major and overall) 2.0 and satisfactory completion of GWT.

**CHE 463 Undergraduate Seminar (2)**

Ethics and professionalism in engineering. This seminar may include research on, and presentation of, recent developments in chemical engineering, and results of senior project work. 2 seminars. Prerequisites: all required CHE 300-level courses and satisfy GWT.

**CHE 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**MATERIALS ENGINEERING COURSE DESCRIPTIONS****MTE 205L Materials Engineering in Industry (1)**

Exploration of modern materials manufacturing process industries. Plant trips to study the processes of the materials conversion industry to practical products and components. Study of the processes involved and the methodology for production, cost reduction, quality, reproducibility, Statistical Process Control (SPC), inventory control, and management. 1 three-hour laboratory. Prerequisites: CHM 112. Corequisite MFE 126/126L.

**MTE 207 Materials Science and Engineering (3)**

Concepts of materials science and the atomic, molecular, and crystalline structures and properties of materials with their relevance to engineering. Mechanical, electrical, thermal, and chemical properties of metals, ceramics, polymers, composites, and semiconductors are covered. 3 lectures/problem-solving. Prerequisites: CHM 122, PHY 131 and MAT 116.

**MTE 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarters. Instruction is by lecture, laboratory or a combination. Prerequisite: permission of instructor.

**MTE 303/303L Polymer Engineering and Lab (3/1)**

Covers both the properties and processing of reinforced and unreinforced plastics emphasizing the behavioral characteristics, structure of plastics, deformation behavior, fracture behavior, processing methods used for polymers, and flow behavior of polymer melts as both Newtonian and Non-Newtonian fluids. 3 lectures/problem-solving, and 1 three-hour laboratory. Prerequisites: MTE 207, ME 220L, and CHE 311 or ME 311.

**MTE 317L Materials Science and Engineering Laboratory (1)**

Crystallography, mechanical properties, annealing, heat treatment and environmental influences on materials. 1 three-hour laboratory. Prerequisite: MTE 207 or equivalent.

**MTE 320/320L Mechanical Metallurgy (3/1)**

A comprehensive exploration of the field of mechanical metallurgy including the continuum description of stress and strain, the flow and fracture of metals from the defect mechanism point of view, the tests used for determining mechanical properties, and the fundamental/analytical techniques applied to the various metalworking processes used in industry. 3 lectures/problem-solving, and 1 three-hour laboratory. Prerequisites: ME 220L, MTE 317L.

**MTE 327/327L Advanced Science of Materials/Laboratory (3/1)**

Advanced concepts of Materials Science and their relevance to engineering. Origin of electronic, thermal, magnetic and optical properties. Applications of electronic, magnetic, and optical materials. 3 lectures, 1 three-hour laboratory. Prerequisites: MTE 317L, PHY 133/153L.

**MTE 328 Thermodynamics of Solids (3)**

Macroscopic thermodynamics, the study of energy and its transformations, as it applies to the field of materials in the solid and liquid state. To be covered in this course are the detailed topics of the first and second law, property relationships, equilibrium, electrochemistry, solutions and mixing, phase rule and phase diagrams. In addition, an introduction to microscopic thermodynamics or statistical thermodynamics will be included as it applies to the understanding of the macroscopic properties and behavior of materials. 3 lectures/problem-solving. Prerequisites: MTE 207 and CHE 202/212L. Corequisites: CHM 304/304A..

**MTE 337/337L Welding Fabrication and Design (2/1)**

Introduction to welding design, including properties and geometry of welded joints. Consideration of thermal effects and previous processing. Application of selected welding processes. Automation related to design. Evaluation methods. Cost factors. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ME 220L, MTE 317L or equivalent.

**MTE 338 Kinetic Processes in Materials (3)**

A second course in the series of applied physical chemistry to the field of materials. Covers the topics of defects in solids, surfaces, interfaces and microstructure, diffusion, diffusional transformations, solidification, diffusionless transformations, reaction kinetics, and non-equilibrium thermodynamics. 3 lectures/problem-solving. Prerequisites: CHE 302 or ME 301, MTE 207 or equivalent.

**MTE 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected

problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: permission of instructor.

### **MTE 401 Corrosion and Materials Degradation (3)**

The study of the field of corrosion engineering and materials degradation is the application of science and art to prevent or control damage from environmental effects economically and safely. To be covered in this course are the practices and principles of corrosion/degradation: the chemical, electrochemical, metallurgical, physical, structural, thermal and mechanical properties of materials; corrosion-testing; the nature of corrosive/destructive environments; the forms of corrosion and degradation, and corrosion/degradation prevention. 3 lectures/problem-solving. Prerequisites: MTE 338 or CHE 303.

### **MTE 403 Production of Inorganic Materials (4)**

Emphasis on the fundamentals of how major inorganic materials are produced using the concepts of thermodynamics, kinetics, transport phenomena, phase equilibria, transformations, process engineering, and surface phenomena to produce the metals, ceramics, and glasses used as starting materials for the remainder of the materials industry. 4 lectures/problem-solving. Prerequisites: MTE 338 or CHE 303, CHE 311 or ME 311.

### **MTE 404 Electronic Materials(4)**

Advanced concepts of electronic materials and their engineering applications. Physical principles, processing, and materials selection for circuits, magnets, transducers, memories, integrated circuits, displays and super conductors. 4 lectures/problem-solving. Prerequisites: MTE 327/L, CHE 302.

### **MTE 405 Physical Metallurgy-Mechanical Properties (4)**

Basic principles underlying the structure and properties of crystalline solids. Metallic and covalent bonding theories; crystallography; solid solutions, intermetallic compounds and alloys. Crystal imperfections, elastic and plastic deformation. Ductile and brittle fracture, fatigue and creep. 4 lectures/problem-solving. Prerequisite: MTE 328 or CHE 302.

### **MTE 406/416L Physical Metallurgy--Solidification and Strengthening Reactions/ Laboratory (3/1)**

Principles of solid-state reactions including elementary kinetics, nucleation and growth theory; annealing of cold-worked metals; diffusionless transformation, precipitation reactions and tempering; physical metallurgy of steels; relation between properties and microstructure. Laboratory experiments related to phase transformations in steel and precipitation hardening. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MTE 328 or CHE 302.

### **MTE 407/407L Ceramic Materials (3/1)**

The composition, structure, and properties of ceramic bodies employed as structural and non-structural materials, with an emphasis on processing and their physical state, elasticity, strength, and optical, thermal, and electrical properties. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: MTE 327, 338.

### **MTE 408/418L Introduction to Composite Materials/Laboratory (3/1)**

Introduction to composite materials engineering processing and mechanics. Properties and processing of fibers and matrices. Polymer matrix composites, metal matrix composites, ceramic composites and carbon/carbon. Lamina and laminate constitutive equations. Laminate strength analysis. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MTE 328 or CHE 302.

### **MTE 420/420L Material Selection and Design I (2/1)**

Integration of the undergraduate program in the basic sciences, engineering sciences, materials engineering, economics, business, and general education in the integrated solution of materials selection and design problems. Analysis, selection, and evaluation of materials and processes in the economic design process. Use of numeric based selection criteria will be emphasized culminating in professional reports and presentations. 2 lecture discussions, and 1 three-hour laboratory/problem-solving. Prerequisites: MTE 407/L, 303/L, 320/L, 337/L, 401.

### **MTE 421 Materials Characterization and Testing (4)**

Complete overview of materials characterization and testing for metals, ceramics, polymers, and composites. Macroscopic characterization of the mechanical, electrical, and optical properties. Microscopic evaluation using x-ray, diffraction, SEM, EDAX, TEM, IR-spectroscopy, and ultrasound evaluation techniques. 4 lectures/problem-solving. Prerequisites: MTE 327/L.

### **MTE 422 Fracture and Failure Analysis (3)**

Failure analysis is the critical first step in identifying a problem that has occurred in a component or structure. This course will study the various types of loading and resultant failure mechanisms of distortion, fracture, wear, and corrosion, so that appropriate initial design or subsequent corrective measures may be taken to prevent future failures. 3 lectures/problem-solving. Prerequisites: MTE 320/320L.

### **MTE 430/430L Material Selection and Design II (2/1)**

Culmination of the undergraduate program in the basic sciences, engineering sciences, materials engineering, economics, business, and general education in the integrated solution of materials selection and design problems. Integrated analysis, selection, and evaluation of materials and processes in the economic design process. Use of numeric-based selection criteria emphasized, culminating in professional reports and presentations. 2 lecture discussions, and 1 three-hour laboratory/problem. Prerequisites: MTE 420/420L.

### **MTE 490 Lamp Design and Manufacture (4)**

Basic principles and material properties used in the design and manufacture of lamps. 4 lectures/problem-solving.

### **MTE 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. . Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

## CIVIL ENGINEERING

Ronald L. Carlyle, Chair

Peter R. Boniface  
Jerome N. Borowick  
Peter J. Clark  
Norman C. Cluley  
Donald P. Coduto  
Hany J. Farran  
Frank J. Janger  
Xudong Jia  
Howard Turner  
Julie Wei  
Donald C. Wells

The accredited program in Civil Engineering prepares graduates to enter the profession in design, construction, or management capacities on such projects as freeways, highways, major buildings, dams, bridges, aqueducts, pipelines, airports, hydro-electric installations, water treatment plants, sewage treatment plants, flood control works, and urban development programs. The department offers three options: the general civil engineering option; the environmental engineering option, and the surveying engineering option, which are separately accredited by ABET.

The general civil engineering option is selected by students desiring a broad background in the various aspects of the civil engineering profession. The environmental engineering option provides the student with a background in the acquisition and uses of water and the ability to solve environmental pollution problems caused by gaseous liquid and solid wastes. The surveying engineering option offers the civil engineering student a background in the surveying profession and in developing precise measurements for the purpose of locating and designing civil engineering projects.

Student projects and field trips are utilized to demonstrate practical applications of classroom and laboratory theory and analysis. Interactions with professional engineering technical groups and societies offer excellent opportunities for student contact with experienced, practicing engineers.

Graduates are employed by governmental agencies at federal, state, and municipal levels and by engineering contractors, private consulting firms and in the areas of sales engineering, teaching, research, materials testing, city planning, and administration fields. Graduates of the program are prepared to do productive work in their first job as well as to develop within their profession throughout their engineering career. The curriculum is designed to prepare a student for direct entry into the engineering profession, professional registration, and for graduate school.

### Program Educational Objectives

The undergraduate Civil Engineering Program at Cal Poly Pomona provides a practical, "hands-on" educational experience for its students that encompasses the following areas of practice in the field of civil engineering -- environmental, geotechnical, highways, structures, surveying, transportation and water resources. The program is organized to:

1. Prepare students for immediate entry into civil engineering practice by providing a background in the fundamental engineering principles, an extensive practical design experience and an opportunity to work in multi-disciplinary teams.
2. Instill in the student an understanding of their professional and ethical responsibilities as civil engineers.

3. Develop the written and verbal skills necessary for students to communicate with other professionals and non-professionals that they will encounter in their future practice of engineering.
4. Provide the student with the necessary background to understand the economic, environmental, societal and cultural impact of engineering solutions on the local, national and global scene.
5. Encourage lifelong learning and prepare the student for graduate work in their chosen field of civil engineering or other fields of interest that they might develop.
6. Encourage students to become registered as professional engineers by teaching them the necessary basics in the engineering fundamentals including mathematics and the physical sciences that will enable them to pass the Fundamentals of Engineering exam.

Civil Engineering students are encouraged to become active in the student chapter of the American Society of Civil Engineers, the Structural Engineers Association of Southern California and the Institute of Transportation Engineers. Qualified students are invited to join the student chapter of Chi Epsilon, the civil engineering honor society.

### Program Educational Objectives

The undergraduate Civil Engineering Program at Cal Poly provides a practical, "hands-on" educational experience for its students that encompasses the following areas of practice in the field of civil engineering - environmental, geotechnical, highways, structures, surveying, transportation and water resources. The program is organized to:

### CORE COURSES FOR MAJOR

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

CAD Engine Concepts	.....CE	127/L	(3)
Elementary Surveying	.....CE	134/L	(4)
Computers in Civil Engineering	.....CE	210/L	(2)
Structural Analysis I	.....CE	304	(4)
Structural Analysis II	.....CE	305	(4)
Structural Materials Laboratory	.....CE	306L	(1)
Geotechnical Engineering I	.....CE	325	(2)
Geotechnical Engineering II	.....CE	326	(3)
Geotechnical Engineering Laboratory	.....CE	327L	(1)
Hydraulic Engineering	.....CE	332/L	(4)
Structural Design--Reinforced Concrete	.....CE	421/422L	(5)
Water Supply Engineering	.....CE	431/L	(4)
Applied Electrical Engineering	.....ECE	232	(3)
Vector Statics	.....ME	214	(3)
Vector Dynamics	.....ME	215	(4)
Strength of Materials	.....ME	218	(3)
Fluid Mechanics	.....ME	311	(3)

### OPTION COURSES FOR MAJOR

(Required for specific option)

### GENERAL CIVIL ENGINEERING

Introduction to Civil Engineering	.....CE	122	(1)
Advanced Surveying	.....CE	220/L	(4)
Highway Engineering Design	.....CE	222/L	(4)
Transportation Engineering	.....CE	223/L	(4)
Computer Programming & Numerical Methods	.....CE	303	(3)
Construction and Engineering Law	.....CE	403	(3)

Structural Design--Steel	.CE	406	(4)
Water Quality Engineering	.CE	432/L	(4)
Structural Design--Timber	.CE	433/L	(3)
Design Project Series	.CE	461,462,463L	
or	.CE	491,492,493	(6)
Technical Electives in Civil Engineering	.CE	XXX	(12)
Thermodynamics	.ME	301	(4)

**ENVIRONMENTAL ENGINEERING**

Aquatic Ecology	.BIO	305	(4)
Introduction to Civil Engineering	.CE	122	(1)
Computer Programming and Numerical Methods	.CE	303	(3)
Environmental Resource Management	.CE	351/L	(4)
Construction and Engineering Law	.CE	403	(3)
Structural Design--Steel	.CE	406	(4)
Water Quality Engineering	.CE	432/L	(4)
Industrial and Hazardous Waste Management	.CE	434/L	(4)
Engineering Hydrology	.CE	451/L	(4)
Groundwater Transport	.CE	456/L	(4)
Coastal Engineering	.CE	455	(4)
Solid Waste Management	.CE	457	(3)
Design Project Series	.CE	461,462,463L	
or	.CE	491,492,493	(6)
Technical Electives in Civil Engineering	.CE	XXX	(4)
Thermodynamics	.ME	301	(4)

**SURVEYING ENGINEERING**

Advanced Surveying	.CE	220/L	(4)
Highway Engineering Design	.CE	222/L	(4)
Surveying Computations	.CE	240	(3)
Geodetic Satellite Surveying	.CE	311/L	(4)
Land Surveying Descriptions	.CE	313	(4)
Geodetic and Electronic Surveying	.CE	320/L	(4)
Boundary Control and Legal Principles	.CE	322	(4)
Public Land Surveys	.CE	331	(3)
Photogrammetry	.CE	427/L	(4)
Engineering Hydrology	.CE	451/L	(4)
Design Project Series	.CE	461,462,464	
or	.CE	491,492,464	(6)
Subdivision Design	.CE	482/L	(4)
Geographical Information Systems	.CE	484/L	(4)

**SUPPORT COURSES**

(Required of all students)

General Chemistry	.CHM	121/L	(4)
General Chemistry	.CHM	122/L	(4)
Analytic Geometry and Calculus II	.MAT	115	(4)
Analytic Geometry and Calculus III	.MAT	116	(4)
Calculus of Several Variables	.MAT	214	(3)
Differential Equations	.MAT	216	(4)
General Physics	.PHY	132	(3)
General Physics	.PHY	133	(3)

**GENERAL EDUCATION COURSES**

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3, and 4 available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

**Area 1:**

Freshman English I	.ENG	104	(4)
Technical Communication and Documentation	.CE	361	(4)

or Freshmen English II	.ENG	105	
Advocacy and Argument	.COM	204	(4)

**Area 2:**

<u>Analytic Geometry and Calculus I</u>	.MAT	114	(4)
<u>General Physics</u>	.PHY	131/151L	(4)
<u>General Physics Lab</u>	.PHY	152L	(1)
<u>General Physics Lab</u>	.PHY	153L	(1)
Life Science	.BIO	110	(3)
<u>Statistical Methods in Engineering</u>	.STA	309	(3)
<u>or Variability and Statistical Approach</u>			
<u>to Engineering Design</u>	.IME	301	(3)

**Area 3:**

3A Elective			(4)
3B Elective			(4)
3C Elective			(4)
<u>Technological Economics</u>	.CE	301	(4)
*3E and 3F Political Sociology	.SOC/PLS	390	(4)
3G General Psychology	.PSY	201	(4)

**Area 4:**

Introduction to American Government	.PLS	201	(4)
United States History	.HST	202	(4)

**Area 5:**

<u>Geotechnology</u>	.GSC	321	(4)
<u>+Multi Organizational Behavior</u>	.MHR	318	(4)

\*Course counted in multiple categories

+One course of those indicated must satisfy the American Cultural Perspectives requirement. All underlined courses satisfy both major and GE requirements.

**COURSE DESCRIPTIONS**

All students in engineering and engineering technology curricula must satisfy ENG 104 prior to enrolling in any 300-level or higher course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

**CE 122 Introduction to Civil Engineering (1)**

Fundamental concepts of civil engineering. The technical, professional, and social responsibilities of the civil engineer. 1 lecture/problem-solving.

**CE 127/127L CAD Engine Concepts (2/1)**

Introduction to the theory of CAD engines in Civil Engineering. Primary, combined and complex elements. CAD engine deliverables. Complex shapes and libraries. Shading and multiple mapping. Group functions and customization. 2 lecture discussions; 1-three hour laboratory.

**CE 134/134L Elementary Surveying/Laboratory (2/2)**

Use and care of surveying instruments, fundamental surveying methods, traverse measurements, area computations, precise equipment, 3D visualization and topographic mapping. 2 lecture discussions, 2 three-hour laboratories. Prerequisite: MAT 106 or equivalent and CE 127/127L.

**CE 210/210L Computers in Civil Engineering/Laboratory (1/1)**

Application and use of the IBM (or clone) personal computer in civil Engineering with emphasis on creating technical reports. Software instruction includes a word processor, a spreadsheet, a graphics program and elemental DOS. Actual use of software applications on an IBM or compatible personal computer with emphasis on creating technical documents. Programming in appropriate language. 1 lecture/problem-solving, 1 three-hour laboratory.



**CE 220/220L Advanced Surveying/Laboratory (3/1)**

Astronomical observations. Theory of hydrographic, geodetic and control surveys. City and land surveys. Route location and layout. Simple, transition and vertical curves. Earthwork computations. Introduction to electronic and photogrammetric methods. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CE 134.

**CE 222/222L Highway Engineering Design/Laboratory (2/2)**

Geometric design of highways; highway sub-structure design; roadway structural section; flexible pavement design; rigid pavement design; highway surface treatments and stabilization. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: CE 220.

**CE 223/223L Transportation Engineering/Laboratory (3/1)**

History and operation of several principal modes of transportation. The principal modes include highways, air, inland waterways, railroads, coastwise shipping and ocean transportation. Emphasis is placed on the financing and planning aspects of transportation. Special modes are also developed. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CE 222 or consent of instructor.

**CE 240 Surveying Computations (3)**

Introduction to the theory of measurements in surveying. Error propagation in horizontal and vertical position. The analysis of surveying measurement errors. Error propagation in rectangular coordinate systems. Introduction to the techniques of least squares in the adjustment of surveying data. Least squares adjustment of triangulation, trilateration and traverse networks. The use of mini-computers in surveying. 3 lectures/problem-solving. Prerequisite: CE 220.

**CE 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limit to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**CE 301 Technological Economics (4)**

Principles of long-range economic analyses. Determination of investment criteria for the practicing civil engineer. Construction and managerial economics: annuities, depreciation, multiple alternatives, replacement, capital budgeting critical path management, accounting. 4 lectures/problem-solving. Prerequisite: junior standing.

**CE 303 Computer Programming and Numerical Methods (3)**

Computer programming in a high level language; numerical and statistical methods as applied to civil engineering. 3 lectures/problem-solving. Prerequisite: ME 218.

**CE 304 Structural Analysis I (4)**

Classification of structures, types of framing systems and loading. Statics and stability of determinate structures including cables, cantilever types, arches, beams, frames, and trusses by analytical and graphical methods. Deformation of determinate beams, frames, and trusses. Approximate methods of indeterminate frame analysis. 4 lectures/problem-solving. Prerequisite: ME 218.

**CE 305 Structural Analysis II (4)**

Types and characteristics of indeterminate beams and framed structures. Analysis utilizing classical methods including consistent displacements, virtual work, slope deflection, moment distribution. Computer solutions

based upon flexibility and stiffness matrices. 4 lectures/problem-solving. Prerequisite: CE 304, and either CE 240 or CE 303.

**CE 306L Structural Testing Laboratory (1)**

Load and deflection testing of full-size beams and small scale beams, frames, and trusses. Use of a data acquisition system to collect and process strain gage and load cell data. 1 three-hour laboratory. Prerequisite: CE 305.

**CE 311/311L Geodesy and Satellite Surveying/Laboratory (3/1)**

Spherical trigonometry; Cartesian and curvilinear coordinates; transformations; geodetic datums; geodetic position computation; major control network extension; satellite and terrestrial positioning system. 3 lectures/problem-solving, 1 three-hour laboratory.

**CE 313 Land Survey Descriptions (4)**

History of land ownership and transfer of title; types of documents of land conveyance; forms of legal descriptions of public and private lands; interpretation of maps and documents for the physical survey location of land boundaries; principles of writing precise land boundary descriptions; study of easements; value of monuments. 4 lectures/problem-solving.

**CE 320/320L Geodetic and Electronic Surveying/Laboratory (3/1)**

Total stations and data collectors; electronic data transfer and interfacing. Triangulation, trilateration and traversing. Precise leveling; astronomy, map projections and state plane coordinates. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: CE 240 and 311.

**CE 322 Boundary Control and Legal Principles (4)**

Boundary retracement principles based on common laws. Emphasis on simultaneous conveyances, rancho lands, resurvey problems, and legal descriptions. 4 lectures/problem-solving.

**CE 325 Geotechnical Engineering I (2)**

Introduction to geotechnical engineering. Soil and rock as engineering materials, soil classification, compacted fill, groundwater, geoenvironmental engineering. 2 lectures/problem-solving. Corequisites: ME 218, ME 311.

**CE 326 Geotechnical Engineering II (3)**

Stresses in soil, consolidation and settlement, soil strength, stability of earth slopes, structural foundations, soil improvement. 3 lectures/problem-solving. Prerequisites: CE 325, ME 218.

**CE 327L Geotechnical Engineering Laboratory (1)**

Application of geotechnical engineering principles to a design project; use of standard soil mechanics laboratory tests. Oral presentation of completed project. 1 three-hour laboratory. Prerequisite: CE 326.

**CE 331 Public Land Surveys (3)**

History of the general practice and rules for the survey of the public lands, the Bureau of Land Management. System of rectangular surveys; monumentation; restoration of lost or obliterated corners; subdivision of sections; special surveys and instructions; field notes; plats and patents; meander lines and riparian rights. 3 lectures/problem-solving.

**CE 332/332L Hydraulic Engineering/Laboratory (3/1)**

Analysis and related design of pressure (pipe) flow. Open channel flow

and special topics for civil engineers. Problems involving basic head loss equations, pipe in series and parallel, pipe networks, critical flow, uniform flow, non-uniform flow, pump stations and culverts. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisite: ME 311.

#### **CE 351/351L Environmental Resource Management/Laboratory (3/1)**

Discussion and analysis of basic environmental skills and selected topics for the environmental engineer. Elements include population projection, curve-fitting, principles of environmental systems, food production, solid waste, energy topics and noise and air pollutions. Labs emphasize field trips. 3 lectures/problem-solving, 1 three-hour laboratory.

#### **CE 361/361L Technical Communication and Documentation (3/1)**

Study and preparation of documents used by the practicing civil engineer. Oral presentations. Proposals and bidding, specifications, environmental impact reports, journalism, technical investigations, test reports, research and development, design reports. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ME 218, junior standing.

#### **CE 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **CE 403 Construction and Engineering Law (3)**

Principles of construction law and interpretation of contract documents. Product liability, professional liability, surveying law, patents. Relationship of owner, engineer and contractor. Interpretation of technical specifications. 3 lectures/problem-solving. Prerequisites: CE 361, senior standing.

#### **CE 406 Structural Design--Steel -- LRFD Method (4)**

Theory and design of structural steel tension members, compression members, beams, beam-columns, simple connections, and eccentric connections. Design philosophies. Probabilistic basis of load and resistance factors. Coverage of the American Institute of Steel Construction Load and Resistance Factor Design (LRFD) specification. 4 lectures/problem-solving. Prerequisite: CE 305.

#### **CE 421 Structural Design-Reinforced Concrete (4)**

Analysis, design and detailing of reinforced concrete structural components including beams, slabs and columns; with emphasis on strength design theory. Elements of integrated building design with primary emphasis on the impact of lateral forces on building stability. Introduction to working stress theory. 4 lectures/problem-solving. Prerequisite: CE 305. Corequisite: CE 422L.

#### **CE 422L Concrete Testing Laboratory (1)**

Composition, proportioning, and testing of concrete mixes. Testing of model reinforced concrete beams. Nondestructive testing of concrete elements for strength, presence of voids and cracks, amount of concrete cover, and size and location of reinforcing bars. 1 three-hour laboratory. Corequisite: CE 421.

#### **CE 424 Foundation and Retaining Wall Design (4)**

Analysis and design of structural foundations and retaining walls considering both geotechnical and structural aspects. Spread footings, piles, drilled shafts, cantilever walls, sheet pile walls. 4 lectures/problem-solving. Prerequisite: CE 327L. Corequisite: CE 421.

#### **CE 427/427L Photogrammetry (3/1)**

Interpretation of aerial photographs. Stereoscopy. Application of aerial surveying to engineering problems, mapping. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CE 134.

#### **CE 428/428L Urban Transportation (3)**

Study and design of transportation in the urban environment - primarily transit; The history, nature of problems, alternative solutions, costs of modernization, mass transit trends, the subsidy debate, role of the State and Federal governments, rideshares planning, ADA services, financial plans, the nature and importance of planning and transit planning process. 3 one-hour lecture-discussion; 1 three-hour laboratory. Prerequisite: CE 223

#### **CE 429/429L Traffic Engineering/Laboratory (3/1)**

Driver and vehicle characteristics. Origin and destination studies. Volume, speed and accident studies. Traffic control devices. Channelization design. Parking facilities design. Intersection design. Roadway lighting. Administration and financing of improvements. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CE 222.

#### **CE 431/431L Water Supply Engineering/Laboratory (3/1)**

Water pollutants and unit process treatment. Subjects include water quality, water uses, aeration, sedimentation, coagulation, flocculation, filtration, softening, disinfection, iron and manganese removal, and saline water conversion. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CE 332.

#### **CE 432/432L Water Quality Engineering/Laboratory (3/1)**

Wastewater characteristics and unit process. Subjects include characteristics of wastewater, sewer design, requirements for disposal, preliminary treatment, biological processes, anaerobic digestion, sludge processing and oxygen sag. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CE 431.

#### **CE 433/433L Structural Design-Timber/Laboratory (2/1)**

Design load requirements. Seismic analysis. Fire resistant requirements. Design of wood structural elements including sawn lumber, glue-laminated timber, and plywood. Connection design. Design of complete structural systems for both vertical and lateral loads. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CE 304.

#### **CE 434/434L Industrial and Hazardous Waste Management/Laboratory (3/1)**

Source and treatment of industrial waste waters. Elements include materials of construction, volume reduction, neutralization, control and instrumentation, removal of suspended solids, common industrial processes. Major project and associated field trip required. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CE 432.

#### **CE 437/437L Slope Stability and Earth Dams/Laboratory (3/1)**

Advanced analysis of soil strength. Evaluation of the stability of earth slopes and design of stable slopes including the use of computer analysis methods. Design and construction of earth dams. Use of soil instrumentation. Field trips. 3 lectures/problem-solving, one 3-hour laboratory. Prerequisite: CE 326.

#### **CE 442 Masonry Design (4)**

Properties of clay brick and concrete masonry materials. Analysis and design of reinforced masonry members, and structural systems with

emphasis on lateral force analysis of masonry structures and their connections. Reinforced masonry applications in high rise construction. 4 lectures/problem-solving. Prerequisite: CE 421.

#### **CE 445 Earthquake Engineering (4)**

Modes of vibration, structural response, observed behavior, and preventive design measures. Implementation of Uniform Building Code and Structural Engineers Association of California requirements. 4 lectures/problem-solving. Prerequisite: CE 406 or CE 421.

#### **CE 451/451L Engineering Hydrology (3/1)**

Precipitation; weather modification; evaporation; infiltration; hydrographs; probability concepts; river and reservoir routing; groundwater; wells; flow nets; dam spillways; and storm drains. 3 lectures/problem-solving, 1 three-hour problem. Prerequisite: CE 332.

#### **CE 456/456L Groundwater Transport, Contamination & Remediation (3/1)**

Darcy's equation, flow equations, well mechanics, source & types of contamination, mass transport equations, advection, dispersion, sorption, numerical modeling, nonaqueousphase liquids, remediation methods. Software: Super Slug, Aquifer Test, FloNet/Trans, WinFlow/Trans, Groundwater Modeling System (Modflow, Modpath, MT3D). 3 one-hour lecture-discussion; 1 three-hour laboratory. Prerequisites: CE 325, CE 332.

#### **CE 457 Solid Waste Management (3)**

Elements include waste generation, storage, collection, transfer, transport, processing, recovery, and disposal. 3 lectures/problem-solving. Prerequisite: junior standing in Civil Engineering or consent of instructor.

#### **CE 461, 462 Senior Design Project (2) (2)**

Synthesis of previous coursework into a Civil Engineering design project. Students complete the project under the supervision of a faculty member. Minimum 120 hours total time. Prerequisites: senior standing and CE 463 or 464.

#### **CE 463/463A Undergraduate Seminar (1/1)**

Class discussions and student assignments relating ethics, career management, and professional development to the civil engineering professional. Professional registration, graduate school and social issues. Formulation of senior project. 1 lecture, 1 two-hour activity. Prerequisites: CE 361, senior standing.

#### **CE 464 Surveying Seminar (2)**

Surveying ethics and liability. Laws pertaining to professional practice, surveying business and research practice, functions of county offices. Planning and design of boundary, architects, ALTA, topographic, condominium and subdivision surveys and plans. 2 discussions. Prerequisites: CE 322, 313 and 331.

#### **CE 476 Bridge Design (4)**

Structural analysis and design of modern bridge structures. Comprehensive study of influence lines and their application to moving loads. Application of AASHTO specifications to bridge design. Design of steel, reinforced concrete and prestressed concrete bridge structures. Introduction to long span cable-stayed and suspension bridges. Aerodynamic performance of bridges under wind loads. Earthquake response of bridges. Bridge infrastructure, maintenance and rehabilitation. 4 lectures/problem-solving. Prerequisites: CE 406, or CE 421 and 422L.

#### **CE 480/480L Advanced Highway Design**

Advanced study of highway and street design, including geometry, drainage, soils, materials, and other topics. Includes development of design drawings using InRoads software. 3 one-hour lecture-discussions; 1 three-hour laboratory. Prerequisites: CE 127, CE 222.

#### **CE 482/482L Subdivision Design (3/1)**

Engineering and surveying methods in land use planning, design, and construction. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: CE 222, CE 332.

#### **CE 484/484L Design of Geographical Information Systems /Laboratory (3/1)**

Introduction to the theory of spatial information systems. Maps as information systems. Spatial information system theory and feedback. Design of data capture models. Design of data display and output models. Design of data storage and data manipulation models. Design of data dissemination models. The design of spatial information systems in engineering practice. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: CE 134/144L.

#### **CE 488 Computer Methods of Structural Analysis (4)**

Development of the flexibility and stiffness methods of structural analysis for trusses, beams, and frames, with emphasis on the stiffness method. Extension of the stiffness method to determine frequencies and mode shapes for use in the Uniform Building Code's dynamic lateral force procedure. Use of a commercially-developed analysis program. 4 lectures/problem-solving. Prerequisite: CE 305

#### **CE 491, 492, 493 Comprehensive Civil Engineering Design I, II, III (2,2,2)**

Completion of a comprehensive design project that encompasses multiple disciplines within civil engineering. Projects are performed in student groups working under faculty supervision. 2 one-hour seminars. Prerequisite for CE 491: CE 406 or CE 431.

#### **CE 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

## ELECTRICAL AND COMPUTER ENGINEERING

Yi Cheng, Chair

Robert L. Bernick	Robert G. Irvine
David L. Clark	Hensley W. Kabisama
Richard H. Cockrum	James S. Kang
Mahmoud Davarpanah	Alexander E. Koutras
M. Samy El-Sawah	Anaiuppam R. Marudarajan
Alan P. Felzer	Mohammad A. Massoudi
Lloyd N. Ferguson, Jr.	Narayan R. Mysoor
Dennis J. Fitzgerald	Norman S. Nise
Laurence D. Graham	Akbar Nouhi
M. Kathleen Hayden	John P. Palmer
Hua K. Hwang	Mohamed Rafiquzzaman
Elhami T. Ibrahim	Toma H. Sacco
	Arthur W. Sutton, Jr.
	Wendy K. Wanderman

The Department of Electrical and Computer Engineering (ECE) offers a Bachelor of Science (B.S.) and a Master of Science in Electrical Engineering M.S.E.E. The B.S. in Electrical Engineering (B.S.E.E.) provides the undergraduate student with a strong core and an opportunity for specialization at the junior and senior level by choosing from a number of Specified Programs of Electives (S.P.E.) Some of the S.P.E.'s offered by the department are Power, Computers, Electronics including analog and digital devices, Controls & Instrumentation including Robotics and Biomedical, Communications & Signal Processing including Analog and Digital, and Illumination Engineering. The M.S. in Electrical Engineering (M.S.E.E) currently offers the graduate student options in Communication Systems, Computer Systems, and Control and Robotics Systems.

The department's principal objective is to provide a sound theoretical background along with current practical engineering knowledge to each student. The accredited undergraduate curriculum includes a large number of laboratories where practical application of classroom theory is experienced by the student. Additionally, a senior project involving design, implementation, and evaluation is required of all undergraduates. A senior project may take the form of team project. The undergraduate student is well-prepared upon graduation to begin either a professional career or a graduate program. The graduate curriculum also provides the student with a choice of laboratories as well as applied research-thesis experiences.

Graduates from the ECE department are in demand by a broad cross-section of the industry, government, public utilities, marketing groups and educational institutions because of the effective integration of theory and practical experience within the curriculum. The students are prepared for employment in design and development, test and evaluation, and applied research.

Students desiring to major in Electrical Engineering should have a high aptitude for science and mathematics, and incoming high school graduates should have taken college preparatory courses in these disciplines. Incoming transfer students should consult an advisor in the ECE department of Cal Poly Pomona to determine which courses meet the program requirements.

Electrical Engineering students are encouraged to become active in the student chapter of the Institute of Electrical and Electronics Engineers as well as many other College of Engineering and University student organizations. Qualified students are invited to join the student chapter of Eta Kappa Nu, the electrical engineering honor society.

## PHYSIOLOGY MINOR

Electrical Engineering students specializing in Biomedical Engineering are encouraged to take the Physiology Minor. See the "University Programs" section of this catalog, or contact David L. Clark for details.

## CORE COURSES FOR MAJOR

Required of all students. A 2.0 cumulative GPA is required in core courses in order to receive a degree in the major.

Introduction to Electrical Engineering	.ECE	109/129L	(4)
C for Engineers	.ECE	114	(3)
Programming Lab for Engineers	.ECE	164L	(1)
Introduction to Digital Systems I	.ECE	204	(4)
Network Analysis I	.ECE	207	(3)
Network Analysis II	.ECE	209	(3)
Electronic Devices and Circuits	.ECE	220	(3)
Introduction to Digital Systems I Lab	.ECE	244L	(1)
Network Analysis I Lab	.ECE	252L	(1)
Network Analysis II Lab	.ECE	253L	(1)
Electronics Lab	.ECE	270L	(1)
Network Analysis III	.ECE	307	(4)
Introduction to Discrete Time Signals & Systems	.ECE	308	(3)
Control Systems Engineering	.ECE	309	(4)
Introduction to Power Engineering	.ECE	310	(4)
Introduction to Communications Engineering	.ECE	315	(4)
Linear Active Circuit Design	.ECE	320	(3)
Introduction to Semiconductor Devices	.ECE	330	(3)
Computer Engineering I	.ECE	341	(4)
Electromagnetic Fields	.ECE	352L	(1)
Computer Simulation of Dynamic Systems	.ECE	357L	(1)
Control Systems Lab	.ECE	359L	(1)
Power Engineering Lab	.ECE	360L	(1)
Basic Active Circuits Lab	.ECE	370L	(1)
Computer Engineering I Lab	.ECE	391L	(1)
Communications Systems	.ECE	405	(4)
Communications Lab	.ECE	445L	(1)
Senior Project	.ECE	461	(2)
Senior Project	.ECE	462	(2)
Undergraduate Seminar	.ECE	463	(2)
or			
Professional Awareness	.ECE	464	(1)
Team Project	.ECE	465	(2)
Team Project	.ECE	466	(2)
Team Project	.ECE	467	(1)
Specified Program of Electives			(20)
(Students select an elective program with advisor's help from table below.)			

## SUPPORT AND DIRECTED ELECTIVES

Analytic Geometry and Calculus	.MAT	115	(4)
Analytic Geometry and Calculus	.MAT	116	(4)
Calculus of Several Variables	.MAT	214	(3)
Calculus of Several Variables	.MAT	215	(3)
Differential Equations	.MAT	216	(4)
Vector Statics	.ME	214	(3)
Vector Dynamics	.ME	215	(4)
Materials Science and Engineering	.MTE	208	(3)
General Physics	.PHY	132	(3)
General Physics	.PHY	133/153L	(4)
General Chemistry	.CHM	121/L	(4)
C&C++ for Programmers	.CS	256	(4)



**SPECIFIED PROGRAM OF ELECTIVES (SPEs)**

20 units for each required, 16 from the shaded areas in one column, with a minimum of 2 labs.  
General SPE requires at least 5 units each from 2 of the SPE columns with the advisor's approval.

ECE Course & Lab	Subject	Units Lecture /Labs	Micro Electron-ics	Comp. Sys.	Comm. & Signal Proces.	Control and Robotic	Instrum. Biomed Ocean	Power Sys.*	Illum. Eng'g.	Radio Freq. Sys.	Gen. SPE
303	Data Structures	4									TBD
317 / 367L	Electromechanics I	4/1									"
318 / 368L	Electromechanics II	4/1									"
322 / 372L	Op. Amps./Feedback Systems	4/1									"
323 / 373L	Instrumentation	3/1									"
325 / 375L	Electronic Digital Design	4/1									"
342 / 392L	Computer Engineering I	4/1									"
343 / 393L	Computer Engineering II	4/1									"
400	SPE Problems	1-2									"
403	Analog Filter Design	4									"
404 / 454L	Robotics	3/1									"
406 / 446L	Fields/Waves in RF/Electromag	3/1									"
407 / 457L	Advanced Circuit Design	3/1									"
408 / 458L	Digital Filter Design	3/1									"
409	Digital Communications	4									"
410 / 460L	Microwave Engineering	3/1									"
412	Solid State Devices	4									"
414 / 444L	Digital Control/Microproc's	3/1									"
418	IC Design	4									"
419 / 489L	Advanced Control Theory	3/1									"
420	Lasers	4									"
421 / 451L	Energy Conservation I	3/1									"
422 / 452L	Energy Conservation II	3/1									"
424 / 474L	State Machine	3/1									"
425 / 475L	Computer Engineering Topics	3/1									"
426 / 476L	Computer Organization	3/1									"
427 / 477L	Advanced Digital Topics	3/1									"
428	Digital Signal Processing	4									"
431 / 481L	Computer Networks	4/1									"
432 / 482L	Microprocessors	3/1									"
434	Ocean Engineering	4									"
435 / 485L	Biomedical Instrumentation	3/1									"
436	Optical Fiber Communications	4									"
448 / 498L	RF Design	3/1									"
468, 478L	Power Electronics I	3/1									"
469, 479L	Power Electronics II	3/1									"
480, 480L	Elec. Machine Design	3/1									"
490, 490L	Introduction to Illumination	4/1									"
492, 492L	Lighting Controls	3/1									"

\*Power systems SPE may require 26 units for the awarding of the Power Systems certificate.

**GENERAL EDUCATION COURSES**

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3, and 4 available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

**Area 1:**

Freshman English I	ENG	104	(4)
Advocacy and Argument	COM	204	(4)
<u>Engineering Reports, Specifications</u> <u>and Proposals</u>	ECE	311	(4)
or ENG or PHL 202			

**Area 2:**

<u>Analytic Geometry and Calculus</u>	MAT	114	(4)
Life Science	BIO	110	(3)
<u>General Physics</u>	PHY	131/151L/152L	(5)
<u>Electromagnetic Fields</u>	ECE	302	(4)

**Area 3:**

3A Elective+			(4)
3B Elective+			(4)
3C Elective+			(4)
3D Principles of Economics	EC	201	(4)
or Principles of Economics	EC	202	
*3F and 3F Political Sociology	SOC/PLS390		(4)
3G Elective+			(4)

**Area 4:**

Political Science	PLS	201	(4)
United States History	HST	202	(4)

**Area 5:**

<u>Ethics and Engineering Decision Making</u>	EGR	402	(4)
<u>Capital Allocation Theory</u>	EGR	403	(4)

\*Course counted in multiple categories.

+One course of those indicated must satisfy the American Cultural Perspectives requirement. All underlined courses satisfy both major and GE requirements.

**COURSE DESCRIPTIONS**

All students in engineering and engineering technology curricula must satisfy ENG 104 prior to enrolling in any 300-level or higher course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

**CAUTION :** Course descriptions show only immediate prerequisite courses, but those courses may in turn have prerequisite courses. It is the student's responsibility to be aware of all prerequisites for a course, direct and indirect.

**ECE 109 Introduction to Electrical Engineering (3)**

Introduction to the fundamental laws of electrical engineering, applications to circuit analysis, matrix methods. 3 lectures/problem-solving. Prerequisite: MAT 114, concurrent ECE 129L.

**ECE 114 C for Engineers (3)**

Computer programming for ECE. Problem-oriented computer language applications to electrical networks. Prerequisite: MAT 114.

**ECE 129L Introduction to Electrical Engineering Lab (1)**

Selected laboratory experiments emphasizing the use and operation of electrical test equipment. 1 three-hour laboratory. Concurrent ECE 109.

**ECE 164L Programming Laboratory for Engineers (1)**

This laboratory includes engineering application assignments using C programming language. Students develop and debug programs in a laboratory setting. 1 three-hour laboratory. Corequisite: ECE 114 or equivalent.

**ECE 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**ECE 204 Introduction to Digital Systems I (4)**

Characteristics and applications of the basic building blocks of digital systems. 4 lectures/problem-solving. Prerequisites: ECE 114, 109, 129L.

**ECE 207 Network Analysis I (3)**

An introduction to network analysis in the time domain with computer applications. 3 lectures/problem-solving. Prerequisites: ECE 109, ECE 114, ECE 129L, MAT 216, PHY 133.

**ECE 209 Network Analysis II (3)**

An introduction to network analysis in the frequency domain with computer applications. Continuation of ECE 208. 3 lectures/problem-solving. Prerequisites: ECE 207, 252L.

**ECE 220 Electronic Devices and Circuits (3)**

Fundamentals and biasing of two and three terminal semiconductor devices. Biasing, bias stability and load lines on transfer characteristic curves to stabilize the operating point. Introduction to small signal parameters. 3 lectures/problem-solving. Prerequisite: ECE 207.

**ECE 231/251L Elements of Electrical Engineering/Laboratory (3/1)**

Electrical principles, DC and AC circuit analysis, simple transients, three phase circuits, magnetics and transformers for non-electrical engineering majors. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: MAT 116, PHY 133.

**ECE 232 Applied Electrical Engineering (3)**

Electrical principles, DC and AC circuits analysis, three-phase circuits, industrial wiring practice, electrical instruments and measurements. For Civil and Agricultural Engineering majors. 4 lectures/problem-solving. Prerequisites: MAT 116; PHY 133.

**ECE 244L Introduction to Digital Systems I Laboratory (1)**

Experiments demonstrating characteristics and applications of the basic building blocks of digital systems. 1 3-hour laboratory. Prerequisite: ECE 129L, 204.

**ECE 252L Network Analysis I Laboratory (1)**

Selected laboratory exercises in electrical networks. 1 three-hour laboratory. Prerequisite: ECE 129L, 207, PHY 153L.

**ECE 253L Network Analysis II Laboratory (1)**

Selected laboratory exercises in electrical networks. One 3-hour laboratory. Prerequisite: ECE 209, 252L.

**ECE 270L Electronics Laboratory (1)**

Fundamental experiments concerned with the common types of semiconductor devices. 1 three-hour laboratory. Prerequisite: ECE 129L. Prerequisite or concurrent: ECE 220.

**ECE 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: permission of instructor.

**ECE 302 Electromagnetic Fields (4)**

Maxwell's equations and electromagnetic concepts. Introduction to static and time varying fields; plane waves, boundary conditions, and transmission line equations. Applications to analog and digital circuits. 4 lectures/problem-solving. Prerequisites: PHY 133, MAT 215, MAT 216, ECE 204, and ECE 220.

**ECE 303 Data Structures for Electrical Engineers (4)**

Implementation of data structures using C++ programming language. Utilization of data structures, such as stacks, linked lists, recursion and graphs for solving electrical engineering problems. 4 lectures/problem-solving. Prerequisite: ECE 114.

**ECE 307 Network Analysis III (4)**

Analysis of network functions in the time and frequency domains. 4 lectures/problem-solving. Prerequisite: ECE 209.

**ECE 308 Introduction to Discrete Time Signals and Systems (3)**

Time and frequency domain analysis of discrete time signals and systems. 3 lecture-problem solving. Prerequisites: ECE 307 and ECE 357.

**ECE 309 Control Systems Engineering (4)**

System representation and performance specifications. Design and analysis of feedback control system via root locus and frequency response. Compensation design techniques. 4 lectures/problem-solving. Prerequisite: ECE 307.

**ECE 310 Introduction to Power Engineering (4)**

Basic principles of power engineering with emphasis on rotating AC and DC machines. Magnetic fields, magnetic material characteristics, and magnetic circuits. AC and DC machine principles, operation models of AC motors and transformers. Polyphase systems and the power system; network representation using phasors. Introduction to codes and standards as they apply to power engineering. 4 lecture discussions. Prerequisite: ECE 209.

**ECE 311 Engineering Reports, Specifications and Proposals (4)**

Techniques of conveying and interpreting technical information, developing a facility with engineering language, both written and oral, reading drawings, making sketches and reading schematics, technical proposals. Avoiding technical, legal and manufacturing pitfalls in engineering specification. 4 lectures/problem-solving. Prerequisites: ENG 104, ECE 320, 204.

**ECE 315 Introduction to Communications Engineering (4)**

Analysis of random phenomena associated with the transmission of digital and analog signals. Analysis of random binary signals, optimum filtering, thermal noise, and signal to noise ratios. 4 lectures/problem-solving. Prerequisites: ECE 307; MAT 215.

**ECE 317/367L Electromechanics I/Laboratory (4/1)**

In-depth treatment of magnetics, transformers and rotating machinery with emphasis on the analysis, operation and applications of DC machines. Dynamic response and control schemes including

various types of DC controllers. Introduction to AC machines. 4 lectures/ problem-solving, 1 three-hour laboratory. Prerequisites: ECE 310, 302, 360L.

**ECE 318/368L Electromechanics II/Laboratory (4/1)**

Continuation of ECE 317 with emphasis on AC machine analysis, operation, and applications. 4 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ECE 317, 309.

**ECE 320 Linear Active Circuit Design (3)**

Fundamentals and biasing of two and three terminal semiconductor devices. Biasing, bias stability and load lines on transfer characteristic curves to stabilize the operating point. Introduction to small signal parameters. 3 lectures/problem-solving. Prerequisite: ECE 207.

**ECE 322 Operational Amplifiers and Signal Conditioning (4)**

Elements of electronic circuit feedback. Operational amplifier systems. Waveshaping circuits and sources. 4 lectures/problem-solving. Prerequisite: ECE 320.

**ECE 323/373L Instrumentation Systems/Laboratory (3/1)**

Components of Instrumentation Systems. Typical power supplies and signal conditioners. A/D and D/A converters. Sensors for various parameters. Error analysis, readouts, recorders and actuators. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 315, 322, 372L.

**ECE 325/375L Electronic Design of Digital Circuits/Laboratory (3/1)**

Device structures for primary logic families. Analysis of switching characteristics and waveform propagation. Structures of various memory devices, logic arrays, and display devices. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 204, 220.

**ECE 330 Introduction to Semiconductor Devices (3)**

Fundamentals of semiconductor devices. Characteristics of junction diodes and bipolar, junction field effect, and metal oxide field effect transistors. 3 lectures/problem-solving. Prerequisites: ECE 220 and MTE 207.

**ECE 333/383L Electronic Instrumentation and Control/Laboratory (3/1)**

Principles and applications of instruments, transducers, readouts, instrumentation systems, amplifiers and signal conditioners, loading, impedance matching, frequency and time response, elementary feedback systems. For non-electrical engineering majors. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisites: ECE 231/251L, MAT 216.

**ECE 341/391L Computer Engineering I/Laboratory (4/1)**

Analysis and design of algorithmic state machines, microcontroller architecture, programming and interface design using Motorola's single chip microcontroller, the 68HC11. 4 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 220, 204, and 244L.

**ECE 342 Computer Engineering II (4)**

Analysis and design of Computer Engineering Systems, based on the Intel 80X86 architecture. Topics include: hardware specifications, peripheral interfacing, interrupts and programming. 4 lectures/problem-solving. Prerequisites: ECE 341/391L.

**ECE 343/393L Computer Engineering III/Laboratory (4/1)**

Analysis and design of Computer Engineering Systems, including microprocessors. 4 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 342, 392L.

#### **ECE 352L Applied Electromagnetics Laboratory (1)**

Experiments demonstrating basic electromagnetic concepts. Standing wave and time domain measurements on transmission lines. Designing digital interface circuits. PC board layout considerations. 1 three-hour laboratory. Corequisite: ECE 302.

#### **ECE 353/355L Computer Electronics I/Laboratory (3/1)**

Basic principles and applications of diodes, transistors, MOS transistors. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: PHY 133. CS 210 is required for CS majors only. Not open to ECE majors.

#### **ECE 354/356L Computer Electronics II/Laboratory (3/1)**

TTL and MOS Logic Device Application. Arithmetic Logic Unit, register array and multiplexer/demultiplexer applications. Use of tristate gating. Bus systems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ECE 353/355L. Not open to ECE majors.

#### **ECE 357L Computer Simulation of Dynamic Systems (1)**

Analog and digital simulation of dynamic systems utilizing time and frequency modeling techniques. 1 three-hour laboratory. Prerequisite: ECE 307.

#### **ECE 359L Control Systems Laboratory (1)**

Control system design assignments based upon the course work of ECE 309. Verification of design solutions through analog and digital simulations. 1 three-hour laboratory. Prerequisites: ECE 309, 357L.

#### **ECE 360L Power Engineering Laboratory (1)**

Selected experiments in power engineering including magnetics, transformers, machinery and power network analysis. 1 three-hour laboratory. Prerequisite or concurrent: ECE 310.

#### **ECE 370L Basic Active Circuit Laboratory (1)**

Design and evaluation of basic amplifier circuits, single and multistage. 1 three-hour laboratory. Prerequisite: ECE 270L. Prerequisite or concurrent: ECE 320.

#### **ECE 372L Operational Amplifiers and Signal Conditioning Lab (1)**

Design and evaluation of feedback OP-AMP, oscillator, and signal conditioning circuits. 1 three-hour laboratory. Prerequisite: ECE 370L. Prerequisite or concurrent: ECE 322.

#### **ECE 392L Computer Engineering II Laboratory (1)**

Experiments demonstrating analysis and design of Computer-Engineering Systems, including computer architecture. 1 three-hour laboratory. Corequisite: ECE 342.

#### **ECE 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **ECE 402 Fields and Waves in RFElectronics (4)**

Electrodynamics, wave equations, and reflection and scattering of waves. Radio frequency applications of transmission line techniques, and impedance matching. S-parameter design techniques, couplers,

hybrids, and filters. Introduction to antennas. Experiments on impedance matching, RFcircuits, antennas, and S-parameters using Network Analyzers. 4 lecture/laboratory. Prerequisite: ECE 302.

#### **ECE 403 Introduction to Filter Design (4)**

An introduction to the design of passive and active filters. Sensitivity analysis. 4 lectures/problem-solving. Prerequisites: ECE 307, 322.

#### **ECE 404/454L Robotic Electronics I/Laboratory (3/1)**

Basic principles of robotics; kinematics and dynamics; sensing; low-level vision; robotics actuators; programming; simple applications. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ECE 309.

#### **ECE 405 Communications Systems (4)**

The study of various types of communication systems with emphasis on their analysis in the frequency domain. The role of system bandwidth and noise rejection in limiting the transmission and reception of information included. 4 lectures/problem-solving. Prerequisites: ECE 307, 315.

#### **ECE 407/457L Advanced Circuit Design/Laboratory (3/1)**

Design and evaluation of advanced linear circuits utilizing state-of-the-art electronic devices. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ECE 322, 307, 372L.

#### **ECE 408/408L Digital Signal Processing I/Laboratory (3/1)**

The analysis, design and implementation of FIR and IIR filters. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ECE 308.

#### **ECE 409 Digital Communication Systems (4)**

Introduction to digital and data communication systems, sampling, modulation techniques, time division multiplexing, performance of digital communication systems. 4 lectures/problem-solving. Prerequisite: ECE 405.

#### **ECE 410 Microwave Engineering (3)**

Principles of waveguide devices, active microwave devices, and circuits. Scattering parameter techniques, FET amplifiers. Microwave generation. 3 lectures/problem-solving. Prerequisites: ECE 406, 446L.

#### **ECE 412 Solid State Electronics (4)**

Physics and technology of solid state electronic devices with emphasis on recent developments in the field. 4 lectures/problem-solving. Prerequisite: ECE 330.

#### **ECE 414/444L Microprocessor Applications in Process Control/Laboratory (3/1)**

Process control fundamentals. Analog and digital signal conditioning, z-transformation techniques. Digital controller principles. Design of discrete time control systems. Development of digital control algorithms for microprocessor-based control systems. Distributed microprocessor control systems. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisites: ECE 309, 359L and 341, 391L.

#### **ECE 418 Integrated Circuit Design (4)**

Integrated circuit processing design rules for integrated circuit layout. VLSI CMOS circuits. Introduction to layout tools and exercises. 4 lectures/problem-solving. Prerequisite: ECE 412.

#### **ECE 419/489L Advanced Control Systems/Laboratory (3/1)**



Time-domain and frequency-domain design of control systems; concepts of state and state space; description of dynamic systems in state-variable format; canonical form; controllability and observability; state feedback and state estimation; applications and hardware. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ECE 309.

#### **ECE 420 Lasers (4)**

Fundamental principles and applications of lasers, energy levels and mechanisms of excitation, basic types of lasers. Q switching and modes. Modulation and detection. 4 lectures/problem-solving. Prerequisites: ECE 302.

#### **ECE 421/451L Energy Conversion Systems I/Laboratory (3/1)**

Advanced and special methods of analysis of power systems, symmetrical components, representation of power systems, use of power systems analysis software for the solution of systems problems, power system transmission line concepts. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 318, or 310 and permission of instructor.

#### **ECE 422/452L Energy Conversion Systems II/Laboratory (3/1)**

System stability and fault conditions, specific design considerations, load flow studies, economic operation practices. Standards and requirements governing industrial and utility system operations. 3 lectures/problem-solving. Use of computer software for load flow and stability analysis. 1 three-hour laboratory. Prerequisite: ECE 421/451L.

#### **ECE 424/474L State Machine Design/Laboratory (3/1)**

Analysis and design of synchronous and asynchronous state machines. 3 lectures/problem-solving, 1 three-hour lab. Prerequisites: ECE 341, 391L.

#### **ECE 425/475L Selected Topics in Computer Engineering/Laboratory (3/1)**

Selected state of the art topics in computer engineering (RISC architecture, instruction sets, programming, pipelining and cache memories). 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 342 and ECE 392L.

#### **ECE 426/476L Computer Organization and Programming/Laboratory (3/1)**

Computer organization concepts such as arithmetic unit, design, floating point arithmetic, microprogramming and virtual memory systems. Three lectures/problem-solving, one three-hour laboratory. Prerequisites: ECE 342 and ECE 392L.

#### **ECE 427/477L Advanced Digital Topics/Laboratory (3/1)**

Theory and design for interfacing memory and I/O to IBM Personal Computers. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ECE 342 and ECE 392L.

#### **ECE 428 Digital Signal Processing II (4)**

A continuation of digital filter design and an introduction to digital signal processing algorithms. 4 lectures/problem-solving. Prerequisite: ECE 408.

#### **ECE 431/481L Computer Networks Laboratory (4/1)**

Operation, performance, and interaction of the different components of computer networks. Data communications, open system interconnection (OSI) and IEEE standards for LANs. Prerequisites: ECE 341 and ECE 391. Corerequisite: ECE 481

#### **ECE 432/482L Microcomputer Applications/Laboratory (3/1)**

Microcomputer applications at the systems level. Course to include usage of both hardware and software design aids. 3 lectures/problem-

solving, 1 three-hour laboratory. Prerequisite: ECE 343, 393L.

#### **ECE 434 Ocean Electronics (4)**

Electronic Instrumentation for basic underwater measurements of ocean depths, currents, wave motion, salinity, water analysis, etc. Data buoy instrumentation systems. Basic ocean surface electronics for communication, navigation, weather, underwater acoustics transducers. 4 lectures and one or more ocean field trips. Prerequisite: ECE 323 or 333.

#### **ECE 435 Biomedical Instrumentation and Measurements (3)**

Discussion of major body systems in terms of their physiology, measurable parameters and current instrumentation. The application of sound engineering principles to obtain reliable physiological data. A system design. 3 lectures/problem-solving. Prerequisites: BIO 110; ECE 323 or 333, or consent of instructor.

#### **ECE 436 Optical Fiber Communications (4)**

Introduction to optical fibers and optical fiber cables. Coupling and cabling. Optical sources and detectors and their application to optical communications. Modulation methods. Noise in detectors. Design and evaluation of optical transmitters, receivers, repeaters and multinetworks. Design specifications, options, tradeoffs and cost. Integrated optics and laser technology applied to optical communications. New developments. 4 lectures/problem-solving. Prerequisites: ECE 302, 330.

#### **ECE 445L Communications Laboratory (1)**

Demonstrations of the individual aspects of communication technique. 1 three-hour laboratory. Prerequisite: ECE 405, 357L.

#### **ECE 448/498L R.F. Design/Laboratory (3/1)**

Principles of R.F. design of transmitters and receivers utilizing solid state electronics devices and integrated circuits. Design of oscillators, power amplifiers, mixers and detectors. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ECE 320, ECE 406 or consent of instructor.

#### **ECE 460L Microwave Measurements (1)**

Electronic measurement equipment and techniques for measurements at microwave frequencies of such quantities as power, impedance, standing wave ratio and frequency, and impedance matching. Frequency domain reflectometry. Gunn oscillator characteristics. 1 three-hour laboratory. Prerequisites: ECE 406 and ECE 446. Corequisite: ECE 410.

#### **ECE 461, 462 Senior Project (2) (2)**

Completion of a project under faculty supervision. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: ECE 463.

#### **ECE 463 Undergraduate Seminar (2)**

New developments, policies, practices, procedures and ethics in electrical and computer engineering. Each student is responsible for the preparation of an approved project proposal in the field of electrical and computer engineering. 2 one-hour lectures/problem-solving sessions. Prerequisites: Completion of all 100-200 level courses, COM 216 or ECE 311, and all but 12 units of required 300 level courses. Satisfactory completion of Graduate Writing Test. Must be within 50 units of completing overall unit requirements for graduation.

#### **ECE 464 Professional Topics for Engineers (1)**

The course consists of developments, policies, practices, procedures and ethics in the areas of Electrical and Computer Engineering. 1 hour

lecture and problem solving sessions. Prerequisite: GWT, all 100 and 200 level courses. All but 12 units of the 300 level courses. 50 units or less to graduate.

#### **ECE 465/466/467 Senior Design Team project (1,2,2, units, respectively)**

Active participation in and significant contribution to a department approved senior level team project under faculty supervision. Results are presented in a formal format, including a report, presentation to faculty and demonstration of hardware. Minimum expected time per student: 150 hours. Prerequisite: GWT, all 100 and 200 level courses. All but 12 units of the 300 level courses. 50 units or less to graduate.

#### **ECE 468/478L Power Electronics I/Laboratory (3/1)**

Basic Principles of Power Semiconductor Switching with emphasis on analysis and design criteria of D.C. voltage controllers, controlled rectifiers and converters. Selected applications to electrical machines and controls. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 270L, 310, 360L.

#### **ECE 469/479L Power Electronics II/Laboratory (3/1)**

Continuation of ECE 468 with emphasis on the analysis and design criteria of D.C. to D.C. converters (choppers), D.C. to A.C. inverters, and A.C. to A.C. converters. Selected control schemes and applications. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 317/367L, ECE 468/478L.

#### **ECE 485L Biomedical Instrumentation and Measurements Laboratory (1)**

Selected experiments pertaining to biomedical instrumentation. 1 three-hour laboratory. Prerequisite: ECE 435.

#### **ECE 490/490L Illumination Engineering (4/1)**

An introduction to Illumination Engineering covering light and lighting basics, color, vision and the eye, basics of lighting units and measurements, basic indoor lighting analysis and design, light sources and luminaries. The lab includes industrial visits, 4 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: PHY 344 or PHY 234 or equivalent.

#### **ECE 492 Lighting Control/Design (4)**

Analysis and design of electronic/magnetic lighting controls, occupancy sensors, and lighting power distribution system. State and Federal code requirements. Selected photometry methods and measurements. 4 lectures/problem-solving. Prerequisites: ECE 490 and MTE 207.

#### **ECE 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: permission of instructor.



## ENGINEERING TECHNOLOGY

Gerald K. Herder, Interim Chair

Donald E. Breyer  
Edward V. Clancy  
Fazal B. Kauser

Lyle B. McCurdy  
Thomas O. Tice  
Tariq Qayyum

Programs in Engineering Technology consist of integrated curricula designed to prepare graduates for technical careers in industry. They emphasize the application of engineering knowledge and methods to the solution of modern problems. Fundamentals and applications of engineering and management principles are reinforced in the laboratory and in the field.

Engineering Technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities. It lies in the occupations spectrum between craftsman and the engineer at the end of the spectrum closest to the engineer. Engineering technologists are a member of the engineering team, consisting of the engineer, engineering technologist and engineering technician.

The engineering technologist is applications-oriented, building upon a background of applied mathematics, including the concepts and applications of calculus. Utilizing applied science and technology, technologists may work with engineers in utilizing applied design techniques to produce practical, workable and safe results quickly and economically; configure hardware from proven concepts; install, operate, or manage complex technical systems, or provide customer engineering support.

High school graduates and community college transfer students with an aptitude in algebra, trigonometry, and the physical sciences, along with an interest in applications of new technology, are encouraged to apply to the program. Students desiring to major in Engineering Technology should have a capacity for science and mathematics, and incoming freshmen should have taken college preparatory courses in these disciplines in high school. Typical incoming transfer students should have completed college algebra and trigonometry and two quarters of college physics (with laboratory) prior to beginning the program at Cal Poly Pomona. All students should contact a program advisor to obtain assistance in developing their educational goals prior to actually starting their coursework. Each student will work with an advisor to coordinate a specific program of study. A minimum of 202 quarter units is required to complete the degree.

The department's programs are oriented to help students achieve competency in applying current methods and design procedures developed by engineers to solve practical technical problems commonly found in industry. Included in each program, is instruction in applied sciences, drafting, computer usage, interpersonal relations, oral and written communications, manufacturing processes, and the impact of technology upon the environment.

The Engineering Technology Department currently offers three degrees, and an incoming student will select from the following choices:

### CONSTRUCTION ENGINEERING TECHNOLOGY (CET)

The Construction Engineering Technology Program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/abet). This degree provides the student with a firm background in construction. Graduates may eventually work in any area of construction including building, heavy-civil, and residential. Construction Engineering Technology (CET) graduates work with owners,

developers, architects, engineers (civil, mechanical, and electrical), building departments, governmental agencies, contractors, and subcontractors to build a variety of construction projects. Job titles include field engineer, project engineer, superintendent, as well as estimator, scheduler, and project manager.

Students receive training in construction materials, drafting, computer applications, construction surveying, structural design, construction equipment, estimating, scheduling, accounting, project management, safety and law.

The program has close ties with the construction industry. The student organization is the Construction Engineering and Management Association (CEMA). This includes the Associated General Contractors (AGC), Building Industry Association (BIA), and Construction Management Association of America (CMAA). The CET program offers a number of construction scholarships, and students may apply for grants based on financial need and/or academic achievement.

### ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY (ECET)

The Electronics and Computer Engineering Technology program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET). In today's complex world, electronics, computers, and communications permeate every facet of our lives, and will do even more so in the future. This growth can provide exciting, challenging, and rewarding career opportunities for forward-looking students in Electronics and Computer Engineering Technology.

This program is an integrated four-year curriculum designed to prepare graduates for entry into industry as electronic engineering technologists. The lower division mathematics, science, and electrical and electronics coursework is designed to provide a strong foundation for the upper-division program. The upper-division coursework emphasizes digital electronics, computer hardware and software, communications electronics, and control and instrumentation. The program stresses the use of established electronic engineering analysis and design principles and applications for the solution of day-to-day technical problems currently found in industry. Graduates are typically expected to work as technical members of "the engineering team."

### ENGINEERING TECHNOLOGY (ET)

The Engineering Technology program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET).

This degree is comprised of three emphasis areas. Students may choose to concentrate in one of the following areas: Mechanical, Manufacturing, and Environmental emphasis. Internship during the senior year is encouraged for all students of this major.

The Mechanical emphasis stresses the application and design of mechanical and thermal power systems utilizing strength of materials, metallurgy, statics, dynamics, fluid mechanics, thermodynamics and heat transfer. Graduates may be involved in applied design, analysis, application, or production of mechanical/thermo fluid systems.

The Manufacturing emphasis stresses technological competency and managerial skills in the economical utilization of raw material and resources through planning, selection, and organization of manufacturing processes. Graduates may be involved in mass production, tooling, selection of machines, and marketing of manufactured goods.

The Environmental emphasis is a 2+2 program with community college Environmental Hazardous Materials and Technology Programs. The



subject matter includes air and water quality, land restoration, hazardous material, hazardous waste management, and solid waste management. The hazardous material and waste management courses are available at community colleges. PETE (Partnership for Environmental Technology Education) has 27 member schools in California and most of them, if not all, offer courses in hazardous material management. Cal Poly Pomona has a land lab and a regenerative study center as part of its campus. Graduates may work for industry, government agencies or engineering companies on environmental regulations and clean-up.

The faculty of the department are committed to helping students develop a strong sense of professionalism, high ethical standards and the pride that comes from accomplishment through technical competence. The department is also committed to helping students develop sound work habits, including neatness, completeness, and timeliness; to communicate effectively in written, oral, graphical, and mathematical form; and to be responsible for their own actions. The faculty are committed to academic excellence and professional integrity.

#### CORE COURSES FOR ALL MAJORS\*

Applied Statics	ETT	210	(3)
Senior Project I	ETT	461	(2)
Senior Project II	ETT	462	(2)
Engineering Graphics	MFE	126/126L(2/1)	
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
General Chemistry Lab	CHM	121/121L	(3/1)
Technical Calculus II	MAT	131	(4)
Mathematics electives chosen from approved list ***			(8)
+Typically: MAT 105 College Algebra (4), or equivalent, and MAT 106 College Trigonometry (4) or equiv.			

#### CONSTRUCTION ENGINEERING TECHNOLOGY\*

Construction Engineering ***	ETC	101	(3)
Construction Drawings and Specifications	ETC	102/112L(2/1)	
Construction Surveying I	ETC	131/141L(3/1)	
Construction Surveying II	ETC	132/132L(3/1)	
Construction Materials	ETC	202	(3)
Construction Inspection	ETC	204	(3)
Electrical Installations	ETC	270/271L(3/1)	
Construction Accounting	ETC	279/289L(2/1)	
Construction Estimating I	ETC	304	(4)
Construction Estimating II	ETC	305	(4)
Structural Theory	ETC	311	(3)
Construction Equipment and Methods	ETC	312	(3)
Timber and Formwork Design	ETC	315	(4)
Steel Design	ETC	316	(3)
Concrete and Masonry Design	ETC	317	(3)
Construction Budget and Cost Control	ETC	401	(3)
Contracts and Specifications	ETC	402	(3)
Construction Safety	ETC	403	(3)
Construction Planning and Scheduling	ETC	405	(3)
Construction Organization and Management	ETC	406	(3)
Foundations and Soil Mechanics	ETC	411/421L(3/1)	
Concrete Mix Design	ETC	431/441L(1/1)	
Strength of Materials for ET	ETT	220/230L(3/1)	
Applied Fluid Mechanics	ETT	310/320L(3/1)	
Drafting Electives			(2)
ETx xxx**Technology Electives			(14)
Total core units in major			(134)

#### ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY\*

D-C Circuit Analysis	ETE	102/102L(3/1)	
A-C Circuit Analysis	ETE	103/103L(3/1)	
Electronic Devices and Circuits I	ETE	203/203L(3/1)	
Electronic Devices and Circuits II	ETE	204/204L(3/1)	
Electrical Circuit Analysis	ETE	210/210L(3/1)	
Introduction to Digital Logic	ETE	230/230L(3/1)	
Micro Computer Systems and Assembly Language Programming	ETE	240/240L(3/1)	
Electronic Devices and Circuits III	ETE	305/305L(3/1)	
Applied Network Analysis	ETE	310/310L(3/1)	
Applied Numerical Methods with C++	ETE	312/312L(3/1)	
Digital Logic Systems	ETE	315/315L(3/1)	
Linear Integrated Circuits	ETE	318/318L(3/1)	
Microprocessor Systems & Applications	ETE	344/344L(3/1)	
Feedback Systems Technology	ETE	350/350L(3/1)	
Technical Communications of ECET	ETE	401/401L(3/1)	
Communication Systems	ETE	435/435L(3/1)	
Electronic Mfg and PCB Fabrication	ETP	272/272L(3/1)	
Computer Applications for ET	ETT	101/101L(2/1)	
Applied Dynamics	ETT	211	(3)
Applied C Programming	ETT	215/215L(3/1)	
Material Science for E.T.	ETT	217/217L(3/1)	
Technical Calculus III	MAT	132	(4)
Lower or Upper division ECET elective ((			(4)
Upper division ECET elective**			(12)
Total core units in major			(134)

#### ENGINEERING TECHNOLOGY

Students must complete a contract composed of:

Emphasis I-- required courses for the Mechanical ET (MET) Emphasis (79 units, min):

Technical Calculus III	MAT	132	(4)
Electro-mechanical Devices and Systems Laboratory	ETE	321/321L(3/1)	
Computer Applications for ET	ETT	101/101L(2/1)	
Applied Dynamics	ETT	211	(3)
Materials Joining/Laboratory	ETT	234/234L(3/1)	
Material Science for ET	ETT	217/217L(3/1)	
Strength of Materials for Engineering Technology/Laboratory	ETT	220/220L(1/1)	
Material Science for ET	ETT	217/217L(3/1)	
Applied Heat Transfer	ETM	308	(3)
Applied Fluid Mechanics II	ETM	312	(4)
Machine Elements/Laboratory	ETM	315/325L(3/1)	
Power Transmission Systems/Laboratory	ETM	320/340L(3/1)	
Instrumentation and Control Applications Laboratory	ETM	330/330L(3/1)	
or Electronic Test Instrumentation/Laboratory	ETE	420/420L(3/1)	
Wind Tunnel Testing Laboratory	ETM	405L	(2)
Internal Combustion Engines and Gas Turbines/Laboratory	ETM	410/410L(3/1)	
Engineering Cost Estimation	IME	403	(3)
Manufacturing Processes -- Materials, Metrology and Treatments/Laboratory	MFE	217/217L(2/1)	
Manufacturing Processes I -- Material Removal/Laboratory	MFE	221/221L(2/1)	
Engineering Graphics II	MFE	226/226L(2/1)	
Manufacturing Processes II -- Forming, Casting and Joining/Laboratory	MFE	230/230L(2/1)	
Computer-Aided Design	MFE	410/410L(1/1)	
Upper-Division Technical Electives			(16)



Emphasis 2 -- required courses for the Environmental ET (ENV ET) Emphasis (79 units, min):

Lower-Division HazMat units, taken at community colleges. . . . .	(21)
Computer Applications for ET . . . . .	ETT 101/101L (3)
General Chemistry II/Laboratory . . . . .	CHM 122/122L (3/1)
Organic Chemistry/Laboratory . . . . .	CHM 201/250L (3/1)
Basic Microbiology . . . . .	MIC 201/201L (3/2)
Hydraulic Engineering/Laboratory . . . . .	CE 332/332L (3/1)
Water Supply Engineering/Laboratory . . . . .	CE 431/431L (3/1)
Water Quality Engineering/Laboratory . . . . .	CE 432/432L (3/1)
Industrial and Hazardous Waste Management/ Laboratory . . . . .	CE 434/434L (3/1)
Solid Waste Management . . . . .	CE 457 (3)
Lower or Upper Division ET Electives. . . . .	(8)
Upper Division ET Electives . . . . .	(18)

Total core units in major. . . . . (134)

\*A 2.0 GPA is required in core courses to receive a degree in this major.

\*\*In consultation with a department advisor

\*\*\*Substitutes for ETT 101

## GENERAL EDUCATION COURSES

An alternate pattern from that listed here for partial fulfillment of Areas I, III, and IV available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

### Area 1:

Freshman English I . . . . .	ENG 104	(4)
Advocacy and Argument . . . . .	COM 100	(4)
or Advocacy and Argument . . . . .	COM 204	
Freshman English II . . . . .	ENG 105	(4)
or Critical Thinking . . . . .	PHL 202	

### Area 2:

Technical Calculus I . . . . .	MAT 130	(4)
College Physics . . . . .	PHY 121	(3)
College Physics Laboratory . . . . .	PHY 141L	(1)
College Physics Laboratory . . . . .	PHY 142L	(1)
College Physics Laboratory . . . . .	PHY 143L	(1)
Life Science . . . . .	BIO 110	(3)
Statistical Methods in Engineering . . . . .	STA 309	(3)

### Area 3:

3a elective		(4)
3b elective		(4)
3c elective		(4)
3d Principles of Economics	EC 201 or 202	(4)
3e and 3f Political Sociology	SOC/PLS390	(4)
3g elective		(4)
(PSY 201 required by major if MHR 318 in Area 5 is taken.)		

### Area 4:

Introduction to American Government . . . . .	PLS 201	(4)
United States History . . . . .	HST 202	(4)

### Area 5:

Engineering Economic Analysis for ET . . . . .	ETT 305	(4)
or Construction Economy . . . . .	ETC 301	
Ethics and Engineering Decision-Making . . . . .	EGR 402	(4)
or Multicultural Organizational Behavior . . . . .	MHR 318	

## COURSE DESCRIPTIONS

All students in engineering and engineering technology curricula must satisfy ENG 104 prior to enrolling in any 300-level or higher course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

### ET Core Courses

#### ETT 101/101L Computer Applications for Engineering Technology (2/1)

Introduction to engineering technology. Use of the personal computer for engineering problem-solving and documentation via software application packages. Technical report required. 2 lectures/problem-solving. Prerequisites: Completion of the MDPT.

#### ETT 110/120L Applied FORTRAN/Laboratory (3/1)

Introduction to structured programming using FORTRAN 77. Programming problems applicable to engineering technology. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETT 101, high school courses in trigonometry and college algebra.

#### ETT 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### ETT 201/251L Electrical Technology/Laboratory (3/1)

Introduction to operation and application of basic electrical measuring instruments. D.C. and A.C. circuit applications involving resistance, inductance and capacitance. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: PHY 123. Not open to ET students in the Electronics and Computer option.

#### ETT 210 Applied Statics (3)

Introduction to the basic concepts of mechanics, emphasizing the action of forces on rigid bodies and the response of those bodies to the applied forces. Methods for logical solutions to engineering problems are stressed. 3 lectures/problem-solving. Prerequisite: "University level trigonometry and algebra," PHY 121.

#### ETT 211 Applied Dynamics (3)

Application of the theory of motion of rigid bodies with acceleration from applied forces. Emphasis on problems in which those bodies can be considered as non-rotating. Introduction to plane motion with rotation. Uses analytical methods. 3 lectures/problem-solving. Prerequisite: ETT 101, ETT 210, MAT 131.

#### ETT 215/215L C Programming for Technology/Laboratory (3/1)

Introduction to structured programming using ANSI C. Programming problems applicable to engineering technology. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisites: ETT 101 or equivalent, college algebra and trigonometry.

#### ETT 217/217L Materials Science for E.T. (3/1)

Concepts of the structure and properties of materials and their relevance to industrial applications, properties of metals, ceramics, plastics, composites, and semiconductors. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: CHM 121, ETT 220; MAT 130; PHY 121.

#### ETT 220/230L Strength of Materials for Engineering Technology/Laboratory (3/1)

Stress-strain diagrams; tensile, compressive and shear stresses; working

stresses and factors of safety; torsional stress and angular deformation in circular shafts; beam analysis, shear and moment diagrams, bending stress, shear stress, and beam deflections; column analysis; bolted and riveted connections in direct shear and eccentric loading; thin-walled pressure vessels; thermal stresses; combined stresses. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETT 210, MAT 131.

#### **ETT 234/234L Materials Joining/Laboratory (1/1)**

Methods of material-joining used in modern industry as applied to metals and plastics. Introduction to evaluation methods. 1 lecture, 1 three-hour laboratory.

#### **ETT 270, 470 Engineering Technology Internship (3) (3)**

Specially assigned or approved on-the-job work activities in industry or other institutions related to student's educational program of studies. Formal report required. Prerequisites: full-time engineering technology related employment. Advance approval by internship coordinator required via a written proposal, and a letter of intent from the sponsoring company. Each course may be repeated once. Maximum credit limited to 12 units.

#### **ETT 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

#### **ETT 305 Engineering Economics Analysis for Engineering Technology (4)**

Principles and techniques of economics analysis of engineering and manufacturing projects. Costs and estimation, time value of money, economic evaluation criteria, basic comparative models, and replacement analysis. Consideration of income taxes, risk, and intangibles. Research papers and independent study required. 4 lectures/problem-solving. Prerequisites: ENG 105 or, PHL 202, EC 201 or EC 202.

#### **ETT 310/320L Applied Fluid Mechanics/Laboratory (3/1)**

Applied principles of fluid flow. Properties of fluids. Fluid impulse and momentum. Viscous flow in pipes and open channels. 3 lectures/problem-solving; 1 laboratory. Prerequisites: ETT 210; MAT 131; PHY 121.

#### **ETT 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **ETT 460 Undergraduate Seminar (2)**

Seminar discussion of new developments, policies, practices and procedures. Preparation and oral presentation by each student of his/her senior project, 2 seminars per week. Prerequisite: senior standing, ETT 101, COM 204, ENG 105 OR PHL 202, satisfaction of GWT.

#### **ETT 461, 462 Senior Project I, II (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Presentation of project in a formal report. Minimum 120 hours total time. Prerequisite: ETT 460, senior standing, and consent of E.T. Department Chair.

#### **ETT 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

#### **Construction ET Courses**

#### **ETC 101 Introduction to Construction Engineering and Microcomputers (3)**

An introduction to construction. An overview of the construction program, the scope of the field of construction and the responsibilities of the construction engineer. Introduction to microcomputers and applications. 3 lectures/problem-solving. Prerequisites: high school courses in trigonometry and college algebra.

#### **ETC 102/112L Construction Drawings and Specifications/Laboratory (1/2)**

A study of the format, guidelines and practices of construction drawings and specifications for buildings and heavy construction. Architectural, civil, structural, mechanical, electrical, plumbing and landscape drawings. Drainage and grading plans. 1 lecture/problem-solving, 2 three-hour laboratories. Prerequisites: MFE 121L.

#### **ETC 131/141L Construction Surveying I/Laboratory (2/2)**

Fundamental surveying methods as applied to construction layout. Use of electronic transit and automatic level for location and construction operations. Vertical and horizontal control. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: high school courses in trigonometry and college algebra.

#### **ETC 132/132L Construction Surveying II/Laboratory (2/2)**

Profile levels, cross-section and highway slope-staking for matrix earthwork calculations and cut/fill distribution. Horizontal and vertical highway curves. Topographic surveys, computer application land-mapping. Construction layout of buildings, roads and utilities. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: ETC 131/141L.

#### **ETC 202 Construction Materials (3)**

Properties of materials used in building and heavy construction. Methods of fabrication and installation of construction materials. Introduction to industry standards and specifications. 3 lectures/problem-solving.

#### **ETC 204 Construction Inspection (3)**

Introduction to construction inspection, functions, responsibilities, authority and technical requirements related to heavy and building construction. 3 lectures/problem-solving. Prerequisites: ETC 102.

#### **ETC 270/271L Electrical Installations/Laboratory (3/1)**

Fundamentals of electrical equipment and installations as related to the construction industry. Electrical wiring, transformers, machines, illumination, heating, wiring codes and specifications. 3 lecture/problems, 1 three-hour laboratory. Prerequisites: PHY 123, high school courses in trigonometry and college algebra. Not open to ECET majors.

#### **ETC 279/289L Construction Accounting/Laboratory (2/1)**

Fundamentals and practices of financial and management accounting in construction industry, including accounting processes, internal control, cost elements, overhead allocation and financial reports. 2 lectures/problem-solving, 1 three-hour laboratory.

**ETC 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination of both. Prerequisite: permission of instructor.

**ETC 304 Construction Estimating I (4)**

Fundamentals of building construction estimating procedures considering both quantity surveying and pricing of labor, materials, and equipment costs. 4 lectures/problem-solving. Prerequisites: junior standing, ETC 102 and ETC 202.

**ETC 305 Construction Estimates II (4)**

Fundamentals of heavy construction estimating procedures considering both quantity survey and pricing. 4 lectures/problem-solving. Prerequisite: ETC 304.

**ETC 311 Structural Theory (3)**

Introduction to structural systems used in construction projects. Design loads. Analysis of statically determinate beams, frames, and trusses for forces and deflections. Computer applications. Introduction to statically indeterminate structures using moment distribution. 3 lectures/problem-solving. Prerequisites: ETT 220, MAT 131, PHY 121.

**ETC 312 Construction Equipment and Methods (3)**

Construction procedures, job planning layout and scheduling, selection and application of construction equipment to building and heavy construction projects. 3 lectures/problem-solving. Prerequisite: junior standing.

**ETC 315 Timber and Formwork Design (4)**

Properties of wood. Design loads. Design of structural elements including beams, columns, horizontal diaphragms, and shearwalls. Connection design. Application of timber design to the construction project including the design of concrete formwork and falsework for slabs, beams, columns and walls. 4 lectures/problem-solving. Prerequisite: ETC 311.

**ETC 316 Steel Design (3)**

Design of structural steel elements including tension members, columns, beams, and beam-columns using allowable stress design (ASD). Design of welded and bolted connections. AISC specifications. Introduction to load and resistance factor design (LRFD). 3 lectures/problem-solving. Prerequisite: ETC 311.

**ETC 317 Concrete and Masonry Design (3)**

Design of reinforced concrete and reinforced masonry structural elements, including beams, T-beams, slabs, columns, walls, retaining walls and footings. ACI specifications. Design of reinforced masonry beams, lintels, walls and retaining walls. 3 lectures/problem-solving. Prerequisite: ETC 315.

**ETC 401 Construction Budgeting and Cost Control (3)**

Methods and procedures used in planning, budgeting, scheduling and cost control related to construction projects. Methods of monitoring, trending, forecasting and appraisal of project cost via manual and computer techniques. 3 lectures/problem-solving. Prerequisites: ETC 279, ETC 405.

**ETC 402 Contracts and Specifications (3)**

Basic principles and detailed review of design drawings and contract documents, including plans, specifications and agreements involved in the construction of facilities. 3 lectures/problem-solving. Prerequisite: senior standing, COM 216, ETC 102.

**ETC 403 Construction Safety (3)**

Logical problem-solving using safety engineering in construction, considering safety legislation, OSHA. Safety programs, accident prevention and public safety. 3 lectures. Prerequisite: senior standing. Corequisite: ETC 312.

**ETC 405 Construction Planning and Scheduling (3)**

Methods and procedures used in planning and scheduling construction projects using graphic charts and CPM networks. Resource allocations, leveling and cost curves. Application of manual and computer network systems. 3 lectures/problem-solving. Prerequisite: ETC 305.

**ETC 406 Construction Organization and Management (3)**

Theory and techniques of construction management and the general organizational structure of a contracting firm. Contractor's policies and procedures regarding the legal, financial, marketing, and personnel management as well as the everyday operations of a construction company and a project. 3 lectures/problem-solving. Prerequisite: ETC 305.

**ETC 411/421L Foundations and Soil Mechanics/Laboratory (3/1)**

Selection and methods of installation of foundations and other soil-supported structures. Footings, piles, caissons, retaining structures, soil embankments and fills. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ETC 311.

**ETC 431/441L Concrete Mix Design/Laboratory (1/1)**

Theory and practice of concrete materials and the methods utilized in the mix design, production, placement and testing of structural concrete. 1 lecture/problem, 1 laboratory. Prerequisites: senior standing, ETC 202, PHY 121.

**ETC 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**Electronics & Computer ET Courses:****ETE 102/102L D-C Circuit Analysis/Laboratory (3/1)**

Principles of electric circuit elements including resistance, capacitance and inductance; magnetism. Basic d-c network theorems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: high school courses in trigonometry and college algebra.

**ETE 103/103L A-C Circuit Analysis/Laboratory (3/1)**

Phasor analysis in a-c circuits. Basic a-c circuit theorems. D-C Transients. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 102.

**ETE 203/203L Electronic Devices and Circuits I/Laboratory (3/1)**

Introduction to the theory of semiconductor junction devices.

Characteristics and operation of diode and bipolar junction transistors; d-c characteristics, biasing, and d-c stability. Basic device applications. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 103.

#### **ETE 204/204L Electronic Devices and Circuits II/Laboratory (3/1)**

Analysis of single stage BJT amplifier circuits. Introduction to field effect transistor devices and analysis of single stage FET amplifier circuits. Small signal analysis, gain calculations, input/output impedance calculations, stability analysis. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 203.

#### **ETE 210/210L Electrical Circuit Analysis/Laboratory (3/1)**

Frequency response in RLC circuits; transfer functions, Bode plots, filters. Introduction to 3-phase circuits. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 103; MAT 105 and MAT 106 or equivalent.

#### **ETE 230/280L Introduction to Digital Logic/Laboratory (3/1)**

Introduction to number systems; boolean algebra; characteristics of standard logic building blocks; logic design using standard MSI and LSI logic blocks; introduction to registers and basic register operations. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: MAT 105, or equivalent.

#### **ETE 240/240L Microcomputer Systems and Assembly Language Programming/Laboratory (3/1)**

Software model and instruction set of the 68HC11 microcontroller, using the monitor for machine-language and assembly language programming, elementary I/O programming using the system timer, keypad and LCD units. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETE 230. Corequisite: ETE 240L.

#### **ETE 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

#### **ETE 305/305L Electronic Devices and Circuits III/Laboratory (3/1)**

BJT and FET high frequency models. Frequency effects of coupling, bypass, and interelectrode capacitance upon gain and input-output impedance of single and multistage BJT and FET amplifiers. Bode plots. Differential amplifiers. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETT 101; ETE 204, 210; MAT 131.

#### **ETE 310/310L Applied Network Analysis Laboratory (3/1)**

Transient analysis, transfer functions, frequency response, second order systems; stability; applications of Laplace Transforms and Fourier analysis. Computer methods utilized. 3 lectures/problem-solving, three-hour laboratory. Prerequisites: ETT 101; ETE 210; MAT 131.

#### **ETE 312/312L Applied Numerical Methods With C++/Laboratory (3/1)**

Computer number systems and codes, use of spreadsheets for equation analysis; using C++ and OOP to determine polynomial roots; numerical solutions of integration and ordinary differential equations, and vector operations, basics of computer graphics. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: MAT 132, ETT 215, ETE 230, 310.

#### **ETE 315/315L Digital Logic Systems/Laboratory (3/1)**

Digital circuit analysis and design using registers and counters. Sequential networks. A-D and D-A conversions. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ETE 230.

#### **ETE 318/318L Linear Integrated Circuits/Laboratory (3/1)**

Characteristics of operational amplifiers. Basic applications and classical circuits. Frequency response. D-C and a-c errors and compensation. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 310, 305.

#### **ETE 319/319L Linear Circuit Applications/Laboratory (3/1)**

Practical applications of currently available monolithic circuit devices in linear and digitally-related linear electronic circuits. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ETE 318.

#### **ETE 321/321L Electro-mechanical Devices and Systems/Laboratory (3/1)**

Introduction to first and second-order electromechanical systems including springs, mass, and dampers -- basic models; system response including displacement, frequency and time response; transfer functions, system analysis using Laplace operations and the s-plane; stability. Introduction and application of ideal op-amp building blocks for amplification, summing, and system simulation. 3 lecture/problems, 1 three-hour laboratory. Prerequisites: MAT 132, ETT 201, 211.

#### **ETE 344/344L Microprocessor Systems and Applications/Laboratory (3/1)**

Microprocessor/microcontroller organization, operation, assembly-language programming, and input/output applications. 3 lecture problems. 1 three-hour laboratory. Prerequisite: ETE 240 or equivalent.

#### **ETE 350/350L Feedback Systems Technology/Laboratory (3/1)**

Introduction to electro-mechanical systems with feedback. Frequency and time response, stability and closed-loop system characteristics, industrial controllers and tuning. Use of computer simulation packages. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETT 101, ETE 310.

#### **ETE 401/401L Technical Communications for ET/Laboratory (3/1)**

Techniques of writing and interpreting engineering information as related to the electronics and computer engineering field. Technical proposals, technical research papers, formal and laboratory reports, engineering specifications, oral presentations; computer methods utilized throughout. 3 lecture problems, 1 three-hour laboratory. Prerequisite: COM 204, ENG 105 or PHL 202, ETT 101, ETE 350.

#### **ETE 412/412L Introduction to C++/Windows Programming/Laboratory (3/1)**

Introduction to C++ and object-oriented programming. Introduction to Windows application programming using API functions -- menus, controls, class libraries. 3 lecture problems, 1 three-hour laboratory. Prerequisite: ETE 215 or equivalent.

#### **ETE 414/414L Linear Amplifier Circuits/Laboratory (3/1)**

Analysis of multistage and large signal amplifiers. Frequency response. Ideal and non-ideal negative feedback amplifiers and their characteristics. Oscillators. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 305, 310.



**ETE 420/420L Electronic Test Instrumentation with Lab VIEW (3/1)**

Fundamentals of electronic test instrumentation and computer data acquisition systems, theory and function of electronic measurements, signal conditioning and instrumentation. Computerized data acquisition and programmable instrument control (IEEE - 488) utilizing LabVIEW graphical programming software. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 305 and ETE 310.

**ETE 435/435L Communication Systems/Laboratory (3/1)**

The study of periodically gated, amplitude, single sideband, and frequency modulation methods involved in communications systems. Receivers and telemetry systems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 305, 310 and MAT 132.

**ETE 437/437L RF Measurements/Laboratory (3/1)**

Electronic measurement equipment and techniques for measurements at radio frequencies of such quantities as power, impedance, standing wave ratio, frequency, voltage and current, Smith Charts, impedance matching, radio receiver measurements, antenna measurements. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 435.

**ETE 438/438L Microwave Techniques/Laboratory (3/1)**

Microwave safety, generation, transmission, wave guides, wave guide components and measurements. Microwave measurement systems and techniques. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 437.

**ETE 442/442L Digital Data Communications/Laboratory (3/1)**

Digital communication concepts and techniques; information codes; error detection codes; line control procedures; modes of transmission; concentrators and distributed intelligence. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ETE 344.

**ETE 445/445L Microprocessor Applications/Laboratory (3/1)**

Organization, software model, and assembly-language programming of the 80xxx family of personal computers -- applications, input/output programming, interrupts, use of the macro assembler. 3 lecture problems, 1 three-hour laboratory. Prerequisite: ETE 344.

**ETE 446/446L Switching Circuits and Devices/Laboratory (3/1)**

Analysis of circuits operating in a switched mode. Waveshaping, timing, and logic families. Special devices, A-D and D-A converters. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETT 101; ETE 230, 305, 310; MAT 131.

**ETE 450/450L Digital Control Systems/Laboratory (3/1)**

Introduction to digital control systems, sampling techniques; zero-order hold circuits, z-transforms and difference equations; digital controllers; digital filters and frequency response; applications of digital controllers in closed-loop feedback systems. 3 lecture problems, 1 three-hour laboratory. Prerequisites: MAT 132, ETT 215, ETE 350, 344.

**ETE 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**Engineering Technology Major Courses:****ETM 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**ETM 306 Applied Thermodynamics (4)**

Applications of fundamental concepts of work, heat, energy. Basic power and refrigeration cycles, and reciprocating machines. First and second law of thermodynamics as applied to engineering technologist. Use of generalized charts and handbooks in solving thermodynamic problems. 4 lectures/problem-solving. Prerequisites: ETT 211, ETT 310, MAT 131.

**ETM 308 Applied Heat Transfer (3)**

Application of empirical and algebraic equations used in the solution of practical and laboratory type of heat transfer problems. Includes three modes of heat transfer: conduction, convection, and radiation. 3 lectures/problem-solving. Prerequisite: ETM 306.

**ETM 312 Applied Fluid Mechanics II (4)**

Introduction to fluids in motion, differential and integral forms of governing equations, non-dimensional analysis and similitude; laminar and turbulent flow; gas dynamics. 4 lecture problems. Prerequisites: MAT 132, ETT 101, 110, 310, ETM306.

**ETM 315/325L Machine Elements/Laboratory (3/1)**

Practical application of the fundamentals of mechanics and strength of materials to the design of machine elements with emphasis on computer-aided design solution-problems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETT 110, 220; PHY 121.

**ETM 320/340L Power Transmission Systems/Laboratory (3/1)**

Introduction to the elements of power transmission systems, including shafting, couplings, belts, chains, gears, clutches, fluid couplings and fluid pumps and motors. Theory and operation of power transmission systems composed of above elements. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ETM 315.

**ETM 324/344L Applied Mechanisms/Laboratory (3/1)**

A study of the elements of mechanisms; cams, gears, kinematics. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETT 211, MFE 121L, MAT 131, PHY 121.

**ETM 330/330L Instrumentation and Control Applications/Laboratory (3/1)**

Theory of application of strain gages, pressure gages, and other transducer types for instrumentation and control of electromechanical systems. This will include velocity, displacement, frequency and time response. Prerequisites: MAT 132, ETE 321.

**ETM 334 Applied Heating and Air Conditioning (4)**

Thermal environmental requirements for human habitation. Psychometrics. Building heating and cooling loads. Air-handling equipment. 4 lectures/problem-solving. Prerequisite: ETM 306.

**ETM 335/345L Heating and Air Conditioning/Laboratory (3/1)**

Heating equipment; refrigeration systems and equipment. Design of a complete system of compatible components for the control of thermal environment. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ETM 334.

**ETM 401/401L Technical Communications for ET/Laboratory (3/1)**

Techniques of writing and interpreting engineering information as applied to mechanical engineering technology -- technical proposals, technical research papers, formal and laboratory reports, engineering specifications, oral presentations, computer methods utilized throughout. 3 lecture problems, 1 three-hour laboratory. Prerequisite: COM 204, ENG 105 or PHL 202, ETT 101, ETT 310 or ETM 306.

**ETM 405L Wind Tunnel Testing Laboratory (2)**

Low speed wind tunnel testing of bodies of various shapes, such as automobiles, bridges, and buildings, etc., to experimentally determine their aerodynamic drag and lift characteristics. 2 three-hour laboratories. Prerequisites: ETT 101, ETM 312, 330, ETE 321.

**ETM 410/410L Internal Combustion Engines/Laboratory (2/1)**

Theory and performance of internal combustion engines -- compression, carburetion, fuel injection, ignition, and cooling; power takeoff, use of instrumentation. Selection and rating of fuels. 3 lecture/problems, 1 three-hour laboratory. Prerequisites: ETM 306, 330.

**ETM 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**ETP 272/282L Electronic Manufacturing, PCB Fabrication/Laboratory (3/1)**

Manufacturing and fabrication processes associated with the electronics industry. High-reliability testing. Bonding, joining, cabling techniques. PCB artwork and manufacturing techniques. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 204, MFE 121L, 210L.

**ETP 276/286L Production Control/Laboratory (3/1)**

Principles of planning and controlling production activities; product development, forecasting, scheduling and loading, routing, material control, dispatching, progress reporting and corrective action. Design of production control systems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: MFE 221, 230.

**ETP 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**ETP 300 Applied Total Quality Management (3)**

Study of technological and management specialization in Total Quality Management within the engineering environment. An overview of TQM as it relates to quality leadership within an organization. 3 lectures/problem-solving. Prerequisite: junior standing.

**ETP 302 Industrial Safety (3)**

An introduction to the problems of industrial safety. Emphasis upon accident prevention and control. Covers state and federal OSHA regulations and implications of the Williams-Steiger Occupational Safety and Health Act of 1970. 3 lectures/problem-solving. Prerequisite: junior standing.

**ETP 305 Manufacturing Engineering Technology Supervision (3)**

A study of technological and professional specialization in engineering supervision. Manufacturing engineering as it relates to the translation of ideas into marketable products. Emphasis is placed upon technological and professional specialization in engineering supervision within manufacturing engineering. 3 lectures/problem-solving. Prerequisite: junior standing, ETT 305.

**ETP 355/355L Production Machining (2/1)**

Precision machining operations with emphasis on methods used in mass production. Cutting tools and fluids used in production-machining. Selection of machines and tooling for production operation. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 222.

**ETP 375 Quality Assurance (3)**

Quality planning, analysis and control. Inspection systems, process control techniques, and acceptance sampling methods. Use of statistical and other methods for assuring desired quality levels. 3 lectures/problem-solving. Prerequisite: course in fundamentals of statistics.

**ETP 377 Manufacturing Systems Engineering Methods (3)**

Analysis, application and computation of statistical methods and mathematical programming procedures as applied to engineering and industrial systems. Use of computer and software packages. 3 lectures/problem-solving. Prerequisites: ETT 110, MAT 131, course in fundamentals of statistics.

**ETP 407 Manufacturing Engineering Value Analysis (3)**

Selected topics and problems utilizing value analysis as a tool for determining the proper relationship between price, cost, and value received. An integration of technical and economical factors of quality. 3 lectures/problem-solving. Prerequisite: senior standing, ETT 305.

**ETP 408 Manufacturing Control (3)**

Problem of the various phases of starting up, operating, and maintaining an owner-managed manufacturing company. Emphasis on economic justification of alternate courses of action open to the manufacturing entrepreneur. 3 lectures/problem-solving. Prerequisite: senior standing, ETT 305.

**ETP 437/437L, 438/438L Nondestructive Evaluation I/Laboratory II/Laboratory (1/1) (1/1)**

Discontinuities in materials and their detection. Process principles and equipment for penetrant, magnetic particle, ultrasonic, radiographic and eddy current methods. Reference to other processes. Radiation health physics. 1 lecture/problem-solving, 1 three-hour laboratory. Prerequisite: ETT 307.

**ETP 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

## INDUSTRIAL AND MANUFACTURING ENGINEERING

Abdul B. Sadat, Chair

Kamran Abedini  
Klaus D. Bauch  
Farouk Darweesh  
Biman K. Ghosh

John D. O'Neil  
Sima Parisay  
Phillip R. Rosenkrantz  
Donald G. Zook

The department offers two degree programs, one in Industrial Engineering and one in Manufacturing Engineering. Each program prepares the students both for engineering practice and for graduate study. The Industrial Engineering major is concerned with the most effective methods of utilizing and integrating people, materials, and equipment in both production and service organizations. The Manufacturing Engineering major is concerned with the most effective ways of designing and developing manufacturing systems. It is possible to major in both Industrial Engineering and Manufacturing Engineering. Interested students should contact their academic advisors or the department office.

Students desiring to major in either Industrial or Manufacturing Engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly Pomona. The community college student planning to transfer into this department should consult a school counselor or this department to determine which courses meet the program requirements.

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

The department of Industrial and Manufacturing Engineering is concerned about the success of its graduates as they matriculate into the industrial world and during their careers as engineers. The department is also concerned about its curricula: Does it meet the demands of industry and the profession? For these reasons the department conducts both formal and informal outcome assessments of the progress of its graduates and the value of its curricula. Assessment is conducted by quarterly interaction with its Industry Advisory Council, by surveys of its graduates, and by surveys of the employers of its graduates. As areas needing change are brought to light they are carefully considered by the faculty, prior to implementation. Curricula changes are made through the normal curricula change channels, and the results monitored for effectiveness. In this manner the department is able to assure itself that its curricula material is state-of-the art and remains so.

### Total Quality Management Minor

The Total Quality Management (TQM) Minor may be taken by students having any major in the University, but it is particularly appropriate for students majoring in either Industrial Engineering or Manufacturing Engineering. The minor is intended to allow students to gain the knowledge and skills necessary for effective application of quality management techniques in manufacturing, service and not-for-profit organizations. The TQM Minor will help fill the need, especially for graduates in engineering and business, who are trained in the concepts, techniques, tools and methods of analysis used for the continuous improvement of product, service or process quality. Computer-based approaches are used whenever they are available and appropriate. A full

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

### INDUSTRIAL ENGINEERING

Industrial Engineering is a dynamic profession with credible growth and increasing importance. Industrial engineers use engineering principles to develop integrated systems of people, materials, and equipment. As problem-solvers, industrial engineers are equipped with practical and scientific tools to tackle complex industrial problems and to increase the productivity of workers, capital, and facilities. Industrial engineers are educated to provide valuable service to management in questions regarding the best use of people, materials, equipment, and energy. They are the engineers who design and implement productivity and quality improvement methods for industry.

The accredited industrial engineering curriculum provides a broad background in humanities and social sciences, mathematics, physical sciences, engineering science, analysis, design, and systems. It provides a good balance between the traditional industrial engineering subjects and the most recent developments in the discipline. Industrial engineering students take courses in work analysis and design, process design, human factors, facilities planning and layout, engineering economic analysis, production planning and control, systems engineering, computer utilization and simulation, operations research, quality control, automation, robotics, and productivity engineering. The program is designed to provide the student with a good foundation of basic concepts and principles in addition to applied engineering techniques. The department and university laboratories and equipment, including computers, are integrated into the coursework throughout the program.

The Industrial Engineering Program has as its educational objectives:

1. Prepare the student to function in today's highly technical environment and to provide leadership.
2. Develop competence in all areas of industrial engineering, including the methodological and computational skills necessary to operate effectively.
3. Train students in communicative skills, oral and written so that they may effectively present their solutions.
4. Prepare students to solve unstructured problems, by analytical means and synthesis and to critically evaluate their solutions.
5. Develop an appreciation of the strength of team approaches, by active use of the team solution method.
6. Instill in its students an appreciation for life-long growth in the field of industrial engineering.

Industrial Engineering students are encouraged to join the Cal Poly Pomona chapter of the Institute of Industrial Engineers. Eligible students may be invited to join the student chapter of Alpha Pi Mu, the industrial engineering honor society. There are also student chapters of the American Foundrymen's Society, the Society of Manufacturing Engineers and the American Society for Quality.

### CORE COURSES FOR MAJOR

Required of all students. A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Fundamentals of Human Factors Engineering . . . .IE	225/L	(4)
Industrial Engineering Mathematical Analysis . . . .IE	311	(3)
Elements of Industrial Engineering Systems . . . .IE	327/L	(4)
Operations Research I . . . . .IE	416	(4)
Operations Research II . . . . .IE	417	(4)

System Simulation	IE	429/L	(4)
Operations Planning and Control	IE	436/L	(3)
Industrial and Manufacturing Engineering			
Fundamentals	IME	112	(3)
Industrial and Manufacturing Engineering			
Computations Laboratory	IME	113/L	(2)
Work Analysis and Design	IME	224/L	(4)
Industrial Costs and Controls	IME	239	(3)
Production Planning and Control	IME	326	(3)
Facilities Planning, Layout and Design	IME	331/L	(4)
Quality Control by Statistical Methods	IME	415	(4)
Senior Project	IME	461	(2)
Senior Project	IME	462	(2)
IE electives (from approved list)			(6)
Manufacturing Systems Processes	MFE	201/L	(4)
C for Engineers	ECE	114	(3)

### SUPPORT AND ELECTIVE COURSES

General Chemistry	CHM	121/L	(4)
General Chemistry	CHM	122/L	(4)
Elements of Electrical Engineering	ECE	231/251L	(4)
Electronic Instrumentation and Control	ECE	333/383L	(4)
Engineering Probability and Statistics	IME	312	(3)
Undergraduate Seminar	IME	460	(2)
Analytical Geometry and Calculus	MAT	115	(4)
Analytical Geometry and Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Engineering Graphics I	MFE	126/L	(3)
Introduction to Computer Integrated			
Manufacturing	MFE	450/L	(4)
Materials Science and Engineering	MTE	207	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)

### GENERAL EDUCATION COURSES

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3, and 4 available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

(Required of all students)

#### Area 1:

Freshman English I	ENG	104	(4)
Advocacy and Argument	COM	204	(4)
English Composition	ENG	105	(4)
or Critical Thinking	PHL	202	

#### Area 2:

<u>Analytical Geometry and Calculus</u>	MAT	114	(4)
<u>Variability and Statistical Approach to</u>			
<u>Engineering Design</u>	IME	301	(3)
or <u>Statistical Methods Engineering</u>	STA	309	
Life Science	BIO	110	(3)
General Physics	PHY	131	(3)
<u>General Physics Laboratory</u>	PHY	151L	(1)
<u>General Physics Laboratory</u>	PHY	152L	(1)

<u>General Physics Laboratory</u>	PHY	153L	(1)
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#### Area 3:

3A Elective+			(4)
3B Elective+			(4)
3C Elective+			(4)
Principles of Economics	EC	201 or 202	(4)
** Political Sociology	SOC/PLS	390	(4)
3G Elective+			(4)

#### Area 4:

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

#### Area 5:

<u>Ethics and Engineering Decision Making</u>	EGR	402	(4)
<u>Capital Allocation Theory</u>	EGR	403	(4)

\*\*Course counted in multiple categories.

+One course of those indicated must satisfy the American Cultural Perspectives requirement. Underlined courses satisfy both major and GE requirements.

### MANUFACTURING ENGINEERING

The Manufacturing Engineering program contains a unique, well-balanced curriculum designed to prepare the student for a fast and productive entry into today's complex manufacturing environments. The program is one of two of its kind in California and is well-received by the industrial community. Manufacturing engineers plan, develop, and optimize the process and systems of production. They improve manufacturing productivity by developing better methods of assembling, testing, and fabricating systems and products.

Manufacturing Engineering students are given a solid foundation in production processes and techniques, properties of materials, computers and automation management, and professional communication. These building blocks are then combined and studied as manufacturing systems and then related to the most recent manufacturing technologies. Integrated sequences of courses are provided in: (1) Engineering Design Graphics; (2) Materials and Manufacturing Processes; (3) Process, Assembly and Product Engineering; (4) Manufacturing Productivity and Quality; and (5) Manufacturing Integration Methods and Systems Development. What makes the manufacturing engineering program unique is the fact that it is designed to help the students apply what they have learned through laboratory assignments, projects, field trips, trade shows, and co-op work. Students get laboratory experience in metal-removal processes, forming and assembly, computer numerical control, robotics, and CAD/CAM.

Manufacturing engineering graduates are in demand by all types and sizes of manufacturing companies because of their diversified training in traditional as well as new areas of manufacturing knowledge. The rapid growth of new technologies in computer-integrated manufacturing, robotics, lasers, artificial intelligence, and composites have opened a whole new world of opportunities for manufacturing engineers. The trend in industry is toward utilizing design engineers and manufacturing engineers as a team in order to produce more economical and functional products.

The Manufacturing Engineering curriculum detailed below prepares the graduate to excel in today's highly technical industrial environment. The educational objectives reflect outcomes as assessed by employers, graduates, and the industrial community. Program emphasis is placed on developing competence in manufacturing engineering functions, written and oral communications, teamwork, and the ability to integrate complex, interdisciplinary, manufacturing systems.



Manufacturing engineering students are encouraged to join the student chapter of the Society of Manufacturing Engineers. There are also student chapters of the American Foundrymen's Society, the Institute of Industrial Engineers, and the American Society for Quality Control.

### CORE COURSES FOR MAJOR

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

Industrial and Manufacturing Engineering		
Fundamentals . . . . .	IME 112	(3)
Industrial and Manufacturing Engineering		
Computations/Laboratory . . . . .	IME 113/L	(2)
Industrial Costs and Controls . . . . .	IME 239	(3)
Production Planning and Control . . . . .	IME 326	(3)
Facilities Planning, Layout and Design . . . . .	IME 331/L	(4)
Quality Control by Statistical Methods . . . . .	IME 415	(4)
Senior Project . . . . .	IME 461	(2)
Senior Project . . . . .	IME 462	(2)
Engineering Graphics I . . . . .	MFE 126/L	(3)
Manufacturing Processes-Materials,		
Metrology and Treatments . . . . .	MFE 217/L	(3)
Manufacturing Processes I-Material Removal . . . . .	MFE 221/L	(3)
Engineering Graphics II . . . . .	MFE 226/L	(3)
Manufacturing Processes II-Form, Cast, and Join . . . . .	MFE 230/L	(3)
Measurement and Methods/Laboratory . . . . .	MFE 320/L	(4)
Production Engineering/Laboratory . . . . .	MFE 326/L	(4)
Principles of Numerical Control . . . . .	MFE 350/L	(3)
CAD/CAM/Lab . . . . .	MFE 375/L	(4)
Manufacturing Operations Analysis . . . . .	MFE 421	(3)
Introduction to Computer Integrated		
Manufacturing . . . . .	MFE 450/L	(4)
Metal Working Theory and Applications . . . . .	MFE 465	(3)
Advanced CAM Systems/Laboratory . . . . .	MFE 476/L	(4)
Manufacturing Electives (selected with advisor's approval) . . . . .		(5)

### SUPPORT AND DIRECTED ELECTIVE COURSES

General Chemistry . . . . .	CHM 121/L	(4)
General Chemistry . . . . .	CHM 122/L	(4)
Elements of Electrical Engineering . . . . .	ECE 231/251L	(4)
Electronic Instrumentation and Control . . . . .	ECE 333/383L	(4)
Engineering Probability and Statistics . . . . .	IME 312	(3)
Undergraduate Seminar . . . . .	IME 460	(2)
Analytic Geometry and Calculus . . . . .	MAT 115	(4)
Analytic Geometry and Calculus . . . . .	MAT 116	(4)
Calculus of Several Variables . . . . .	MAT 214	(3)
Calculus of Several Variables . . . . .	MAT 215	(3)
Differential Equations . . . . .	MAT 216	(4)
Vector Statics . . . . .	ME 214	(3)
Vector Dynamics . . . . .	ME 215	(4)
Strength of Materials . . . . .	ME 218	(3)
Thermodynamics . . . . .	ME 301	(4)
Fluid Mechanics . . . . .	ME 311	(3)
General Physics . . . . .	PHY 132	(3)
General Physics . . . . .	PHY 133	(3)

### GENERAL EDUCATION COURSES

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3, and 4 available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

(Required of all students)

#### Area 1:

Freshman English I . . . . .	ENG 104	(4)
Advocacy and Argument . . . . .	COM 204	(4)
English Composition . . . . .	ENG 105	(4)
or Critical Thinking . . . . .	PHL 202	

#### Area 2:

<u>Analytical Geometry and Calculus</u> . . . . .	MAT 114	(4)
Life Science . . . . .	BIO 110	(3)
<u>General Physics</u> . . . . .	PHY 131/151L, 152L, 153L	(6)
<u>Variability and Statistical Approach to</u>		
<u>Engineering Design</u> . . . . .	IME 301	(3)
or <u>Statistical Methods Engineering</u> . . . . .	STA 309	

#### Area 3:

3a Elective+ . . . . .		(4)
3b Elective+ . . . . .		(4)
3c Elective+ . . . . .		(4)
3d Principles of Economics . . . . .	EC 201or 202	(4)
**3e and 3f Political Sociology . . . . .	SOC/PLS 390	(4)
3g Elective+ . . . . .		(4)

#### Area 4:

Introduction to American Government . . . . .	PLS 201	(4)
United States History . . . . .	HST 202	(4)

#### Area 5:

<u>Ethics and Engineering Decision-Making</u> . . . . .	EGR 402	(4)
<u>Capital Allocation Theory</u> . . . . .	EGR 403	(4)

\*Course counted in multiple categories.

+One course of those indicated must satisfy the American Cultural Perspectives requirement. Underlined courses satisfy both major and GE requirements.

### COURSE DESCRIPTIONS

All students in engineering and engineering technology curricula must satisfy ENG 104 prior to enrolling in any 300-level or higher course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

#### IE 225/225L Fundamentals of Human Factors Engineering/Laboratory (3/1)

Study of human physiological, biomechanical, and psychological characteristics and how they influence engineering and design of equipment, machines, products, facilities, tools, and environments. 3 lectures/problem-solving, 1 three-hour laboratory.

#### IE 311 Industrial Engineering Mathematical Analysis (3)

Application of linear equations, matrices, and determinants to the solution of industrial engineering problems. Mathematical analysis of the effects of changes in system's operating parameters on product/service performance, quality, and cost. 3 lectures/problem-solving. Prerequisite: MAT 214.

#### IE 327/327L Elements of Industrial Engineering Systems/Laboratory (3/1)

Concepts and principles of system engineering theory. Introduction to the theory and methodology of engineering systems. Development of analytic techniques to establish needs, objectives, priorities and utilities, and the evaluation of system effectiveness. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: IE 311.

**IE 392 Principles of Productivity Engineering (3)**

Productivity definitions, concepts, and trends, use of various industrial engineering techniques in productivity improvement, relationship between productivity and profit, phases of a productivity improvement project, case studies. Plant visits and guest speakers. 3 lectures/problem-solving. Prerequisite: upper division standing.

**IE 403 Engineering Cost Estimating (3)**

Concepts and techniques of forecasting and estimating costs of engineering, manufacturing and service operations, products, equipment, projects, and systems. Preliminary and detailed procedures. Qualitative, quantitative and computer methods. 3 lectures/problem-solving. Prerequisite: junior standing in engineering.

**IE 416 Operations Research I (4)**

Applications of linear programming and non-linear programming, queuing theory, and other analysis techniques to problems encountered in industry and business. 4 lectures/problem-solving. Prerequisites: IE 311.

**IE 417 Operations Research II (4)**

Development and application of planning and inventory models, networks and graph techniques, Markov analysis, waiting lines, simulation, and sequencing and scheduling algorithms to problems encountered in industry and business. 4 lectures/problem-solving. Prerequisite: IME 312.

**IE 419 Reliability Concepts and Techniques (3)**

Reliability concepts and techniques as used in various types of industrial organizations. Analysis of the influence of reliability on such factors as complexity, state of the art, and environment. Component reliability related to systems requirements. 3 lectures/problem-solving. Prerequisite: IME 312.

**IE 426 Applied Decision Theory (3)**

Introduction to decision theory and its applications. Modern utility theory and its application to decision-making under risk and uncertainty. Applications of Bayesian decision theory. Emphasis on applications covering a wide range of both profit and nonprofit-oriented institutions. 3 lectures/problem-solving. Prerequisite: IME 312 or equivalent.

**IE 429/429L Industrial Systems Simulation (3/1)**

Systems analysis, design, and measurement. Data gathering and analytical tools used in formulating and optimizing work systems. Theory of systems concepts based on logical synthesis and empirical analysis. Case studies and industrial simulations. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: IME 312.

**IE 436/436L Operations Planning and Control/Laboratory (2/1)**

Analysis and design of systems for planning, scheduling and controlling production, inventory and service operations/activities. Use of mathematical and computer models. Projects and open-ended problems. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: IE 327, IE 416, IME 326.

**IE 437 Industrial Engineering Systems (3)**

Concepts of systems engineering methodology. Methods of technological forecasting and future study. The design and analysis of complex systems under conditions of risk uncertainty and changing environment. 3 lectures/problem-solving. Prerequisite: IE 327.

**IE 490/490L Luminaries Design and Manufacture (3/1)**

The design and manufacture of luminaries for various purposes and intents. This course will cover the fundamental strategies of efficient luminary design and manufacture. Through understanding the characteristics of different lamps, with the integration of enclosure material and geometry, the intent of luminary design will be evaluated on the merits of output, esthetics, and economics. The manufacturing of luminaries will uncover the technical issues in the production and economics of luminary design. 3 lectures/problem-solving. 1 three-hour laboratory.

**IME 112 Industrial and Manufacturing Engineering Fundamentals (3)**

Introduction to industrial and manufacturing engineering concepts, functions, and techniques. Solution of elementary industrial and manufacturing engineering problems. 3 lectures/problem-solving.

**IME 113/113L Industrial and Manufacturing Engineering Computations/Laboratory (1/1)**

Fundamentals of digital computer methods, logic diagramming, programming in a high-level language. Computer solutions of elementary industrial and manufacturing engineering problems. 1 lectures/problem-solving, 1 three-hour laboratory.

**IME 134/134L Molding and Casting/Laboratory (1/1)**

Shaping of metals while in the liquid state, common molding and casting techniques for both ferrous and non-ferrous materials and alloys. 1 lectures/problem-solving, 1 three-hour laboratory.

**IME 224/224L Work Analysis and Design/Laboratory (3/1)**

Theory and application of work analysis as related to process design, facilities, workplace layout, tools and equipment, and services. Analytical techniques of measurement of work content including stopwatch time study, standard data, predetermined time systems, computerized work measurement and work sampling. 3 lectures/problem-solving, 1 three-hour laboratory.

**IME 239 Industrial Costs and Controls (3)**

Engineering approach to cost recording, budgetary procedures and controls. Estimating production costs. Engineering problems. Current techniques in automating the cost recording and cost control functions. 3 lectures/problem-solving.

**IME 280 Processes and Measurement (4)**

Commonly-used manufacturing and service processes and systems, units of measurement, and measurement techniques. Introduction to process capability and the continuous improvement process. Prerequisite: STA 120 or STA 309 or equivalent.

**IME 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**IME 301 Variability and the Statistical Approach to Engineering Design (3)**

The study of variability in real-world engineering problems. Graphical methods of data analysis. Importance of the statistical approach to engineering design. The role of statistical tools in design and development. 3 lectures/problem-solving. Prerequisite: MAT 116.

**IME 312 Engineering Probability and Statistics (3)**

Engineering applications of the concepts of probability, statistical distributions, statistical analysis, regression and correlation analysis, analysis of variance and covariance, design of experiments, and probabilistic and statistical models. 3 lectures/problem-solving. Prerequisite: IME 301 or STA 309.

**IME 326 Production Planning and Control (3)**

Principles of production planning and control systems. Methods of forecasting, planning, scheduling, and controlling production operations and inventory activities. Quantitative models and computer systems. 3 lectures/problem-solving. Prerequisites: IME 112, IE 225, IME 224, IME 312.

**IME 328/328L Electronic Process Design/Laboratory (1/1)**

Design of manufacturing processes with particular emphasis on processes used in the electronics industry. Evaluation of alternative methods of processing depending upon delivery, volume, and quality specifications. Types of processes included are finishing, plating, printed circuit board production, component preparation and installation, chassis construction, electroforming, and packaging. 1 lecture/problem-solving, 1 three-hour laboratory. Prerequisite: basic electronic and drafting course or consent of instructor.

**IME 331/331L Facilities Planning, Layout and Design/ Laboratory (3/1)**

Planning and designing facilities, layouts, and material handling systems. Systems engineering approach; quantitative analysis methods; computerized techniques. Projects. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: MFE 201 or consent of instructor, IME 326. MFE 126/L recommended.

**IME 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**IME 415 Quality Control by Statistical Methods (4)**

Systems of inspection, analysis and action taken to control the quality of manufacturing processes. Process control techniques, acceptance sampling methods, statistical analysis and other techniques used by management to control costs and improve quality. 4 lectures/problem-solving. Prerequisite: IME 312.

**IME 435/435L Design of Experiments (3/1)**

Introduction to design and analysis of experiments. Applications in product and process design and development; process correction and quality improvement. Taguchi's loss-function approach to quality; signal-to-noise ratio analysis. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: IME 312.

**IME 455/455L Principles of Robotics/Laboratory (2/1)**

Components of robots, industrial robots, robot programming, economics of robotics, interfacing robots with process machines, parts feeders, conveyors and inspection devices, robot controllers, microprocessors, applications, case studies, plant visits. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: senior standing.

**IME 460 Undergraduate Seminar (2)**

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 seminars. Prerequisite: senior standing.

**IME 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: IME 460.

**IME 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**MFE 126/126L Engineering Graphics I/Laboratory (2/1)**

Engineering graphics for product design, manufacturing and construction. Emphasis on graphic communication used for processing parts and layouts. Orthographic projection, pictorial views, section and auxiliary views, dimensioning for production-processing, and the four fundamental views of descriptive geometry. Use of instruments and CAD for engineering drawings. 2 lectures/problem-solving, 1 three-hour laboratory.

**MFE 201/201L Manufacturing Systems Processes/Laboratory (3/1)**

Study of basic manufacturing processes with emphasis on terminology, technology, process principles and capabilities, material selection and comparative advantages and disadvantages. Processes discussed include material removal, joining, assembly and casting. Other topics include NC, measurement and gaging, and statistical methods. 3 lectures/problem-solving, 1 three-hour laboratory.

**MFE 217/L Manufacturing Processes -- Materials, Metrology and Treatments (2/1)**

First in a three-course sequence. Provides basic knowledge of engineering materials and the enhancement of their mechanical properties. measurement methods and process controls. Statistical process control; heat treatment of materials; electronic manufacturing and surface technology. 2 lectures/problem-solving, 1 three-hour laboratory.

**MFE 221/221L Manufacturing Processes I--Material Removal (2/1)**

An introduction to science of metal removal and the physics of metal cutting as related to cutting tool geometry, material being cut and machine tools being used. Consideration of machine speeds, feeds, tolerances and surface finish determinates as related to both manually and numerically controlled machines, dynamics of metal cutting, tool life analysis, economics of machining, the concept of group technology in cellular and flexible modes. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 217 or equivalent.

**MFE 226/226L Engineering Graphics II/Laboratory (2/1)**

Engineering graphics for manufacturing. Emphasis on preparation and use of detail drawings and assembly drawings and application of geometric and positional tolerancing (ANSI Y14.5). Interpretation of engineering drawings, representation of threads and fasteners, and assembly drawings using CAD. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 126/126L or equivalent.

**MFE 334/L Foundry Process Engineering (2/1)**

Investigation of the various casting techniques characteristic of modern foundry practice. Green sand, sodium silicate, shell core, shell mold, investment, die casting and lost foam considered in relation to required molds, patterns, melting processes and materials. Computer

applications include simulation software for mold system design. 2 lecture/problems. Prerequisites: MFE 126, MFE 217, MFE 230 or MFE 201 or equivalents.

### **MFE 230/230L Manufacturing Processes II--Forming, Casting and Joining (2/1)**

Theory and practice related to processes dealing with the deformation, consolidation and casting of engineering materials. Modern manufacturing methods are explored with emphasis placed on the application of engineering principles to the production of marketable products. Topics include: molding, casting, powder metallurgy, hot and cold working, welding and heat treating manufacturing processes and introductory exposure to manufacturing systems. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 217 or equivalent.

### **MFE 246L Graphics for Electronics (2)**

Principles and techniques for design and drafting of printed circuit and integrated circuit electronic packaging systems. Design considerations, problems and practices are evaluated in the development and adaptation of electronic circuits and artwork for electronic and electrical printed circuit production processes. 2 three-hour laboratories. Prerequisite: basic electronics and drafting courses.

### **MFE 310/310L Advanced Computer-Aided Drafting/Laboratory (2/1)**

Advanced commands and the development of skills in 3-D visualization, application of advanced drawing techniques for assembly modeling; wireframe and solid modeling. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 121, MFE 126/L or equivalent.

### **MFE 320/320L Measurement and Methods/Laboratory (3/1)**

Commonly used units of measurement, measurement devices and measurement techniques found in industrial and environmental systems including dimensional measurement, force, electricity, time and work, noise, light, temperature, humidity, atmospheric constituents and radiation. Emphasis on metrology, work measurement and methods improvement. Introduction to process capability, measurement assurance and the continuous improvement process. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: consent of the instructor.

### **MFE 323/323L Geometric Dimensioning and Tolerancing (2/1)**

Basics of dimensioning and tolerancing, tolerances of form and position. Government and industry requirements. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 121L or MFE 126/126L or equivalent.

### **MFE 326/326L Production Engineering/Laboratory (3/1)**

The utilization of engineering concepts in the planning and design of processes and products. Selection of appropriate manufacturing processes and systems; sequences of operations, equipment and facilities; methods and tooling to assure optimum producibility. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: MFE 217/L, MFE 221/L and MFE 230/L.

### **MFE 350/350L Principles of Numerical Control (2/1)**

Principles and applications of numerical control in manufacturing, manual and computer-assisted programming, CNC systems including microprocessor applications to production processes, advanced NC systems for full contouring, macro- and variable programming, programmable controllers for CNC and DNC applications in industry. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 221 or equivalent.

### **MFE 375/375L Computer-Aided Design/Computer-Aided Manufacturing/Laboratory (3/1)**

Integration of computer-aided design principles, part design specifications and producibility concepts in computer-aided manufacturing applications. Emphasis on machine tools for flexible automation, CNC machining data generation, CAD/CAM interface and communication of automated systems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 350/L and MFE 126/L or equivalent.

### **MFE 380/380L Manufacturing Metrology (1/1)**

The science of engineering measurement as used in inspection and quality control. Emphasis is placed on the general use of scientific measuring devices and how these devices can be used to secure optimal conditions of manufacture. 1 lecture/problem, 1 three-hour laboratory.

### **MFE 406 Safety Engineering (3)**

Principles of safety engineering applied to manufacturing systems. Control of noise, heat, electrical hazards, vibration, radiation, lighting, and air contaminant's in the workplace. Accident prevention. Material handling safety, machine guards and personal protection equipment. 3 lectures/problem-solving.

### **MFE 410/410L Computer-Aided Design (1/1)**

Introduction to interactive computer graphics systems with emphasis on its application in engineering design. Course taught in an industrial environment. 1 lecture/problem, 1-three hour laboratory. Prerequisites: a course in computer programming, MFE 126/L or equivalent.

### **MFE 411/411L Manufacturing Processes-Finishing (1/1)**

A comprehensive overview of the possibilities and limitations of finishing processes for both metallic and non-metallic materials. Consideration of cleaning methods, surface conditioning, and coating processes as related to obtaining high-quality products at reduced manufacturing costs. 1 lecture/problem, 1 three-hour laboratory. Prerequisite: MFE 201/L or equivalent.

### **MFE 421 Manufacturing Operations Analysis (3)**

Analysis of manufacturing operations with emphasis on system optimization, problem solving, feasible systems alternatives and cost considerations. 3 lectures/problem-solving. Prerequisites: IME 312.

### **MFE 438/438L Plastics Engineering I/Laboratory (2/1)**

An investigation of non-metallic plastic materials, their sources, and polymer combination. Overview of organic chemistry as it relates to plastics polymer chemistry. Plastic formulas, mixing characteristics, flow characteristics, stability and additives. Basic plastic polymers (both thermosetting and thermoplastic resins). 2 lectures/problem-solving, 1 three-hour laboratory.

### **MFE 450/450L Introduction to Computer Integrated Manufacturing/Laboratory (3/1)**

Principles of high volume manufacturing systems, automated material handling and storage devices, control systems in manufacturing, data communication, part recognition. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ECE 333 or ETE 210 or equivalent.

### **MFE 465 Metal Working Theory and Applications (3)**

Three-dimensional stress and strain analysis, yield criteria for ductile metals. Stress-strain relations. Phenomenological nature of engineering metals. Plane strain plastic deformation. Plastic strain with axial



symmetry and pseudo plane stress. Extremum principles for plastic material. 3 lectures/problem-solving. Prerequisites: MFE 221, MFE 230, ME 218.

#### **MFE 476/476L Advanced Computer-Aided Manufacturing Systems/Laboratory (3/1)**

Principles of group technology, cellular manufacturing, computer-aided process planning, flexible manufacturing systems and computer networks in manufacturing. Applications of artificial intelligence and expert systems in manufacturing. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 450/450L.

#### **MFE 484 Producibility Engineering (3)**

Engineering methodologies and design practices which have proven in industry to improve product producibility, reliability, and quality are presented. Concepts include concurrent engineering, just-in-time manufacturing and cellular arrangements for flexible manufacturing.

#### **MFE 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.



## MECHANICAL ENGINEERING

George F. Engelke, Chair

Leonard Berkowitz  
John R. Biddle  
Peter A. Dashner  
Uei-Jiun Fan  
Edward M. Gates  
Vladimir Glzman  
James D. Goodin  
William C. Hauser

Gary W. Koonce  
David L. Miller  
Carl E. Rathmann  
Hassan M. Rejali  
Charles L. Ritz  
Kenneth J. Schneider  
Michael T. Shelton  
William B. Stine

Mechanical engineering has traditionally been one of the most general branches of engineering. A mechanical engineer requires a broad knowledge in many fields: mechanics, thermal/fluid sciences, design, machinery and instrumentation, energy, control system theory and more. The breadth and flexibility of a mechanical engineer's education provides a wide choice of careers and allows movement into a variety of engineering areas to better meet the challenges of a changing world. The accredited mechanical engineering curriculum permits students to explore different fields, specializing in one or more of them as they find their true interests. In particular, the curriculum is designed such that the graduating engineer: a) will have the ability to apply advanced mathematics through multivariate calculus and differential equations and be familiar with statistics and linear algebra; b) will have the ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems; c) will have knowledge of contemporary analytical, computational, and experimental practices; d) will have competence in experimental design, data collection, data analysis, and use of computational tools; and e) have knowledge of chemistry and calculus based physics with depth in at least one of them.

During the junior and senior years, approved technical electives packages in various areas of Mechanical Engineering are available to students. These areas are: Energy (Thermal/Fluid Sciences), Machine Design, and Mechanics. Those students who wish to further their knowledge in these specific areas may take **all** of their technical elective units from any one of these packages. These students will be awarded a certificate attesting to the fact that they have successfully completed the courses in a particular area. Others, who would like to have a more general knowledge of the Mechanical Engineering field, can choose their technical elective courses from any combination of the packages.

Principles developed in the classroom are applied to the operation and testing of heat transfer equipment, fluid handling equipment, energy, energy systems, environmental control systems, internal and external combustion engines and engineering materials in the various laboratories.

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

Mechanical engineers work in industry, business, government, universities, and in the professions of law and medicine. They are involved in research, development, design, testing, production, operation, maintenance, marketing, sales, administration, management, and education. Graduates of the program are prepared to do productive work in their first jobs as well as to grow with their profession

throughout their engineering career. The curriculum is designed to prepare a student for direct entry into the engineering profession and for graduate school.

Mechanical engineering students are encouraged to become active in the student chapters of the Society of Mechanical Engineers, the Society of Automotive Engineers, the American Society of Heating, Refrigeration and Air Conditioning Engineers, and The Association of Energy Engineers. Qualified students are invited to join the student chapter of Pi Tau Sigma, the mechanical engineering honor society.

### CORE COURSES FOR MAJOR

Required of all students. A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Mechanical Engineering Orientation .....	ME100L	(1)
Engineering Digital Computations .....	ME 232/L	(3)
Vector Statics .....	ME 214	(3)
Vector Dynamics .....	ME 215	(4)
Strength of Materials .....	ME 218	(3)
Strength of Materials .....	ME 219	(3)
Strength of Materials Laboratory .....	ME 220L	(1)
Mechanics Laboratory .....	ME224L	(1)
Engineering Materials .....	ME 225	(4)
Introduction to Mechanical Design .....	ME 235/L(3/1)	
Thermodynamics .....	ME 301	(4)
Thermodynamics .....	ME 302	(4)
Fluid Mechanics .....	ME 311	(3)
Fluid Mechanics .....	ME 312	(3)
Fluid Mechanics Laboratory .....	ME 313L	(1)
Intermediate Dynamics .....	ME 316	(4)
Stress Analysis .....	ME 319	(3)
Machine Design .....	ME 325/L(3/1)	
Materials Design Laboratory .....	ME 350L	(1)
Heat Transfer .....	ME 415	(4)
Advanced Engineering Measurements .....	ME 435/L(3/1)	
Senior Project .....	**ME 461	(2)
Senior Project .....	**ME 462	(2)
Undergraduate Seminar .....	ME 463	(2)
Analytical Geometry and Calculus .....	MAT 115	(4)
Analytical Geometry and Calculus .....	MAT 116	(4)
Calculus of Several Variables .....	MAT 214	(3)
Calculus of Several Variables .....	MAT 215	(3)
Differential Equations .....	MAT 216	(4)
General Physics .....	PHY 131/151L(4)	
General Physics .....	PHY 132/152L(4)	
General Physics .....	PHY 133/153L(4)	

### ELECTIVE AREAS AND COURSES (19 units)

(Required of all students)

A total of 19 units of course work is dedicated to enhancing the student's knowledge of a particular area of Mechanical Engineering or his/her general knowledge of the field. Courses in three areas are offered as packages whereby the student may select all of the 19 units from the courses in one of these areas. Upon graduation, the student will be issued a certificate by the department testifying that he/she has successfully completed the courses in the particular package.

Students who wish to minor in a particular area of engineering may petition to have the required courses for the minor accepted as technical electives. ME 499 and graduate level courses are also acceptable as technical electives.

Alternatively, students may choose to select a mixture of courses from the three areas as their technical elective courses. No more than four units of the total of 19 units of technical electives may be taken outside of the Mechanical Engineering Department. The courses in the three areas are as follows:

### Energy (Thermal/Fluid Sciences)

Energy Management	ME	306	(4)
Alternative Energy Systems	ME	307	(4)
Synthesis of ME Problems	ME	340	(3)
Acoustics and Noise Control	ME	405	(4)
Finite Element Analysis	ME	406	(4)
Solar Thermal Engineering	ME	407/L	(3/1)
Nuclear Engineering	ME	408	(4)
Kinetic Theory/Statistical Thermodynamics	ME	409	(4)
Heat Power	ME	411/L	(3/1)
Internal Combustion Engines	ME	412/L	(3/1)
Mechanical Vibrations	ME	413	(4)
Building Energy Calculations	ME	417/L	(3/1)
Air Conditioning	ME	418/L	(3/1)
Thermal Systems Design	ME	427	(4)

### Machine Design

Machine Design/Laboratory	ME	326/L	(3/1)
Acoustics and Noise Control	ME	405	(4)
Finite Element Analysis	ME	406	(4)
Mechanical Vibrations	ME	413	(4)
Dynamics of Machinery/ Laboratory	ME	421	(4)
Human Engineering in Design/ Laboratory	ME	438/L	(2/1)
Design of Machine Controls/ Laboratory	ME	439/L	(3/1)

### Mechanics

Synthesis of ME Problems	ME	340	(3)
Finite Elements Analysis	ME	406	(4)
Mechanical Vibrations	ME	413	(4)
Dynamics of Machinery	ME	421	(4)

### SUPPORT COURSES

(Required of all Students)

General Chemistry	CHM	122	(3)
Engineering Graphics I	MFE	126/L	(2/1)
Engineering Graphics II	MFE	226/L	(2/1)
Elements of Electrical Engineering	ECE	231/251L	(3/1)
Manufacturing Systems Processes	MFE	201/L	(3/1)

\*\*ME 460 or ME 471, ME 472, and ME 473 may be substituted.

### GENERAL EDUCATION COURSES

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3, and 4 available for students in this major is the Interdisciplinary General Education (IGE) Program. Please see the description of IGE elsewhere in this catalog.

#### Area 1:

Freshman English I	ENG	104	(4)
Mechanical Engineering Communications	ME	231	(4)
or Freshman English II	ENG	105	(4)
Advocacy and Argument	COM	204	(4)

#### Area 2:

<u>Analytical Geometry and Calculus</u>	MAT	114	(4)
<u>General Chemistry</u>	CHM	121/L, 122L	(5)
Life Science	BIO	110	(3)
<u>Engineering Numerical Computations</u>	ME	330	(4)

#### Area 3:

3A Elective+			(4)
3B Elective+			(4)
3C Elective+			(4)
Principles of Economics	EC	201 or 202	(4)
*Political Sociology	SOC/PLS	390	(4)
3G Elective+			(4)

#### Area 4:

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

#### Area 5:

<u>Electronic Instrumentation and Control</u>	ECE	333/383L	(4)
<u>Capital Allocation Theory</u>	EGR	403	(4)

\* Course counted in multiple categories.

+One course of those indicated must satisfy the American Cultural Perspectives requirement. Underlined courses satisfy both major and GE requirements.

### COURSE DESCRIPTIONS

All students in engineering and engineering technology curricula must satisfy ENG 104 prior to enrolling in any 300-level or higher course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

#### ME 100L Mechanical Engineering Orientation (1)

Introduction to the resources and facilities of the mechanical engineering department. An overview of career opportunities and introspection about mechanical engineering. Various forms of engineering communication including report writing, graphical presentations and problem-solving format. Becoming conversant with unit systems and dimensional analysis. 1 three-hour laboratory.

#### ME 232/232L Engineering Digital Computations/Laboratory (3)

Problems involving basic computational methods including elementary concepts of digital computer programming. Proficiency will be gained in writing computer programs. Assignments include the use of the computer facilities. 3 lectures/problem-solving. Corequisite: MAT 114.

#### ME 214 Vector Statics (3)

Two and three dimensional equilibrium of frames, machine and trusses employing vector algebra. Principles of friction, centroids and center of gravity, moments of inertia for areas and masses. 3 lectures/problem-solving. Prerequisites: MAT 115 and C or better in PHY131. Corequisite (for ME students) : ME 224L Mechanics Laboratory.

#### ME 215 Vector Dynamics (4)

Vector mathematics of absolute and relative motion of particles and the planar motion of rigid bodies in an inertial reference frame. Newton's laws of motion, work-energy, impulse-momentum. 4 lectures/problem-solving. Prerequisite: MAT 116 and C- or better in ME 214.

#### ME 218 Strength of Materials (3)

Plane stress and strain. Principal stresses and strains, Mohr's Circle.



Properties of materials, stress strain diagrams. Generalized Hooke's Law for isotropic materials. Design loads, working stresses, and factor of safety. Statically indeterminate axially-loaded members. Torsional shearing stresses and displacements. Combined axial and torsional loads. Flexural and transverse shear stresses. Shear and moment diagrams. Beams of two materials. Thin-walled pressure vessels. 3 lectures/problem-solving. Prerequisite: C- or better in ME 214.

#### **ME 219 Strength of Materials (3)**

Deflection and slope of beams by double integration, singularity functions, superposition and energy methods. Statically indeterminate beams. Column analysis with centric and eccentric loads. Combined axial, torsional, and flexural stresses. Theories of failure (ductile and brittle). Thick-walled pressure vessels. 3 lectures/problem-solving. Prerequisite: C- or better in ME 218.

#### **ME 220L Strength of Materials Laboratory (1)**

Standard physical tests of engineering materials including torsion, tension, compression and bending. Experimental stress analysis using strain gages. 1 three-hour laboratory. Corequisite: ME 219. Prerequisites: C- or better in ME 231 and ME 224L. A score of 6 or better on GWT or consent of instructor.

#### **ME 224L Mechanics Laboratory (1)**

Spatial visualization, free-body diagramming, vector manipulation, force transmission and distribution, force balances, force-moment equivalences, practice in recognizing and developing problem-solving techniques. 1 three-hour laboratory. Corequisite: ME 214

#### **ME 225 Engineering Materials (4)**

Relevance of materials science concepts in engineering. Metallurgy and strengthening methods for ferrous and non-ferrous metals. Engineering properties and applications of metals, plastics, ceramics, elastomers, and composites. Principles of corrosion protection. 4 lectures/problem-solving. Prerequisites: CHM 112, C- or better in ME 218.

#### **ME 231 Mechanical Engineering Communications (4)**

The mechanics of effective engineering communications. Composition and style of various types of written and oral presentations of technical information. Critical analysis of specifications related to the design, test and performance of components and systems typically found in the field of mechanical engineering. 4 lectures/problem-solving. Prerequisite: ENG 103 or 104, C- or better in ME 214.

#### **ME 233/233L Introduction to Mechanical Design (3/1)**

Introduction to machine and product design techniques and the design and selection of power transmission elements such as couplings; U-joints; roller and silent chains; V, flat and gear belts; gears and gear transmissions; friction drives; electric motors. Introduction to shaft design, bearings and attachments. The execution of layouts and engineering specifications for manufacture. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: MFE 126/126L, C- or better in ME 214 and ME 224L.

#### **ME 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

#### **ME 301 Thermodynamics (4)**

Thermodynamic properties and processes; equations of state; tables and charts of thermodynamic properties; work and heat, the first law of thermodynamics and first law properties; the second law of thermodynamics and entropy; power cycles, 4 lectures/problem-solving. Prerequisites: PHY 132.

#### **ME 302 Thermodynamics (4)**

Rankine cycle and its variations; refrigeration cycles; advanced Brayton cycle and Otto and Diesel cycles; mixtures of ideal gases; Maxwell relations; chemical thermodynamics. 4 lectures/problem-solving. Prerequisite: C- or better in ME 301.

#### **ME 306 Energy Management (4)**

Energy system modeling; forecasting techniques; analysis of energy requirements; energy audits; net energy analysis; conservation strategies; energy, environment and economics interface; role of energy management and case studies. 4 lectures/problem-solving. Prerequisite: C- or better in ME 301 or equivalent.

#### **ME 307 Alternative Energy Systems (4)**

Analysis and synthesis of energy systems; fossil fuel systems; viable alternative energy sources, solar, geothermal, wind, biomass, hydro and ocean resources; conversion, storage, and distribution. Environmental impact and economics of alternative systems. Synthesis of energy system components. 4 lectures/problem-solving. Prerequisites: C- or better in ME 301.

#### **ME 311 Fluid Mechanics (3)**

Analysis and problems dealing with properties and behavior of fluids at rest and in motion. Fundamental concepts; fluid statics; transport theorem; flow of incompressible frictionless fluid; laminar and turbulent flow of real fluids in closed conduits; impulse and momentum applied to fluids; fluid measurement. 3 lectures/problem-solving. Prerequisites: PHY 132 and MAT 214. C- or better ME 215.

#### **ME 312 Fluid Mechanics (3)**

Similarity and dimensional analysis; steady closed conduit flow in pipe networks; flow of real compressible fluids; additional topics selected from boundary layers, turbulence, drag and dynamic machinery. 3 lectures/problem-solving. Prerequisite: C- or better in ME 301 and 311.

#### **ME 313L Fluid Mechanics Laboratory (1)**

Measurement of viscosity, centrifugal pump performance, pressure drop in a pipe, air velocity distribution from a fan discharge. Calibration and use of laboratory equipment; acquisition, processing, and analysis of data by manual and automated methods; report writing. 1 three-hour laboratory. Prerequisites: a score of 6 or better on the GWT, C- or better in ME 231. Corequisite: ME 312.

#### **ME 316 Intermediate Dynamics (4)**

Three-dimensional particle and rigid body dynamics, motion relative to rotating reference frames, moments and products of inertia, momentum and energy principles, gyroscopic motion, analysis of single degree of freedom vibrating systems. 4 lectures/problem-solving. Prerequisite: C- or better in ME 215 and MAT 216.

#### **ME 319 Stress Analysis (3)**

Stress concentration. Repeated loading involving fatigue and endurance strength. Shaft design. Introduction to energy methods. Design of screws,



fasteners, and connections. Shrink fit. Special topics. 3 lectures/problem-solving. Prerequisites: C- or better in ME 219 and ME 220.

### **ME 325/325L Machine Design/Laboratory (3/1)**

Design and application of machine components such as brakes, clutches, gears, mechanisms, bearings, ways, sleeves, and bushings. Lubrication of machine elements, gaskets, seals, "o" rings, and fasteners. Design techniques and the design of a simple machine. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: MFE 201/201L, MFE 226/L. C- or better in ME 215, ME 233/233L and ME 319.

### **ME 326/336L Machine Design/Laboratory (3/1)**

The emphasis of this course will be placed on the actual process of design. Lectures and laboratories will be devoted to the design of complete mechanisms and machines based on solid modeling and finite element analysis. The projects are so chosen as to demand the application of knowledge learned in other courses and act as a synthesizing agent. Real industrial problems are used as projects. 1 lectures/problem-solving, 1 three-hour laboratories. Prerequisite: C- or better in ME 325/325L.

### **ME 330 Engineering Numerical Computations (4)**

Numerical methods applied to the solution of problems in engineering. Roots of equations, matrix methods, curve fitting, numerical integration and differentiation, numerical solution of differential equations. 4 lectures/problem-solving. Prerequisites: MAT 216, and C- or better in ME 132 or equivalent.

### **ME 340 Synthesis of Mechanical Engineering Problems (3)**

Analysis and synthesis of steady-state and transient engineering problems associated with mechanical engineering. Emphasis is placed upon formulating the differential or fundamental equations from basic assumptions and applying various methods of solution. 3 lecture/problems. Prerequisite: MAT 216, C- or better in ME 215, 301, 311.

### **ME 350L Materials Science and Selection Laboratory (1)**

Laboratory tests of cold working, annealing, heat treatment, galvanic corrosion, and mechanical properties of materials. Material selection for prescribed applications. 1 three-hour laboratory. Prerequisite: C- or better in ME 225 and ME 231, or equivalent.

### **ME 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. The student(s) must submit a proposal of the work to be done to the ME Curriculum Committee and obtain the committee's approval before beginning the proposed effort. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### **ME 405 Acoustics and Noise Control (4)**

Fundamental acoustic parameters (dB, dBA, PSIL, octave band). Physiological response to noise. Noise standards. Sound pressure-power relation. Noise measurement, with individual experience using a Precision Integrating Noise Meter. Noise suppression by absorption, isolation and resonators. Case studies in noise control and reduction. 4 lectures/problem-solving. Prerequisite: C- or better in ME 301, or ME 311, or consent of instructor.

### **ME 406 Finite Element Analysis (4)**

Stiffness and influence coefficients. Shape functions. Element stiffness. Coordinate transformations. Assemble stiffness matrix. Solution to give deflections and forces, or analogous parameters for heat transfer and

fluid flows. Apply a widely-used finite element computer program (NASTRAN) to structure design, heat transfer and/or fluid flow. 4 lectures/problem-solving. Prerequisite: C- or better in ME 330 and ME 319 or consent of instructor.

### **ME 407/407L Solar Thermal Engineering (3/1)**

Solar radiation distribution and measurement; methods of solar energy collection; thermal analysis of flat plate solar collectors; experimental testing and efficiency determination; solar energy storage; solar economics; transient and long-term system performance; computer modeling for solar space and water-heating applications. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: C- or better in ME 301.

### **ME 408 Nuclear Engineering (4)**

Nuclear power plant design, operation and safety. Reactor vessel internal and core components. Nuclear physics. Neutron reactions, fission and moderation. Reactor physics and reactor kinetics. 4 lectures/problem-solving. Prerequisites: MAT 216, PHY 133, C- or better in ME 301.

### **ME 409 Kinetic Theory/Statistical Thermodynamics (4)**

Review of classical thermodynamics; kinetic theory of an ideal gas; distribution of molecular velocities; transport phenomena; quantum mechanics; Bose-Einstein quantum statistics; Maxwell-Boltzmann statistics; partition functions; advanced kinetic theory. 4 lectures/problem-solving. Prerequisite: C- or better in ME 302 and ME 312, or equivalents.

### **ME 411/411L Heat Power/Laboratory (3/1)**

Application of the principles of thermodynamics to actual power plant cycles. Rankine cycle and its variations; boiler and steam turbine heat balance and efficiency; steam plant auxiliaries, plant heat balance and efficiency; gas turbine and combined cycles. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: C- or better in ME 302 and ME 311.

### **ME 412/412L Internal Combustion Engines/Laboratory (3/1)**

The development of analytical and experimental techniques to estimate the performance of internal combustion engines. Discussion includes ideal and actual cycles, combustion, carburetion, fuel injection, ignition, supercharging, cooling, and fuels as applied to spark ignition and compression ignition engines. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: C- or better in ME 302.

### **ME 413 Mechanical Vibrations (4)**

Free and forced vibration with and without damping. Periodic and aperiodic excitation. Rotating unbalance, vibration isolation, vibration measuring instruments, vibration of multiple degree of freedom systems, flexibility and stiffness coefficients, transfer matrices, computational methods. 4 lectures/problem-solving. Prerequisites: C- or better in ME 316 and ME 330 or equivalent.

### **ME 415 Heat Transfer (4)**

Basic principles of conduction, convection, and radiation heat transfer. One-dimensional and multi-dimensional conduction, steady and unsteady state. Theoretical and empirical relations for free and forced convection in external surface flows and in tube and duct flows. Heat exchangers. Basic laws of radiation heat transfer, radiation properties of surfaces and radiant energy exchange among simple surfaces. 4 lectures/problem-solving. Prerequisites: MAT 216, C- or better in ME 301 and ME 311.

**ME 417/417L Building Energy Calculations/Laboratory (3/1)**

Psychometrics; thermal environmental requirements for human habitation; calculation of building heating and cooling loads; predicting building energy use. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: C- or better in ME 302 and ME 311.

**ME 418/418L Air Conditioning/Laboratory (3/1)**

Review of psychometrics; room air distribution; building air distribution systems; principles of refrigeration; refrigeration equipment; combustion; heating equipment; air conditioning system types. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: C- or better in ME 302 and ME 311.

**ME 421 Dynamics of Machinery (4)**

Position, velocity and acceleration analysis of mechanical mechanisms by analytical, graphical and computer techniques. Determination of static and dynamic forces on machine components and linkages. Balancing of rotating masses. Critical speeds of shafts. Analysis of gyroscopic action with applications. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisite: C- or better in ME 316.

**ME 427/427L Thermal Systems Design/Laboratory (4)**

Piping networks, sizing and design of a pipe system, fluid transients, rotary pump design and selection, heat exchanger design, thermal system simulation using computer-aided analytical techniques. Preliminary design and preparation of specifications for procurement of thermal fluid mechanical equipment to meet performance requirements. 4 lectures/problem-solving. Prerequisites: C- or better in ME 415.

**ME 435/435L Advanced Engineering Measurements/Laboratory (3/1)**

Analysis of the generalized measurement system with application of sensing, modifying and signal read-out equipment to problems of engineering measurements. Harmonic analysis; uncertainty and error analysis. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ECE 333 and C- or better in ME 316 and ME 313L.

**ME 460/L Team Senior Design Project (4)**

Design, fabrication and testing of a project(s) selected by and under supervision of a faculty member. Students work in small groups. Project results are presented through periodic written and/or oral progress reports and a written formal final report. lecture discussions; Prerequisites: Completion of all junior level courses.

**ME 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: C- or better in ME 463.

**ME 463 Undergraduate Seminar (2)**

New developments, policies, practices, procedures and ethics in mechanical engineering. Each student is responsible for the preparation of a senior project proposal and the development and oral presentation of a topic in the field of mechanical engineering. 2 lecture seminars. Prerequisites: C- or better in ME 312 and ME319 or equivalent. Must have satisfied the GWT requirement.

**ME 471, 472, 473 Professional Practice (1), (1), (2)**

Supervised employment in a professional engineering environment. Placement arranged by student and approved by faculty advisor. Requires: satisfactory completion of work assignment (20 hours per week for three quarters for credit for 471, 472 and 473, with a minimum time commitment of 600 hours); periodic progress reports; and a written final report. Prerequisite: senior standing. Corequisites: ME 463 and permission of the instructor.

**ME 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.











## COLLEGE OF ENVIRONMENTAL DESIGN

Linda Sanders, Dean  
Noel Vernon, Associate Dean

The College of Environmental Design (ENV) offers accredited professional degree programs at the graduate and undergraduate level in Architecture, Landscape Architecture, and Urban and Regional Planning. The Art Department offers a bachelor of arts degree, with options in Fine Arts and Graphic Design, and a minor in Art History. The curricula of the College of Environmental Design are centered within the departments but share a common commitment to discover workable solutions to complex environmental and cultural concerns.

As professional disciplines, the departments share a commitment to the development of skills for a professional career. These skills are enriched by the support courses taken within the College and the University. The faculty is comprised of professionals involved in research, practice and instruction.

Incoming ENV students are required to have access to a computer selected by the College of Environmental Design. Such access may be accomplished by purchase, rental, or other alternatives agreed upon by the College and the student. The College will work closely and confidentially with students requiring aid to assure computer access to all ENV students. No students will be denied entry to ENV based upon inability to purchase or rent a computer. The College also will work with students already owning suitably powerful computers using other platforms.

### INSTITUTE FOR ENVIRONMENTAL DESIGN

Jeffrey Olson, MLA, Director

The purpose of the Institute for Environmental Design is to encourage and support research and creative activity by the Environmental Design faculty for the purposes of professional growth and development, improvement of teaching quality, outreach to the community, and advancement of disciplinary and professional fields of knowledge and endeavor. The Institute is also concerned with identifying and resolving environmental design issues of importance to society and the design and planning professions. To that end, researchers, scholars and creative practitioners are active in the fields of architecture, behavior and design, community development, computers, energy, housing, international development, landscape design, preservation, professional practice, resource management/conservation, transportation, urban design, and urban and regional planning. Additional interdisciplinary research is carried out in cooperation with the University's Center for Regenerative Studies.

The Institute sponsors individual and collaborative faculty research and creative activities, including grants for travel to conferences and seed grants. In addition, the Institute supports faculty activity that involves, or promises to involve, Environmental Design students or to clearly benefit students through teaching. The Institute provides space and other resources for faculty research activities and supports faculty in every stage of the professional development process.

For further information, contact the director, Professor Jeffrey Olson (909) 869-2685, E-mail: JKolson@CSUPomona.Edu.

### INSTITUTE FOR INTERNATIONAL STUDIES

Spyros Amourgis, Director

The Institute has been formed within the College to develop, coordinate and promote academic programs and activities with educational institutions abroad, as well as to assist with visiting students and

scholars on campus. The Institute's primary role is to monitor undergraduate and graduate studies and programs run overseas for any of the four disciplines of the College, as well as to monitor visiting foreign students. The College encourages students to participate in the CSU International programs in Italy, Denmark and Canada, as well as in the College-sponsored programs in Greece, France, Japan and Mexico. An average of 60-80 students participate each year in the various programs. Under existing agreements, an increasing number of foreign students study each year at the College.

Further information is available from the director, Professor Spyros Amourgis, Building 7, Room 103A, (909) 869-2691, FAX (909) 869-4516, E-Mail: SAmourgis@CSUPomona.Edu.

### OCCUR/CAL POLY POMONA

(Outreach Community Center for Urban Research)  
217 South Lemon Street, Ontario, CA  
Norberto F. Nardi, Director, Professor of Architecture

In the world of design, OCCUR provides a unique oasis for work on real urban projects in an off-campus, interdisciplinary facility located in the heart of downtown Ontario. Studios, classroom space and an outdoor courtyard workshop area are adjacent to the OCCUR offices, reminiscent of the successful atelier teaching methods of the past. Regular academic design courses for all ENV departments, as well as special courses, meet at the facility in single or multi-discipline units to work on projects tailored to specific urban issues or relating to a project for a community or organization. A report is published at the end of the course.

The resources of the College of Environmental Design, as well as the expertise available from the entire University, benefit OCCUR's approach to projects, one that earned the Center the 1995 Academic Award from the American Planning Association, California Chapter. Research focuses on education through academic coursework and on community outreach through involvement in local projects, special educational workshops and seminars.

OCCUR's mission is to perform a variety of research services for community-oriented programs within the Cal Poly Pomona region which are intended to improve the quality of the physical environment and the lives of local residents, as well as to expand the educational experience of Cal Poly Pomona students and faculty. For further information, contact OCCUR at (909) 984-1858 or FAX (909) 984-4809.

### RICHARD AND DION NEUTRA VDL RESEARCH HOUSE

Kevin O'Brien, Director

(The initials V.D.L. stand for Cornelius H. van de Leeuw, Dutch industrialist and friend of Richard Neutra who offered aid and entrusted the young Neutra to build Research House I.)

The Neutra Research House (VDL I) on Silverlake Boulevard in Los Angeles was designed and built in 1932. The present home has been completely reconstructed upon the original foundations after an electrical fire in 1963, utilizing similar room sizes and configuration. Under the direction of Richard Neutra's son, Dion, significant changes were executed in floor plans and appearance, as well as detailing and fenestration, particularly in the entry and on the east facade. The 1938 Garden House (off the south patio) suffered small damage in the fire, and it was here that Dion and his family lived during the reconstruction, allowing him the opportunity to supervise the work closely. VDL II, as the re-built house was then referred to, served as Mr. and Mrs. Richard Neutra's residence and the base for the Neutra Institute. In 1979, Mrs. Neutra and California State Polytechnic University, Pomona came to an agreement whereby the Richard and Dion Neutra Research House would

become a University facility. Through the generosity of Mrs. Neutra and the entire Neutra family, the University has gained an architectural work of great significance and an invaluable instructional aid.

### ENV LIBRARY

Wendy L. Carr, Librarian

The ENV Library houses a variety of materials designed to support the college curriculum. These include books, periodicals, technical reports, product information, samples, organizational newsletters, CDs and on-line access to a variety of informational service groups. These materials are available to current faculty, students and staff and, on a limited basis, to off-campus users.

Special Services include:

**Faculty Reserves:** A service that allows current faculty to place items on limited (hourly) reserve to maximize accessibility by students.

**Class Orientation:** A brief presentation to students by ENV Library staff on the available services, any particular areas of interest, and the use of reference tools. Depending on the number of students, this presentation may be done either in the classroom or within the ENV Library itself. This service is available by appointment only and requires advance notice.

**Computer Search:** On-line searches of out-of-state library catalogs are only a few of the services accessible via our student Netscape info-stations.

### ENV VISUAL RESOURCES LIBRARY

Kathy Morgan, Slide Curator

The ENV Visual Resources Library, located in the Environmental Design building, houses a collection of 35 mm slides, videos, and CD-ROMs which support the curriculum of the various departments within the college. The collection is circulated to current faculty, staff and students.

The Curator provides reference services to users of the collection. Consultation on accessing sources for specific images and WWW searches for images are provided for faculty in support of the curricula.

### ENV ARCHIVE

Wendy L. Carr, Archive Coordinator

The Archive is an organized physical accounting of the curriculum and history of the College as well as documentation of the evolution of trends in Southern California Architecture. Projects by students, faculty, and outside professionals in the environmental design disciplines are stored at two on-campus locations. Items include models, books, photographs, plans, papers, computer diskettes, slides, and audio and visual recordings.

The Archive also includes the special collections of Craig Ellwood, Richard Neutra and Raphael Soriano. As an aid to research, some archival materials are available on a limited basis for use by faculty, staff, students and invited scholars, but the majority of the materials in these three special collections are unavailable for use at this time.

**Retention of student work:** All work of the students of the College of Environmental Design is considered the property of the College and, as such, may be retained to be displayed, archived, or used in promotional materials or for accreditation purposes at the discretion of the faculty, department chair or other designated representative of the College.

For further information, contact the Archive Coordinator at (909) 869-4553, E-mail WLCarr@CSUPomona.Edu.

### ENV OFFICE OF STUDENT AFFAIRS

Joyce E. Howland, Ph.D., Director

Marcy Cordero, Coordinator, Internship Program

**Admissions:** Prospective students for all programs in the college may obtain admissions information in this office. Copies of articulation agreements with community colleges also are available.

**Registration:** Information is provided regarding telephone registration, adding and dropping classes, simultaneous enrollment at other colleges, petitions for undergraduate credit in a graduate course, etc.

**Records:** Files for students currently enrolled in the undergraduate architecture and landscape architecture programs are maintained in this office. All other active students' files are maintained in the respective department offices. Students may inquire in this office as to whether or not an instructor has submitted a change of grade; however, blank change-of-grade forms are given to faculty only. Incomplete grade contracts are kept on file in this office. Student files may be checked-out by faculty only. Student addresses and telephone numbers are confidential and will be given only to faculty.

**Advising:** This office assists the student's faculty advisor in providing undergraduate students with academic advice and information regarding University and College policy and procedure. Graduate students should contact the graduate coordinator in their major department for academic advising and graduate program information. Advisement for students who are participating in the Intensive Learning Experience (ILE) Program is coordinated by Joyce Howland. All petitions which require the Dean's signature are submitted to Joyce Howland for approval after the student has obtained all other signatures required on the form.

**Internships:** ENV students are encouraged to enhance their education with work experience in their chosen profession. Internships augment educational experiences by providing knowledge necessary to evaluate career goals and objectives and by offering opportunities to network within the profession. This office solicits and coordinates internships in Architecture, Art, Landscape Architecture, and Urban and Regional Planning to assist students in acquiring quality part-time positions at professional firms and agencies. Architecture students should contact this office for information regarding verification of their required work-experience hours. Through this office, special resume-writing assistance is available to ENV students and workshops are offered to assist students in developing and presenting their resumes and portfolios.

For further information, contact Dr. Joyce Howland at (909) 869-2670, E-mail: JHowland@CSUPomona.Edu.

### COMPUTER-AIDED INSTRUCTION LABORATORY (CAI LAB)

Paul Tran, Instructional Support Assistant

The Computer-Aided Instruction Laboratory, located in the Environmental Design Building, provides a range of work stations for ENV students to explore significant issues in their fields with computers. Classroom computer instruction is supported by the laboratory for a variety of design and planning applications, including Geographic Information Systems, Computer-Aided Design, advanced graphics applications and statistical modeling. Applications research and continuing education for the professional community are also carried out by the laboratory.

Further information is available from the CAI Laboratory Committee Chair, George Proctor, (909) 869-2680, E-mail: GRProctor@CSUPomona.Edu.



**Departments and Majors****ARCHITECTURE**

William M. Adams, Chair

Bachelor of Architecture

Master of Architecture

**ART**

Maren H. Henderson, Chair

Bachelor of Arts in Art, with options in Fine Arts and Design

Minor in Art History

**LANDSCAPE ARCHITECTURE**

Kenneth S. Nakaba, Chair

Bachelor of Science in Landscape Architecture

Master of Landscape Architecture

**URBAN AND REGIONAL PLANNING**

Richard W. Willson, Chair

Bachelor of Science in Urban and Regional Planning

Master of Urban and Regional Planning

**SPECIAL ADMISSIONS CRITERIA FOR ARCHITECTURE**

The undergraduate program in architecture is designated as an impacted program (see earlier section of catalog on "Admissions"). In order to alleviate the pressure of impaction and to better evaluate applicants to the programs in question, a special admission policy has been adopted. Candidates interested in applying to Architecture must do so during the month of November to be considered for the following academic year. All candidates must meet regular University admission standards as well as additional standards required by the Department of Architecture. For specific admission information, interested students should contact the College of Environmental Design Office of Student Affairs at (909) 869-2670.

**ENVIRONMENTAL DESIGN COURSES****ENV 101/101L Foundations of Design I (2/2)**

Studio introducing undergraduate ENV majors to design fundamentals, stressing a basic vocabulary of 2- and 3-D design and design process in an atmosphere of discovery and creativity. Projects will focus on perception, visualization, representation, and expression as well as an introduction to the examination of aesthetic, symbolic, and cultural elements. First studio of a two-studio ENV sequence. 1 two-hour lecture; 2 three-hour laboratories.

**ENV 102/102L Foundations of Design II (2/2)**

Second studio in a sequence of design fundamentals for undergraduate ENV majors. The course is site- and site-user-related, with an emphasis upon contextualism and the physical and cultural determinants of design and urban form. Prerequisite: ENV 101. 1 two-hour lecture, 2 three-hour laboratories.

**ENV 112 Design and the Built Environment (4)**

Introduction to the tools, techniques, and processes used by design professionals to create the physical world. Experiences with the built

environment provides ways to join abstract ideas with practical and creative solutions for living. 4 lectures/problem-solving.

**ENV 115/115A History of Art and Design I (3/1)**

Interdisciplinary, chronologically-structured course on the history of art and environmental design from pre-history to 1400 A.D. Course emphases include aesthetics, design ethics, the chronology of significant events of world art and environmental history (including the "great" monuments, moments, and figures as well as the vernacular continuum), and the relevance of historical art and design issues to the present and the future, as well as written communication and analytical skills. 3 one-hour lectures; 1 one-hour seminar.

**ENV 120/120L Introduction to Computers in Design (1/1)**

Interdisciplinary introduction to computers, focusing on thinking skills, creativity, and expression and providing a practical introduction to the use of computers in design. 1 one-hour lecture; 1 two-hour laboratory.

**ENV 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units with a maximum of 2 units per quarter.

**ENV 299/299A/299L Special Topics for Lower Division Students (1-4)**

Study of a selected topic, the title to be specified in advance. Instruction is by lecture, laboratory, or a combination. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

**ENV/EDU 340 Classroom City (4)**

This course presents City Building Education, a hands-on introduction to design, architecture, and the built environment, and how it relates to classroom content areas.

**ENV 350 Diversity in Design Language (4)**

Explores relationships of belief systems and mythology to design and the organization of the physical environment. Development of unique design vocabulary responsive to the natural environment. Interdisciplinary student teams create contemporary projects with culturally diverse design language reflecting the changing regional and world population. 4 lectures/problem-solving.

**ENV 370 California Designs for Living (4)**

The creative interaction of peoples of California with their natural and built environments. The response of culturally unique designs for living to universal human needs and processes. The influence of California environments on the world.

**ENV 380 Design Studio Research (2-4)**

Environment-behavior research coordinated with specific environmental design studio courses. Introduction to and experience with archival and field research methods, data collection and analysis techniques, interpretation for design problems, and report preparation. Concurrent enrollment in specified environmental design studio required. 2 or 4 lecture discussions.

**ENV 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Problems to be initiated by student with guidance from faculty. Total credit limited to 4 units with a maximum of 2 units per quarter.

**ENV 401 Take Part Workshop (2)**

Instruction and practice in planning participatory workshops; facilitation of the environmental planning process. Prerequisite: Concurrent enrollment in environmental design program.

**ENV 402/402L Design Research Communication (2/2)**

Introduction to basic techniques in the visual and graphic representation and communication of environment-behavior and social science research. Examination of theory-building/hypothesis-testing, micro and macro-levels of research, quantitative and qualitative methods of inquiry, and appropriate modes of graphic interpretation. Skill development in comprehending and generating research data and graphic and written communication of findings. 2 lectures/problem-solving, 2 three-hour labs. Concurrent enrollment required.

**ENV 420 The Designer as Teacher (4)**

A course preparing architecture and planning students for communicating issues of design of the built environment to clients, community groups, and students. 4 lecture discussions.

**ENV 421 Design Issues in Housing (4)**

Current behavioral, social and cultural issues in housing design as they relate to domestic organization, life cycle, class and ethnicity. Considerations of function and meaning in form-making, design adaptations in light of change, and evaluation procedures. 4 lectures/problem-solving.

**ENV 422 Designing for Elderly and Disabled (4)**

Identifies special needs of elderly and disabled adult populations in relation to the physical care, recreation and public facility environments. Addresses design considerations in the built environment which include: housing, work places, public spaces and recreational areas. 4 lectures/problem-solving.

**ENV 423 Design for Children and Accessibility (4)**

Examines physical environmental issues as they are related to the growth and developmental stages of children and youth (0-15). Compares urban, suburban and rural settings for care, recreation, learning and shelter of children and youth. Addresses social, ethnic and cultural issues in the planning and design of spaces for children and youth. 4 lecture discussions.

**ENV 424 Institutional Environments (4)**

Design research on the history and theory of total institutions including hospitals, hospices, mental institutions, prisons and other totalizing environments such as space stations. Design and programming issues such as safety and security, surveillance, home-like qualities, privacy and community, and relation to exterior spaces. 4 lecture discussions.

**ENV 470, 471, 472, 473 Cooperative Education (2-4) (2-4) (2-4) (2-4)**

Full-time work experience that applies environmental design principles to practice. Prerequisite: junior standing or approval of cooperative education coordinator. Work assignment must have prior approval. Course may be repeated per student's major department limitations. Prerequisite: Architecture students must have fulfilled the 1,000 hours office experience.

**ENV 450 Sustainable Communities (4)**

Historical survey and cross-cultural study of sustainable communities in relation to their particular built form. Examination and analysis of these intentional communities as models of traditional, alternative, co-housing and future communities. Exploration of legal and economic organization and holding patterns, housing and community design features, and values inhibiting or facilitating experimentation. 4 lecture discussions.

**ENV 489 Community Design and Social Change (4)**

Principles and processes integrating spatial and social relations in the organization and expression of community. Cross-cultural examination of change in "design" of communities; implications for quality of life and role of designer. 4 lecture discussions. Prerequisite: upper division standing.

**ENV 499/499A/499L Special Topics for Upper Division Students (1-4)**

Study of a selected topic, the title to be specified in advance. Instruction is by lecture, laboratory, or a combination of both. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

## ARCHITECTURE

Sigrid Miller Pollin, Chair

William Adams	Norberto Nardi
Spyros Amourgis	Judith Sheine
Brooks Cavin, III	Dariouche Showghi
Richard J. Chylinski	Patrick Sullivan
Michael W. Folonis	Christine Theodoropoulos
Hsin-Ming Fung	Barry L. Wasserman
Arthur E. Hacker	Hofu Wu
Paul Helmle	Bernard Zimmerman
Denise Lawrence	

The Bachelor of Architecture as a first professional degree (B.ARC) is accredited by the National Architecture Accrediting Board.

The degree, Bachelor of Architecture, is offered in a five-year curriculum which focuses on the design laboratory. The studio sequence consists of three segments: A three-year basic core, a four-quarter group of topic studios taken jointly by fourth- and fifth-year students, and a culminating senior project. All work becomes the property of the department with superior work retained for display and archival use.

Coursework within the Department of Architecture is open only to those students who have been admitted to the Department and are designated Architecture majors.

Prior to graduation, all students are required to fulfill 500 hours of work. A minimum of 250 hours must be with a registered architect and the remaining 250 hours may be with a faculty-approved alternative. This work must be verified by the department coordinator of Professional Practice and Cooperative Education.

The Department of Architecture is a member of the Association of Collegiate Schools of Architecture. Courses are taught by a faculty of professionals engaged in practice, education, and research.

For information regarding the graduate program, refer to the Graduate Studies section of this catalog.

### ADMISSION TO THE PROGRAM

Because the program offered by the Department of Architecture is over-subscribed, applications are accepted only in the month of November, prior to admission in the following fall quarter.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses for the major, in order to receive a degree in the major.

Design Foundations I	ENV	101/101L	(4)
Design Foundations II	ENV	102/102L	(4)
History of Art and Design I	ENV	115/115A	(4)
Introduction to Computers in Design	ENV	120/120L	(2)
Introduction to Architecture	ARC	103/103L	(4)
Architectural Design	ARC	201/201L	(6)
Architectural Design	ARC	202/202L	(6)
Architectural Design	ARC	203/203L	(6)
Architectural Design	ARC	301/301L	(6)
Architectural Design	ARC	302/302L	(6)
Architectural Design	ARC	303/303L	(6)
Structures	ARC	321/321A	(4)
Structures	ARC	322/322A	(4)
Structures	ARC	323/323A	(4)

Environmental Controls	ARC	331/331A	(4)
Environmental Controls	ARC	332/332A	(4)
Building Construction	ARC	341	(4)
Building Construction	ARC	342	(4)
Ancient and Medieval Architecture	ARC	361/361A	(4)
Renaissance and Baroque Architecture	ARC	362/362A	(4)
European Architecture (1750-1950)	ARC	363/363A	(4)
Architectural Design	ARC	401/401L	(6)
Architectural Design	ARC	402/402L	(6)
Architectural Design	ARC	403/403L	(6)
Architectural Design	ARC	405/405L	(6)
Architectural Design	ARC	406/406L	(6)
Seismic Design in Architecture	ARC	424	(4)
American Architecture	ARC	464/464A	(4)
Architectural Practice	ARC	471	(4)
Architecture and Computers	ARC	474	(4)
Project Research Data Collection	ARC	491	(2)
Project Programming	ARC	494	(2)
Bachelor's Degree Project	ARC	495	(8)

Total Core Courses . . . . . 152

### PROFESSIONAL ELECTIVES

Select 16 units from below or from approved supplemental department list:

Energy Conservation	ARC	333	(4)
Solar Applications	ARC	334	(4)
Advanced Structures	ARC	425	(4)
Advanced Structures	ARC	426	(4)
Contemporary Architecture	ARC	465	(4)
Japanese Architecture	ARC	466	(4)
California Architecture	ARC	467	(4)
Latin American Architecture	ARC	468	(4)
The Architect and the Development Process	ARC	473	(4)
Computer-Aided Design in Architecture	ARC	475	(4)
Business Development in Architecture	ARC	476	(4)
Behavioral Factors in Architecture	ARC	481	(4)
Behavioral Factors in Architecture	ARC	482	(4)
Behavioral Factors in Architecture	ARC	483	(4)
Approved Engineering Elective			(4)

Total Professional Electives . . . . . (16)

### GENERAL ELECTIVES

Free Electives . . . . . (9-10)

### INTERDISCIPLINARY GENERAL EDUCATION

The Department of Architecture prefers that students starting in the program as freshmen take the Interdisciplinary General Education (IGE) program coursework to meet their general education degree requirements. Coursework would be as follows:

### IGE PROGRAM

Consciousness and Community	IGE	120	(4)
Rationalism and Revelation	IGE	121	(4)
Authority and Faith	IGE	122	(4)
Culture and Contact	IGE	220	(4)
Reform and Revolution	IGE	221	(4)
Individualism and Collectivism	IGE	222	(4)
Promise and Crisis	IGE	223	(4)
Connections Seminar	IGE	224	(4)

**ADDITIONAL GENERAL EDUCATION REQUIREMENTS (TRACK B)****Area 1:**

B. Advocacy and Argument . . . . .	COM	204	(4)
C. Freshman English II . . . . .	ENG	105	(4)

**Area 2:**

A. Trigonometry . . . . .	MAT	106	(4)
B. College Physics . . . . .	PHY	121	(3)
College Physics Laboratory . . . . .	PHY	141	(1)
C. Any listed Life Science course . . . . .			(4-5)
D. Any listed upper division math or science course . . . . .			(4)

**Area 3:**

Any course from list A through G . . . . .			(28)
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**Area 4:**

United States History . . . . .	HST	202	(4)
Introduction to American Government . . . . .	PLS	201	(4)

**Area 5:**

See Advisor for recommended list . . . . .			(8)
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Total IGE/GE Courses . . . . .			(72-73)
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**GENERAL EDUCATION COURSES (TRACK B)****Area 1:**

A. Freshman English I . . . . .	ENG	104	(4)
B. Advocacy and Argument . . . . .	COM	204	(4)
C. Freshman English II . . . . .	ENG	105	(4)

**Area 2:**

A. Trigonometry . . . . .	MAT	106	(4)
B. College Physics . . . . .	PHY	121	(3)
College Physics Lab . . . . .	PHY	141	(1)
C. Any listed Life Science course . . . . .			(4-5)
D. Any listed upper division math or science course . . . . .			(4)

**Area 3:**

A. Any listed Fine and Performing Arts . . . . .			(4)
B. Any listed Philosophy and History . . . . .			(4)
C. Any listed Literature and Foreign Language . . . . .			(4)
D. Principles of Economics . . . . .	EC	202	(4)
or Principles of Economics . . . . .	EC	201	(4)
E. Principles of Sociology . . . . .	SOC	201	(4)
or Introduction to Cultural Anthropology . . . . .	ANT	102	(4)
or any listed EWS course . . . . .			
F. Any listed course except . . . . .	PLS	290	(4)
G. Any listed course . . . . .			(4)

**Area 4:**

United States History . . . . .	HST	202	(4)
Introduction to American Government . . . . .	PLS	201	(4)

**Area 5:**

See Advisor for recommended list . . . . .			(8)
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Total General Education Courses . . . . .			(72-73)
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TOTAL UNITS FOR 5-YEAR BACHELOR OF ARCHITECTURE DEGREE. 250

**COURSE DESCRIPTIONS**

(Courses open only to declared ARC Majors unless otherwise specified)

**ARC 103/103L Introduction to Architectural Design (1/3)**

An introduction to the formal and spatial language of architecture explored studio projects informed by the analysis of case studies. 1 lecture, 3 three-hour laboratories. Prerequisites: ENV 101/101L, 102/102L, 115. Concurrent enrollment required.

**ARC 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or survey of selected problems. Problems to be student-initiated under faculty guidance. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**ARC 201/201L Architectural Design (3/3)**

Exploration of basic design and architectural elements. Continuing development of the process of architectural design with an emphasis on two and three dimensional communication techniques. Prerequisite: ARC 103. 3 lectures, 3 three-hour laboratories. Concurrent enrollment required.

**ARC 202/202L Architectural Design (3/3)**

A continuation of basic design exercises focusing on simple buildings and their relationship to the site and to the imperatives of nature. 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 201. Concurrent enrollment required.

**ARC 203/203L Architectural Design (3/3)**

The design process continued using simple programs and the influence of context. Introduction to environmental and structural constraints. (C grade or better required for advancement to ARC 301.) 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 202. Concurrent enrollment required.

**ARC 299/299A/299L Special Topics for Lower Division Students (1-4)**

Study of a selected topic, the subject matter and title to be initiated by the faculty in advance. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

**ARC 301/301L Architectural Design (3/3)**

The design process as it relates to building materials and construction. The interaction of aesthetic, technological, and economic determinants. 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 203 with a C grade or better, ARC 341, ARC 363, MAT 106. Concurrent enrollment required.

**ARC 302/302L Architectural Design (3/3)**

Interaction of construction technology, human behavior and site development on the design of multiple buildings in specific context. 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 301. Concurrent enrollment required.

**ARC 303/303L Architectural Design (3/3)**

Integration of construction technology, human behavior and site development on the design of mixed use buildings in specific context. 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 302. Concurrent enrollment required.

**ARC 321/321A Structures (3/1)**

Theories of structural design and the relationship of structure to form, function, and economics. Analysis of structural systems, including the determination of forces and stresses. 3 one-hour lectures, 1 one-hour discussion. Prerequisite: ARC 203, MAT 106, PHY 121, 141. Concurrent enrollment required.



**ARC 322/322A Structures (3/1)**

Theories of structural designs and the relationship of structure to form, function and economics. Analysis of structure systems including the determination of forces, stresses and deflections. The design of wood and steel structures as a medium for introducing basic concepts of building and construction systems and materials. 3 one-hour lectures, 1 one-hour discussion. Prerequisite: ARC 321. Concurrent enrollment required.

**ARC 323/323A Structures (3/1)**

Theories of structural design and the relationship of structure to form, function, and economics. Analysis of structural systems, including the determination of forces, stresses, and deflections. The design of concrete structures as a medium for introducing basic concepts of building and construction systems and materials. 3 one-hour lectures, 1 one-hour discussion. Prerequisite: ARC 322. Concurrent enrollment required.

**ARC 331/331A Environmental Controls (3/1)**

Principles, evaluation and control of environmental systems. 3 one-hour lectures, 1 one-hour lecture discussion. Prerequisites: ARC 203, MAT 106. Concurrent enrollment required.

**ARC 332/332A Environmental Controls (3/1)**

Integration, conservation and control of environmental systems. 3 one-hour lectures, 1 one-hour discussion. Prerequisite: ARC 331. Concurrent enrollment required.

**ARC 333 Energy Conservation (4)**

Integration and management of environmental systems in design to minimize energy and costs. 2 two-hour lectures. Prerequisite: ARC 332.

**ARC 334 Solar Design Applications in Architecture (4)**

Advanced study of building with respect to solar design. The study of passive and active solar design, building orientation, materials and site-planning. A review of historical applications of solar design. The study of solar design as an alternate energy source. 2 two-hour lectures. Prerequisite: ARC 332.

**ARC 341 Building Construction (4)**

An overview of construction, building components, and systems investigated through case studies. 2 two-hour lectures. Prerequisite: ARC 202.

**ARC 342 Building Construction (4)**

Techniques of construction, building components, and systems investigated through case studies and taught as an integral part of ARC 301, Architectural Design. Selected building materials will be discussed. 2 two-hour lectures. Prerequisites: ARC 203, 341.

**ARC 361/361A Ancient and Medieval Architecture (3/1)**

A survey of the architecture of ancient Greece and Rome, of the early Christian and Byzantine eras, and of the Romanesque and Gothic periods in Western Europe. 3 one-hour lectures, 1 one-hour discussion. Prerequisites: ENV 115, ENG 104 or 105 or COM 204. Concurrent enrollment required.

**ARC 362/362A Renaissance and Baroque Architecture (3/1)**

The theory and design of architecture and city planning from 1400 to 1750 with an emphasis on Italy, France, and England. 3 one-hour lectures, 1 one-hour discussion. Prerequisite: ARC 361. Concurrent enrollment required.

**ARC 363/363A European Architecture 1750-1950 (3/1)**

A survey of European architecture from the late eighteenth century to the mid-twentieth century including stylistic revivals, technological changes, and achievements of major architects. 3 one-hour lectures, 1 one-hour discussion. Prerequisite: ARC 362. Concurrent enrollment required.

**ARC 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Problems to be initiated by student with guidance from faculty. Total credit limited to 4 units with a maximum of 2 units per quarter. Prerequisite: ARC 303.

**ARC 401/401L Topics in Architectural Design (3/3)**

Topics in Advanced Architectural Design. See Department Office for list of topics offered. 3 lectures, 3 three-hour laboratories. Prerequisites: ARC 303, ARC 323, ARC 332, ARC 342. Concurrent enrollment required.

**ARC 402/402L Topics in Architectural Design (3/3)**

Topics in Advanced Architectural Design. See Department Office for list of topics offered. 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 401. Concurrent enrollment required.

**ARC 403/403L Architectural Design (3/3)**

An exploration of urban design issues including research and analysis of the topics associated with mixed use projects. 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 402. Concurrent enrollment required.

**ARC 405/405L Topics in Architectural Design (3/3)**

Topics in Advanced Architectural Design. See Department Office for list of topics offered. 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 403. Concurrent enrollment required.

**ARC 406/406L Topics in Architectural Design (3/3)**

Topics in Advanced Architectural Design. See Department Office for list of topics offered. 3 lectures, 3 three-hour laboratories. Prerequisite: ARC 405. Concurrent enrollment required.

**ARC 424 Seismic Design in Architecture (4)**

A study of the fundamental characteristics of earthquake design in architecture. A survey of building codes, case studies of building performance in earthquakes and calculations relative to earthquake design. 2 two-hour lectures. Prerequisite: ARC 323.

**ARC 425 Advanced Structures (4)**

Topics of importance conducted in seminar addressing particular issues, such as seismic design, tensile structures and case studies in structural performance. 2 two-hour lectures. Prerequisite: ARC 424.

**ARC 426 Advanced Structures (4)**

The structural analysis of a building. The calculation of vertical and horizontal loads on a wood frame or steel structure, and the design and selection of the structural elements and connectors. 2 two-hour lectures. Prerequisite: ARC 424.

**ARC 451 Theory of Architecture and Urbanism (4)**

The theories which form the basis of architecture and urbanism including the art of giving visual coherence and organization to the built environment. 2 two-hour lectures. Prerequisite: Upper division status in declared major. Not open to architecture majors.

**ARC 464/464A American Architecture (3/1)**

English, Spanish, and French Colonial American Architecture of the new republic. Nineteenth-century eclecticism and technical innovation. The formulation of a modern architectural theory. 3 one-hour lectures, 1 one-hour discussion. Prerequisite: ARC 363. Concurrent enrollment required.

**ARC 465 Contemporary Architecture (4)**

A study of the development of post-Bauhaus architecture in England, France, United States, Japan and South America. 2 two-hour lectures. Prerequisite: ARC 363.

**ARC 466 Japanese Architecture (4)**

A survey of Japanese architecture from feudal times to the present with emphasis on the traditional house and the innovative architecture of the post-war period. 2 two-hour lectures. Prerequisite: ARC 363.

**ARC 467 California Architecture: The Look of the Place (4)**

California examined from the vantage of its architectural elements, its houses, workplaces, civic spaces, and roads, and their history. The influences, events, values, technologies, and processes which interact in the making of architecture and which result in human patterns upon the landscape of California will be surveyed. Field trips. 2 two-hour lectures. Prerequisite: ARC 363 or permission of instructor. Open to undergraduate non-majors.

**ARC 468 Latin American Architecture (4)**

A survey of architecture and urbanism in Latin America from the Pre-Columbian era to the present. Identification of design issues is addressed through case studies and design exercises. Prerequisite: ARC 363. 2 two-hour lectures.

**ARC 471 Architectural Practice (4)**

The administrative, legal, ethical aspects of the architectural profession and the relationship between the profession and the construction industry. 2 two-hour lectures. Prerequisite: ARC 203 or equivalent.

**ARC 473 The Architect and the Development Process (4)**

The potential roles of the architect in the development process will be discussed. Issues include goals, appraisal of needs, economics, and market analysis feasibility studies, appraisal procedures, cash flow methods, financing options, decisions, design and delivery processes, involvement at levels of design decisions and project administration. 2 two-hour lectures. Prerequisite: ARC 471.

**ARC 474 Introduction to Computer-Aided Design in Architecture (4)**

A laboratory exploration of the principles governing the use of computers in the architectural design process. This introductory CAD course is designed to give students a working knowledge of the AutoCAD system. 2 two-hour lectures. Prerequisites: ENV 120, ARC 203 or permission of instructor.

**ARC 475 Advanced Computer-Aided Design in Architecture (4)**

Advanced study in the use of computers in the architectural design process emphasizing enhanced visualization skills through the use of electronic media. 2 two-hour lectures. Prerequisite: ARC 474.

**ARC 476 Business Development in Architecture (4)**

The study of the relationship between the architect, employee, client, and contractor; including a study of new business development strategies, winning a commission, marketing, and client communications. 2 two-hour lectures. Prerequisites: ARC 471.

**ARC 481 Behavioral Factors in Architecture (4)**

Relationship of the concepts of psychology, social anthropology and sociology to the design of the built environment. The effects of architecture on its users. The relationship of social patterns and cultural mores to urban patterns. 4 lectures. Prerequisite: ARC 203 or permission of instructor.

**ARC 482 Behavioral Factors in Architecture (4)**

A course designed to study methods of programming and project evaluation in the development of architectural design work. 4 lectures. Prerequisite: ARC 481.

**ARC 483 Behavioral Factors in Architecture (4)**

A course designed to study in a seminar format case studies of the application of behavioral factors in the design process. 4 lectures. Prerequisite: ARC 482.

**ARC 491 Project Research Data Collection (2)**

Identification, development of bibliography and initial research for bachelor degree project. 2 seminars. Prerequisite: admission to ARC 405.

**ARC 494 Project Programming (2)**

Continuation of ARC 491. Research and programming of the bachelor degree project. 2 seminars. Prerequisite: ARC 491.

**ARC 495 Bachelor's Degree Project (8)**

Comprehensive architectural design project illustrating the individual student's proficiency in the design process. The independent design projects are meant to reveal an understanding of programming, human behavior, context, conceptual design, integration of structural and environmental systems, design development, and verbal and visual presentation. Prerequisites: ARC 406 and ARC 494.

**ARC 499/499A/499L Special Topics for Upper Division Students (1-4)**

Study of a selected topic, the subject matter and title to be initiated by the faculty in advance. Instruction is by lecture, laboratory, or a combination. Prerequisites: permission of instructor and ARC 203.

## ART

Maren H. Henderson, Chair  
Babette Mayor, Coordinator, Graphic Design

Eileen M. Fears	Yoram Makow
Charles D. Fredrick	Sandra Rowe
Joe Hannibal	Stanley C. Wilson

The Art major provides a sequence of courses leading to the bachelor of arts degree. The program consists of an option in Fine Arts, an option in Graphic Design, and a minor in Art History. The program focuses on the development of skills in both studio and academic endeavors, on creative problem-solving, on aesthetic analysis, and on the production of art forms.

Students in Fine Arts should expect to develop skills and knowledge in painting, drawing, printmaking, ceramics, sculpture, and art history. Students in Graphic Design should expect to develop skills in graphic design, printing, illustration, exhibition design, and design by computer (including motion graphics and video). Skills from either option will enable students to find employment in art, design, and related fields, or to pursue their education at the graduate level.

A student majoring in art at Cal Poly Pomona under the Fine Arts option may wish to prepare for a career in teaching. The art major program at Cal Poly Pomona has been approved by the California Commission on Teacher Credentialing as a Single Subject Waiver Program. This means that, for the Cal Poly Pomona art major, the requirement for taking the National Teachers Examination in art is waived.

Most art courses are available for the general university student.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses for the major in order to receive a degree in the major.

Introduction to Drawing	ART	140A	(3)
Foundations of Drawing	ART	141A	(3)
Introduction to Design	ART	150A	(3)
or Design Foundations I	ENV	101/101L	
History of Western Art	ART	212	(4)
History of Western Art	ART	213	(4)
History of Western Art	ART	214	(4)
Senior Project	ART	461	(2)
Senior Project	ART	462	(2)
Undergraduate Seminar	ART	463	(2)

### OPTION COURSES FOR MAJOR

#### FINE ARTS

Introduction to Clay	ART	130A	(3)
Introduction to Crafts	ART	190A	(3)
History of Tribal Art	ART	211	(4)
or History of Asian Art	ART	216	
Introduction to Painting	ART	220A	(3)
Intermediate Drawing	ART	242A	(3)
Life Drawing	ART	244A	(3)
Printmaking	ART	260A	(3)
Fundamentals of Sculpture	ART	280A	(3)
Visual Arts in the 20th Century	ART	312	(4)
or Contemporary Art	ART	313	
3-D Design	ART	387A	(3)

Minimum of 17 upper division units in Art  
with consent of advisor (17)

#### GRAPHIC DESIGN

Lettering and Typography	ART	251A	(3)
Graphic Layout	ART	252A	(3)
2-D Design	ART	253A	(3)
Graphics: Introduction to the Computer	ART	255A	(3)
Printmaking	ART	260A	(3)
Drafting for Artists	ART	342A	(3)
Drawing for Illustration	ART	346A	(3)
Graphic Media and Production	ART	351A	(3)
Advanced Graphics	ART	352A	(3)
Design by Computer I	ART	355A	(3)
Design by Computer II	ART	356A	(3)
Relief Printmaking	ART	361A	(3)
or Intaglio Printmaking	ART	363A	
or Three-dimensional Design	ART	387A	
Advanced Design	ART	453A	(3)
Design by Computer III	ART	456A	(3)

#### SUPPORT AND ELECTIVE COURSES

##### FINE ARTS

Introduction to Computers in Design	ENV	120/120L	(2)
Intermediate Painting	ART	324A	(3)
or Transparent Watercolor	ART	325A	
Life Drawing	ART	344A	(3)
or Expressive Drawing	ART	345A	
Multimedia Painting	ART	327A	(3)
or Intermediate Sculpture	ART	381A	
Approved electives, chosen in consultation with advisor			(13)

##### GRAPHIC DESIGN

Introduction to Computers in Design	ENV	120/120L	(2)
Introduction to Clay	ART	130A	(3)
or Introduction to Crafts	ART	190A	
or History of Tribal Arts	ART	211	
or History of Asian Art	ART	216	
or Fundamentals of Sculpture	ART	280A	
Introduction to Painting	ART	220A	(3)
or Intermediate Drawing	ART	242A	
or Exhibition Design	ART	288A	
Visual Arts in the 20th Century	ART	312	(4)
or Contemporary Art	ART	313	
Photography	COM	131/131L	(2/2)
Principles of Marketing	IBM	301	(4)
Promotional Strategies	IBM	307	(4)
Approved electives chosen in consultation with advisor			(10)

#### GENERAL EDUCATION COURSES

##### Area 1:

Select one approved course from each area. (12)

##### Area 2:

Must include at least one laboratory class.

Select one approved course from each area. (16)

##### Area 3:

Select one approved course from each area. (28)

##### Area 4:

United States History	.HST	202	(4)
Introduction to American Government	.PLS	201	(4)

**Area 5:**

See advisor. . . . . (8)

The total curriculum must include 60 units of upper division courses.

**ART HISTORY MINOR**

History of Western Art . . . . .	ART 212	(4)
History of Western Art . . . . .	ART 213	(4)
History of Western Art . . . . .	ART 214	(4)

The student will select four additional courses (16 units) from the following:

History of Tribal Arts . . . . .	ART 211	(4)
or		
History of Asian Art . . . . .	ART 216	(4)
History of Art in the United States . . . . .	ART 310	
History of Design . . . . .	ART 311	(4)
Visual Arts in the 20th Century . . . . .	ART 312	(4)
Contemporary Art . . . . .	ART 313	(4)
Art of Mexico, Central & South America . . . . .	ART 314	(4)
Art of the Ancient Near East . . . . .	ART 315	(4)
Art of the Classical World . . . . .	ART 316	(4)
Art of the Middle Ages . . . . .	ART 317	(4)
Art of the Italian Renaissance . . . . .	ART 318	(4)
Art of the Baroque . . . . .	ART 320	(4)
Art History Seminar . . . . .	ART 418	(4)

**COURSE DESCRIPTIONS****ART 110 The Visual Arts (4)**

Introduction to basic forms, styles, and aesthetics of the visual arts. Includes Western and Non-Western cultures. 4 lecture discussions.

**ART 130A Introduction to Clay (3)**

Exploration of fundamentals of ceramic materials utilizing slab, coil, and mold-making. Emphasis on developing creative ability. 6 hours activity.

**ART 140A Introduction to Drawing (3)**

Analysis and practice of drawing. Problems involving development of perception. Emphasis on concepts and methods. 6 hours activity.

**ART 141A Foundations of Drawing (3)**

Study of drawing with emphasis on depictive concepts, materials, tools and techniques. 6 hours activity. Prerequisite: ART 140 or permission of instructor.

**ART 150A Introduction to Design (3)**

Development of appreciative and creative skills. Variety of materials used, with an emphasis on two-dimensional design concepts. 6 hours activity.

**ART 190A Introduction to Crafts (3)**

Basic projects with various craft materials. Development of two- and three-dimensional skills and concepts through the materials and their properties. Criteria applied to craft materials. 6 hours activity.

**ART 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**ART 211 History of Tribal Arts (4)**

Art of tribal cultures (African, Oceanic, North American Indian) within context of religious beliefs and social function. 4 lectures.

**ART 212 History of Western Art (4)**

Comprehensive survey and analysis of the development of art in Western civilization from prehistoric times to the Renaissance. 4 lectures.

**ART 213 History of Western Art (4)**

Comprehensive survey and analysis of the development of art in Western civilization from the Renaissance to the 18th century. 4 lectures.

**ART 214 History of Western Art (4)**

Comprehensive survey and analysis of the development of art in Western civilization from the 18th to the 20th centuries. 4 lectures.

**ART 216 History of Asian Art (4)**

Survey of art and architecture of India, Southeast Asia, China, Korea and Japan. 4 lecture discussions.

**ART 220A Introduction to Painting (3)**

Image as painting. Varied projects designed to foster development of visual equivalents for ideas and emotions using basic painting skills. 6 hours activity. Suggested: ART 140A, 141A and 150A.

**ART 225A Fundamentals of Watercolor Painting (3)**

Methods and techniques with transparent watercolor. Outdoor sketching and studio projects. 6 hours activity. Prerequisite: ART 140A and ART 150A or permission of instructor.

**ART 242A Intermediate Drawing (3)**

A synthesis of the basic drawing elements (line, value, texture, composition) and perspective-with an imaginative and self-expressive use of material. 6 hours activity. Prerequisite: ART 140A and ART 141A or permission of instructor.

**ART 244A Beginning Life Drawing (3)**

Skills and techniques in drawing the human figure from studio models. 6 hours activity. Prerequisite: ART 140A or permission of instructor.

**ART 251A Lettering and Typography (3)**

Development of appreciative and skillful usage of alphabets. Techniques of forming and spacing letters. 6 hours activity.

**ART 252A Graphic Layout (3)**

Design principles of visual communication. Projects in page layout, corporate image, and advertising design. 6 hours activity. Prerequisite: ART 251A or permission of instructor.

**ART 253A Two-Dimensional Design (3)**

Elements and principles of two-dimensional design, especially color theory and visual perception. 6 hours activity. Prerequisite: ART 150A or permission of instructor.

**ART 255A Graphics: Introduction to the Computer as a Medium (3)**

Introduction to the use of personal computers in design and visual communication. Emphasis on state-of-the-art design and illustration software. 6 hours activity. Prerequisite: ART 150 or permission of instructor.



**ART 260A Printmaking (3)**

Method and techniques of printmaking. Relief and intaglio processes. 6 hours activity.

**ART 262A Screen Printing (3)**

Screen printing as an art form using paper, glue, lacquer film stencils and photo techniques. 6 hours activity.

**ART 280A Fundamentals of Sculpture (3)**

Fundamentals of sculpture involving modeling, carving or forming clay, plaster, wood, stone and metal. 6 hours activity. Suggested: ART 130A and ART 190A.

**ART 288A Exhibition Design (3)**

Practices and projects in exhibition design and display. Includes wall display and gallery installation. 6 hours activity.

**ART 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, activity, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

**ART 310 Art of the United States (4)**

Survey of the art of the United States from the provincial art of the colonies to the key role of American artists in the development of modern art. 4 lectures.

**ART 311 History of Design (4)**

Survey of the great periods of design from ancient to modern with emphasis on the modern period. Includes both western and non-western civilizations. Analysis of principles and methods. 4 lectures.

**ART 312 Visual Arts in the 20th Century (4)**

Comprehensive survey and analysis of the founding movements and key developments in the history of modern art in Europe and the United States and other key centers from 1900 to the present. 4 lectures.

**ART 313 Contemporary Art (4)**

Analysis of the visual arts in Europe and the United States in the last quarter-century with special attention to the current scene. 4 lectures. Prerequisite: ART 312 or permission of instructor.

**ART 314 Art of Mexico, Central and South America (4)**

Arts of pre-Columbian civilizations and the colonial period to the present. 4 lecture discussions.

**ART 315 Art of the Ancient Near East (4)**

Survey of the arts of ancient civilizations, primarily Egypt and Mesopotamia, showing the interrelations and cultural exchanges of the ancient world. 4 lectures.

**ART 316 Art of the Classical World (4)**

Survey of the arts of the classical world; the development of Greek, Etruscan, and Roman art. 4 lectures.

**ART 317 Art of the Middle Ages (4)**

Survey of art and architecture of the European Middle Ages, from early Christian art through late Gothic. 4 lectures.

**ART 318 Art of the Italian Renaissance (4)**

Survey of art and architecture of Italy of the 14th through 16th centuries. 4 lectures.

**ART 320 Art of the Baroque Period (4)**

Survey of art and architecture of the 17th and 18th centuries in both Northern and Southern Europe. 4 lecture discussions. Prerequisite: ART 212 or 213 or 214 or permission of instructor.

**ART 324A Intermediate Painting (3)**

Painting methods and techniques with emphasis on form and composition. 6 hours activity. Prerequisite: ART 220 or permission of instructor. May be repeated for total of 9 units.

**ART 325A Transparent Watercolor (3)**

Methods and techniques with transparent watercolor. Outdoor sketching and studio projects. 6 hours activity. Prerequisite: ART 225A or permission of instructor. May be repeated for total of 9 units.

**ART 327A Multimedia Painting (3)**

Painting projects in mixed media. Discovering visual effects by combining traditional and nontraditional methods and techniques. 6 hours activity. Prerequisite: ART 220A or permission of instructor. May be repeated for total of 9 units.

**ART 332A Pottery (3)**

Basic methods of forming, decorating, glazing and firing pottery forms with an emphasis on use of the potter's wheel. 6 hours activity. May be repeated for a total of 9 units.

**ART 334A Ceramics (3)**

Intensified study of ceramic and sculptural forms; study of glaze calculation and firing processes. 6 hours activity. Prerequisite: ART 130A or permission of instructor. May be repeated for a total of 9 units.

**ART 335A Raku (3)**

Introduction to asymmetrical forms with an emphasis on low-fire glaze calculations. Aspects of primitive kiln construction with concentration on reduction firings. 6 hours activity. Prerequisite: ART 130A or permission of instructor.

**ART 338A Ceramics: Glaze Calculations (3)**

Analytical approach to the development of glazes; working knowledge of the empirical formula; understanding of glaze materials. 6 hours activity. Prerequisite: ART 130A.

**ART 342A Drafting for Artists (3)**

Basic mechanical drawing techniques and interpretations; architectural drafting, furniture detailing, blueprint reading, and graphic communication. 6 hours activity. Prerequisite: ART 242A or permission of instructor.

**ART 344A Life Drawing (3)**

Drawing for creative expression from studio models using variety of drawing materials. 6 hours activity. Prerequisite: ART 244A or permission of instructor. May be repeated for a total of 9 units.

**ART 345A Expressive Drawing (3)**

Advanced problems in draftsmanship with special emphasis on linear and textural expression. 6 hours activity. Prerequisite: ART 242A or permission of instructor. May be repeated for a total of 9 units.

**ART 346A Drawing for Illustration (3)**

Developing graphic images that accurately depict objects and situations. Communicating concepts through graphic media. 6 hours activity. Prerequisite: ART 244A or permission of instructor. May be repeated for a total of 9 units.

**ART 351A Graphic Media and Production (3)**

Advanced study of the graphic media and their practical applications. Methods and procedures for preparing two-dimensional design for reproduction. 6 hours activity. Prerequisites: ART 251A, 252A.

**ART 352A Advanced Graphics (3)**

Advanced projects in layout, corporate image and advertising design. 6 hours activity. Prerequisite: ART 251A, 252A, 351A or permission of instructor. May be repeated once for credit.

**ART 355A Design by Computer I (3)**

The use of personal computers in design, visual communication and fine arts. Emphasis on aesthetics in computer-generated images created through the use of existing, menu-driven software and a variety of input devices. Prerequisite: ART 255A. 6 hours activity. May be repeated once for credit.

**ART 356A Design by Computer II (3)**

Application of the computer and video systems in the development of fine arts images. Prerequisite: ART 355A or permission of instructor. 6 hours activity. May be repeated once for credit.

**ART 361A Relief Printmaking (3)**

Exploration of materials and processes in relief printing including block carving, collage and assemblage techniques. 6 hours activity. Prerequisite: ART 260A or permission of instructor. May be repeated for a total of 9 units.

**ART 362A Advanced Screen Printing (3)**

Advanced projects in screen printing. 6 hours activity. Prerequisite: ART 262A or permission of instructor. May be repeated for a total of 9 units.

**ART 363A Intaglio Printmaking (3)**

Techniques and skills in intaglio methods of printmaking including drypoint, etching, aquatint, mezzotint, and engraving. 6 hours activity. Prerequisite: ART 260A or permission of instructor. May be repeated for a total of 9 units.

**ART 364A Lithography (3)**

Techniques and skills in lithographic methods of printmaking on metal plates. 6 hours activity. Prerequisite: ART 242A and ART 260A or permission of instructor. Suggested: ART 345A. May be repeated for a total of 9 units.

**ART 375/375A Photography as an Expressive Art Form (3)**

Explores the technical and aesthetic aspects of photography for creative expression in the fine arts and design. 6 hours lecture/activity. Corequisites: ART 375/375A. Prerequisite: COM 131/131L or experience in black/white darkroom techniques, and permission of instructor.

**ART 381A Intermediate Sculpture (3)**

Work in sculpture using variety of techniques and materials. 6 hours activity. Prerequisite: ART 280A or permission of instructor. May be repeated for a total of 9 units.

**ART 387A Three-Dimensional Design (3)**

Theory and application of aesthetic elements in three-dimensional forms. 6 hours activity. Prerequisite: ART 280A or permission of instructor. May be repeated for a total of 9 units.

**ART 388A Gallery and Exhibition Design (3)**

Professional practices in gallery exhibition design and installation. 6 hours activity. Prerequisite: ART 288A or permission of instructor. May be repeated for a total of 9 units.

**ART 395A Crafts Design (3)**

Development of concepts, methods, and skills in basic craft media such as clay, wood, metal, and fiber construction. 6 hours activity. Prerequisite: ART 190A or permission of instructor. May be repeated for a total of 9 units.

**ART 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**ART 405 Art and the Child (4)**

Understanding the development of visual language and perception through study of children and their art. 4 lecture/discussion.

**ART 418 Art History Seminar (4)**

Intensive study of selected issues and topics in the history of art, with emphasis on developing skills in research and writing. Each seminar will have a sub-title describing its focus. Essential for prospective graduate students in Art History. 4 lecture/discussion. Prerequisites: ART 212, 213, and 214.

**ART 424A Advanced Painting/Acrylic (3)**

Advanced methods and techniques in acrylic media and compositional development. 6 hours activity. Prerequisite: ART 324A or permission of instructor. May be repeated for a total of 9 units.

**ART 425A Advanced Watercolor (3)**

Advanced techniques in wet, cross wash and compositional development. 6 hours activity. Prerequisite: ART 225A, 325A or permission of instructor.

**ART 428A Advanced Painting (3)**

Advanced work in relationship of form to idea. Greater development of personal imagery and paint materials. 6 hours activity. Prerequisite: ART 345A and ART 424A or permission of instructor. May be repeated for a total of 9 units.

**ART 430A Advanced Ceramics (3)**

Advanced work in ceramic sculpture and design in clay. 6 hours activity. Prerequisite: ART 332A or 334A or permission of instructor. May be repeated for a total of 9 units.

**ART 453A Advanced Design (3)**

Advanced projects in two-dimensional design. 6 hours activity. Prerequisite: ART 253A, 352A or permission of instructor. May be repeated once for credit.

**ART 456A Design by Computer III (3)**

Motion graphics/video and computer for advanced computer graphics

course emphasizing the creation of images in motion as may be used in visual communications, entertainment, advertising and fine arts. 6 hours activity. Prerequisite: ART 355A. May be repeated once for credit.

#### **ART 458 Internships in the Fine Arts and Graphic Design (1-2)**

On-the-job training involving learning and production. Department guidelines must be followed, and internships must be approved in advance by department internship coordinator. One unit of credit given for each 50 or more hours of training with artist or design professional. Prerequisite: contract with instructor and sponsor. Total credit limited to 4 units with a maximum of 2 per quarter.

#### **ART 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision and culminating in a public exhibit or presentation of research. Minimum 120 hours total time. Prerequisite: senior standing and completion of 12 units in area of emphasis.

#### **ART 463 Undergraduate Seminar (2)**

An open forum of senior students in which the latest developments and practices in art criticism, education, and professional studio and gallery management are discussed. 2 lectures.

#### **ART 482A Installation, an Introduction to Conceptual Art (3)**

Installation art, as a vehicle for 3-dimensional, conceptual self-expression, explores concept, content, format, technique, and documentation in the manipulation of hybrid materials and methods in both gallery and site-specific/public context. 6 hours activity. Prerequisites: ART 280A or permission of instructor. May be repeated for a total of 9 units.

#### **ART 484A Advanced Sculpture (3)**

Intensified study of sculpture with emphasis on new developments in sculptural media. 6 hours activity. Prerequisite: ART 381A or permission of instructor. May be repeated for a total of 9 units.

#### **ART 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, activity, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.





## LANDSCAPE ARCHITECTURE

Kenneth S. Nakaba, Chair

John T. Lyle	D. Rodney Tapp
Jeffrey K. Olson	Takeo Uesugi
Phillip N. Pregill	Noel Dorsey Vernon
Joan Safford	Mark J. von Wodtke
Sharon Stine	Joan Woodward

Landscape architects are professionally concerned with the design, management, preservation, and use of the land. The curriculum in Landscape Architecture provides a foundation in all of these areas with particular emphasis on design, along with the cultural and technical subjects that support it. Coursework includes study of the elements and principles of art, design and planning processes, graphic communication, plants and planting design, construction methods and environmental history. Instruction fosters the development of creative and problem-solving abilities, communication skills, technical knowledge, environmental awareness and professional attitudes. In most courses, students develop design proposals or technical solutions for actual sites with instruction, guidance, and critiques from faculty members. In the final year of study, students may choose to emphasize urban or regional landscape issues.

The Bachelor of Science in Landscape Architecture is a professional degree, nationally accredited by the Landscape Architectural Accreditation Board and approved by the California Board of Landscape Architects. Holders of this degree find career opportunities in private practice; with municipal, county and state departments of planning and of parks and recreation; with corporate organizations; and with federal agencies such as the United States National Forest Service and Park Service. The student organization is affiliated with the American Society of Landscape Architects.

The curriculum requires a minimum of four years. New students must begin the program in the fall quarter. Students may enter the program directly from high school or as transfers from other institutions. In order to enter the four-year design sequence at the second year level, a portfolio review is required. Students must achieve a grade of "C" or better in all core courses in order to advance in the program. Concurrent enrollment in core courses is required for each year within the curriculum.

Students who maintain a grade point average of 3.2 or higher are eligible for membership in Sigma Lambda Alpha, a national honorary society for students of landscape architecture.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses for the major, in order to receive a degree in the major.

Design Foundations I	ENV	101/L	(4)
Design Foundations II	ENV	102/L	(4)
Landscape Design Methods	LA	103 /L	(3)
Introduction to the History of Landscape Architecture	LA	121/L	(3)
Basic Landscape Design	LA	201/L	(4)
Basic Landscape Design	LA	202/L	(4)
Basic Landscape Design	LA	203/L	(4)
Landscape Graphics	LA	232/L	(3)
Plants and Design	LA	241/L	(3)
Plants and Design	LA	242/L	(3)
Plants and Design	LA	243/L	(3)

Intermediate Landscape Design	LA	301/L	(5)
Intermediate Landscape Design	LA	302/L	(5)
Intermediate Landscape Design	LA	303/L	(5)
Landscape Construction	LA	331/L	(4)
Landscape Construction	LA	332/L	(4)
Landscape Construction	LA	333/L	(5)
Plant Design	LA	341/L	(3)
Plant Design	LA	342/L	(3)
Advanced Landscape Design	LA	401/L	(5)
Advanced Landscape Design	LA	402/L	(5)
Advanced Landscape Design	LA	403/L	(5)
#Regional Landscape History	LA	322/L	(3)
#The Urban Landscape	LA	423/L	(3)
#World Gardens	LA	424/L	(3)
#Asian Gardens	LA	425	(3)
Senior Seminar	LA	463	(2)
Landscape Architecture Practice	LA	464	(2)
Landscape Architecture Project	LA	465	(2)

#Select 2 of the four courses above.

### SUPPORT AND GENERAL EDUCATION COURSES

(Required of all Students)

General Surveying	AE	232/L	(3)
Introduction to Drawing	ART	140A	(3)
Landscape Horticultural Principles	HOR	131/L	(4)
Basic Soil Science	SS	231/L	(4)
Introduction to Computers in Design	ENV	120	(2)

### GENERAL EDUCATION COURSES

#### Area 1:

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

#### Area 2:

A. Trigonometry	MAT	106	(4)
B. Fundamentals of Chemistry	CHM	103	(4)
C. Life Science	BIO	110/111L	(4)
D. Any approved upper division math or science course			(4)
(See Advisor)			

#### Area 3:

A. History of Art and Design I	ENV 115/115A	(4)
B. Select one course		(4)
C. Select one course		(4)
D. Business and Its Environment	OM	103 (4)
E. Select one course		(4)
F. Select one course		(4)
G. General Psychology	PSY	201 (4)

#### Area 4:

United States History	HST	202 (4)
Introduction to American Government	PLS	201 (4)

#### Area 5:

See Department advisor.		(8)
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### DIRECTED ELECTIVES

See Department for approved list. (12)



**COURSE DESCRIPTIONS**

(Open to LA majors only unless otherwise specified)

**LA 103/103L Landscape Design Methods (1/2)**

Techniques for organizing and synthesizing varied elements in the shaping of landscape form; recognition of major design determinants and the role of landscape architects and other professionals in dealing with diverse aspects of design, stressing application of ideas through construction of full-scale experimental projects. 1 one-hour lecture, 2 three-hour laboratories. Prerequisite: ENV 102, with a grade of "C" or better.

**LA 121 Introduction to the History of Landscape Architecture (3)**

Study of human beings' efforts to create and control their physical environment, emphasizing major historical landscapes in their relationships with cities and buildings, and in terms of their cultural, social, political and economic contexts. 3 lectures. May be taken by non-LA majors with permission of instructor.

**LA 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**LA 201/201L, 202/202L, 203/203L Basic Landscape Design (2/2) (2/2) (2/2)**

Fundamental concepts of site-planning and design and their application to basic landscape problems, with particular emphasis on varying conditions of climate, plant communities, land forms and orientation. LA 201, 202, 203: 2 lectures, 2 three-hour laboratories. Prerequisite: LA 103, with a grade of "C" or better. A grade of "C" or better is required to advance within the sequence. Concurrent enrollment required.

**LA 232/232L Landscape Graphics (1/2)**

Development of communication skills emphasizing perspective and delineation techniques as they relate to landscape architecture. May be repeated once for credit. Laboratory course; 1 lecture, 2 three-hour laboratories. To be taken concurrently with LA 201. Prerequisite: LA 103, with a grade of "C" or better. Concurrent enrollment required.

**LA 241/241L, 242/242L, 243/243L Plants and Design (1/2) (1/2) (1/2)**

An introduction to planting design issues based upon ecological, functional and aesthetic design principles. Instruction includes the identification of plant materials appropriate for use in California including trees, shrubs, vines and herbaceous plants. 1 lecture, 2 three-hour laboratories. A grade of "C" or better is required to advance within the sequence. Concurrent enrollment required.

**LA 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

**LA 301/301L, 302/302L, 303/303L Intermediate Landscape Design (2/3) (2/3) (2/3)**

Application of design concepts and principles to more difficult problems involving a wide range of conditions in the physical environment. 2 lectures, 3 three-hour laboratories. Prerequisites: LA 203, 241, 242, 243, with a grade of "C" or better; ENG 104, 105 or equivalent. A grade of "C" or better is required to advance within the sequence. Concurrent enrollment required.

**LA 322/322L Regional Landscape History (2/1)**

How the landscape has guided human activity and habitat patterns on the regional and global scales, and how these patterns have in turn changed the natural landscape. Emphasis on major periods of urbanization, agricultural expansion, and development of recreation, conservation and open space systems, along with projections for the future. 2 lectures, 1 three-hour laboratory. Prerequisite: ENV 115. May be taken by non-LA majors with instructor's permission.

**LA 331/331L, 332/332L, 333/333L Landscape Construction (2/2) (2/2) (3/2)**

Landscape construction problems involving the formulation and preparation of plans for grading, drainage, staking, reference and lighting, planting, irrigation, construction details, structures, and other working drawings; relationship to specifications and contract documents. For LA 331, 332: 2 lectures, 2 three-hour laboratories. For LA 333: 3 lectures, 2 three-hour laboratories. Prerequisites: MAT 106; LA 203, AE 232. A grade of "C" or better is required to advance within the sequence. Concurrent enrollment required.

**LA 341/341L, 342/342L Planting Design (1/2) (1/2)**

A continuation of LA 241, 242, 243 with greater emphasis given to the organization and composition of plant materials towards solving design problems. Instruction includes development of planting plans, details, cost estimates, and specifications. 1 lecture, 2 three-hour laboratories. Prerequisites: LA 203, 241, 242, 243. A grade of "C" or better is required to advance within the sequence. Concurrent enrollment required.

**LA 400 Special Problems for Upper Division Students (1-2)**

Individual group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**LA 401/401L, 402/402L, 403/403L Advanced Landscape Design (2/3) (2/3) (2/3)**

Processes of design as applied to complex projects in landscape architecture, including proposal, programming, analysis, concept development and presentation. Each student selects an area of concentration: urban, rural, regional, or special problems. 2 lectures, 3 three-hour laboratories. Prerequisite: LA 303, LA 342, with a grade of "C" or better. A grade of "C" or better is required to advance within the sequence. Concurrent enrollment required.

**LA 423/423L The Urban Landscape (2/1)**

Urban space as traced through history, concentrating primarily on the development of the square and the park from the classic agora to the complexities of public space in modern western cities. The design of the city park is traced from the industrial era to present. Innovations and changing concepts in leisure and recreation are noted. 2 lectures, 1 three-hour laboratory. Prerequisite: ENV 116, LA 121. May be taken by non-LA majors with instructor's permission. Concurrent enrollment required.

**LA 424/424L World Gardens (2/1)**

History of garden design emphasizing Italian Renaissance, 17th century France and the English Natural period. Primary development of American gardens from colonial times to present. Oriental, Moorish, Hindu and Mogul gardens. 2 lectures, 1 three-hour laboratory. Prerequisite: ENV 116, LA 121. Concurrent enrollment required.

**LA 425 Asian Gardens (3)**

Development of an understanding of planning and design in the gardens of East-Asia including China, Korea, and Japan, with greater emphasis

on history, culture, and arts. Indian and South-East Asian influences are also included. Garden concept to form is discussed in the comparative approaches to garden designs of the regions. 3 lectures. Prerequisite: LA 121. May be taken by non-LA majors with permission of instructor.

#### **LA 441 Internship (1-2)**

On-the-job training in the profession dealing with some aspect of landscape architecture. The experience must involve learning as well as production. Internships must be approved in advance by the departmental internship coordinator. One unit of credit is granted for each 50 hours of training under a licensed professional. May be repeated for a maximum of 6 units. Prerequisite: approval of instructor.

#### **LA 454 Seminar on Landscape Architecture Research (2)**

Discussion and analysis of basic research methods; investigation of contemporary research issues in landscape architecture. Seminar, 2 hours.

#### **LA 459 Seminar on Design Theory (2)**

Investigation and discussion of design theories in landscape architecture and other design professions. Seminar, 2 hours.

#### **LA 463 Senior Seminar (2)**

Discussions of environmental design problems. The role of the landscape architect in society. Seminar, 2 hours.

#### **LA 464 Landscape Architectural Practice (2)**

The practice of landscape architecture, covering professional responsibilities and ethics, client and contractor relationships. Lecture, 2 hours.

#### **LA 465 Landscape Architectural Project (2)**

Selection and completion of a project with formal report done under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Minimum of 120 hours.

#### **LA 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

Graduate courses are listed in the Graduate Studies section of this catalog.



## URBAN AND REGIONAL PLANNING

Richard W. Willson, Chair

Felix R. Barreto	Charles E. Loggins
David E. Bess	Jerry Mitchell
Herschel Farberow	Gwendolyn H. Urey
Charles M. Hotchkiss	Ana Maria C. Whitaker
Richard E. Lloyd	

The profession of Urban and Regional Planning deals with the critical issues of physical change in cities and regions, and is concerned with environmental, social, and economic improvement. This unique program develops problem-solvers with imagination, desire, and ability to serve people and improve the quality of the environment. The curriculum offers classes which seek a balance among the physical, social, economic, ecological, and political forces so important in working with problems of human settlement. Students use cutting edge technology such as Geographic Information Systems (GIS). Throughout the program, students study real-life issues and propose solutions to them. Simply stated, learning current planning theory, practice, and techniques—as they apply to California, the nation and the world—constitute the essence of the program.

The Bachelor of Science in Urban and Regional Planning is accredited by the Planning Accreditation Board. For information about the graduate program in Urban and Regional Planning, see the Graduate Studies section of this catalog.

### QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Urban and Regional Planning. A full description of this minor is included in the "University Programs" section of this catalog.

### CORE COURSES FOR MAJOR

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

Design Foundations I	ENV	101/101L	(4)
Design Foundations II	ENV	102/102L	(4)
Introduction to Computers and Design	ENV	120/120L	(2)
Introduction to Cities and Planning	URP	101/101A	(4)
Process and Theory of Planning	URP	102/102A	(4)
Evolution of Cities	URP	104	(4)
Communication Graphics for Planning	URP	203/203L	(4)
Quantitative Methods for Planning	URP	331/331L	(4)
Applied Demography for Planning	URP	332/332L	(4)
Planning and Policy Analysis	URP	334/334A	(4)
Urban Land Use Planning and Theory	URP	335/335A	(4)
Planning Public Infrastructure	URP	337/337L	(4)
Institutional Framework for Planning	URP	351	(4)
Intergovernmental Framework for Planning	URP	352	(4)
Community Planning Studio I	URP	431/431L	(4)
Community Planning Studio II	URP	432/432L	(4)
Senior Project	URP	461	(2)
Senior Project	URP	462	(2)
Undergraduate Seminar	URP	463	(4)

Choose a minimum of 32 units with approval of advisor from courses listed below:

Evolution of American Cities and Planning Movement	URP	411	(4)
Planning and Urban Design in Europe	URP	412	(4)
Community Development Theory and Process	URP	434/434A	(4)
Urban Growth Management	URP	466	(4)
Planning in a Global Economy	URP	475	(4)
Rural and Small Town Planning	URP	481/481A	(4)
The Urban Development Process	URP	483/483A	(4)
Neighborhood Revitalization	URP	484/484A	(4)
Urban Design Seminar	URP	485/485L	(4)
Computer Applications in Planning	URP	486/486L	(4)
Environmental Factors in Regional Planning	URP	487	(4)
Urban Transportation Planning	URP	488/488L	(4)
Advanced Planning Studio	URP	498/498L	(4)
Special Topics for Upper Division Students	URP	499	(1-4)

### SUPPORT AND ELECTIVE COURSES

History of Art and Design	ENV	115/115A	(4)
Statistics with Applications	STA	120	(4)
Principles of Economics	EC	201	(4)
Advocacy and Argument	COM	204	(4)
Report Writing	COM	216	(4)
Urban Geography	GEO	315	(4)

### GENERAL EDUCATION COURSES (TRACK A OR B)

See Advisor, 72 units required.

### COURSE DESCRIPTIONS

#### URP 101/101A Introduction to Cities and Planning (3/1)

Study of the contemporary American city, with emphasis on observing and understanding urban phenomena. Uses examples from Southern California, with field trips. This course, required of all incoming planning majors, includes orientation to the planning curriculum and the profession. 3 lectures, 1 two-hour activity. Concurrent enrollment required.

#### URP 102/102A Process and Theory of Planning (3/1)

Study of urban and metropolitan development, theories of urban change, and the role of planning. Issues include planning in a pluralistic, multicultural society; the role of planning in government and the private sector; and the environmental and ethical responsibilities of planners. 3 lectures, 1 two-hour activity. Prerequisites: URP 101. Concurrent enrollment required.

#### URP 104 Evolution of Cities (4)

Historical review of cities from antiquity to modern times. The origins and development of cities in Europe, Asia, Africa, and America. Critical examination of social, economic, political, cultural and technological interrelationships that have determined city location, form, growth and decline over time. The relationships of those factors to modern urban planning. 2 two-hour lectures.

#### URP 203/203L Communications Graphics For Planning (2/2)

Examination and experimentation in graphic techniques as a communicative tool for planners. 2 lectures, 2 three-hour laboratories. Prerequisites: ENV 101 and ENV 102. Concurrent enrollment required.



**URP 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

**URP 301 Principles of Urban Planning (4)**

The planning function in government. The planning process. Principles for projecting land requirements and locations for various urban land uses. Ways of implementing the plans. Not open to URP majors. 4 lectures.

**URP 331/331L Quantitative Methods for Planning (3/1)**

Quantitative methods in the context of planning and decision-making. Review of probability and descriptive statistics. Types and sources of basic planning data. Collection and organization of data in tables, graphs, and figures. Analysis and interpretation of quantitative information. 3 lectures, 3 hours of laboratory. Prerequisites: URP 102, STA 120. Concurrent enrollment required.

**URP 332/332L Applied Demography for Planning (3/1)**

Introduction to demographic concepts and terminology. Methods for making population estimates and projections. Organization and use of U.S. Census materials. Techniques for analyzing population characteristics, particularly for small geographic areas (counties and smaller). 3 lectures, 3 hours of laboratory. Prerequisite: URP 331. Concurrent enrollment required.

**URP 334/334A Planning and Policy Analysis (2/2)**

Theories and methods for evaluating planning proposals and projects. Use of analysis techniques drawn from the social sciences dealing with urban planning policies and programs. 2 lectures, 2 seminars. Prerequisites: URP 332, EC 201, COM 216. Concurrent enrollment required.

**URP 335/335A Urban Land Use Planning and Theory (3/1)**

Reviews macro-level land use shifts in metropolitan areas, focusing on problems of housing, transportation and the environment. Emphasis on spatio-economic/demographic patterns and dynamics between urban centers and suburbs as well as between metropolitan and non-metropolitan areas in the United States during the twentieth century. 3 lectures, 1 two-hour activity. Prerequisite: URP 331. Concurrent enrollment required.

**URP 337/337L Planning Public Infrastructure (3/1)**

Examines how infrastructure systems such as transportation, energy, water, and public facilities serve people and their activities. Teaches skills for infrastructure planning, evaluation, and implementation. 3 lecture discussions, 3 hours of laboratory. Prerequisite: URP 335. Concurrent enrollment required.

**URP 351 Institutional Framework for Planning (4)**

Introduces the institutional framework for planning. Reviews the development of the General Plan, zoning, and the legal basis for modern planning. Emphasis is placed on gaining an understanding of the legal process that planners work within and applicable constitutional rights. 4 lecture discussions. Prerequisites: URP 101 and URP 102.

**URP 352 Intergovernmental Framework for Planning (4)**

Introduces the modern intergovernmental framework for planning. Reviews the development of national, state, and regional land use policy, environmental controls and intergovernmental financing that provides the basis for modern land use planning and growth management. 4 lecture-discussions. Prerequisite: URP 351.

**URP 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**URP 411 Evolution of American Cities and the Planning Movement (4)**

Evolution of American development patterns. Emphasis on how location and form reflect the needs of changing multicultural communities. Planning as a social reform movement. Growth in California and the Los Angeles metropolitan region. Not open to graduate students. 4 lectures. Prerequisite: URP 351 or permission of instructor.

**URP 412 Planning and Urban Design in Europe (4)**

Illustrated lectures on contemporary planning and urban design theory and practice currently in evidence in Western Europe. Contemporary theories and concepts as related to present social concerns. Relevance of the European experience to the solution of America's urban problems. 4 lecture/seminars. Prerequisite: upper division standing.

**URP 431/431L Community Planning Studio I (2/2)**

Application of research, analysis and community planning procedures. Programming a planning activity. Using teamwork and communication in planning. 2 lectures, 6 hours of laboratory. Prerequisites: completion of 300 level core. Concurrent enrollment required.

**URP 432/432L Community Planning Studio II (2/2)**

Analysis and synthesis of planning and community design topics interpreted from problems or sub-issues emphasized in URP 431. 2 hours lecture, 6 hours laboratory. Prerequisite: URP 431 or approval by instructor. Concurrent enrollment required.

**URP 434/434A Community Development Theory and Process (3/1)**

The history, legal background and process of community development and urban renewal. Study of conservation, rehabilitation and redevelopment practices. Problems involved in federal, state, and local, public and private community development programs. 3 lectures, 1 two-hour activity. Prerequisite: URP 332. Concurrent enrollment required.

**URP 441 Field Work (2-3)**

Practical application of urban and regional planning techniques through supervised field work. Written report and evaluation of experience required. (One unit of credit will be allowed for each 60 hours of field work.) May be repeated for a maximum of 6 units for undergraduates, maximum of 3 units for graduate credit. 1 lecture and 6 to 12 hours of field work. Prerequisite: permission of instructor.

**URP 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in urban and regional planning field. Project results presented in a formal report. Minimum 60 hours total time per two-unit course. Prerequisite: All required URP 300-level courses, COM 216, successful completion of GWT.

**URP 463 Undergraduate Seminar (4)**

Intensive study of the legal, ethical, and professional aspects of urban and regional planning in public and private practice. Review of planning problems with regard to planning theory. 4 seminars. Prerequisite: all required URP 300-level courses.



**URP 466 Urban Growth Management (4)**

The impact of urban growth on the environment. Preparation of Environmental Impact Reports. Current methods, procedures and trends for managing urban growth. 4 lecture discussions. Prerequisite: URP 332.

**URP 475 Planning in a Global Economy (4)**

Major issues confronting planners in a global economy. Explores spatial, cultural and economic factors associated with major problems and examines development of appropriate policies and programs. 4 lecture discussions.

**URP 481/481A Rural and Small Town Planning (3/1)**

Theories and methods of planning in small towns and rural communities. The changing role of the traditional small town and agricultural trade center in rural development. Conflicts and contradictions of various development strategies. Rural resettlement programs. 3 lectures, 1 two-hour activity. Prerequisite: URP 434. Concurrent enrollment required.

**URP 483/483A The Urban Development Process (3/1)**

Introduction to the roles of the many participants in the design and development of urban projects. Procedural aspects of development, requests for proposals, methods of finance, project feasibility analysis, program evaluation and review, and government incentives. 3 lectures, 1 two-hour activity. Prerequisite: URP 332. Concurrent enrollment required.

**URP 484/484A Neighborhood Revitalization (3/1)**

Delimiting the urban neighborhood. Traditional functions and life cycle of urban neighborhoods. Revitalization policy options and strategies. Public and private sector involvement in neighborhood revitalization. Citizen-initiated revitalization programs. 3 lectures, 1 two-hour activity. Prerequisite: URP 434. Concurrent enrollment required.

**URP 485/485L Urban Design Seminar (3/1)**

Design in the planning process, with emphasis on research, analysis and programming for the context of design decisions. Methods of understanding human interaction with the built environment. Prerequisite: URP 203. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required.

**URP 486/486L Computer Applications in Planning (1/3)**

Introduction to the microcomputer and specialized application programs: geographic information systems, data bases, calculations and computer generated graphics. Specific planning applications and the development of templates. Studio preparation of a computer-based planning application program. Prerequisite: URP 332, 1 lecture, 3 three-hour laboratories. Concurrent enrollment required.

**URP 487 Environmental Factors in Regional Planning (4)**

Analysis of environmental problems and the regional planning institutions that work to solve them. Review of contemporary planning practices and their application to emerging environmental issues. 4 lectures. Prerequisite: URP 332.

**URP 488/488L Urban Transportation Planning (3/1)**

Supply and demand management approaches to transportation planning. Land use/transportation relationships. Function of travel modes, modeling local and regional flows. Finance, politics and policy in transportation planning. 3 lecture-discussions, 1 three-hour laboratory. Prerequisite: URP 337.

**URP 498/498L Advanced Planning Studio (3/1)**

Study of a selected topic through advanced studio, subject matter to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. 3 seminars, 1 three-hour laboratory. Prerequisite: consent of instructor.

**URP 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

Graduate courses are listed in the "Graduate Studies" section of this catalog.











## COLLEGE OF LETTERS, ARTS, AND SOCIAL SCIENCES

Barbara J. Way, Dean

M. Kathleen Massey, Interim Associate Dean

The College of Letters, Arts, and Social Sciences advances knowledge and learning in established academic disciplines in the humanities, social sciences, and performing arts. It provides introductory and advanced course work in more than 20 degree and certificate programs.

The College also provides courses that substantially make up the General Education curriculum required of all students. These courses provide a foundation of knowledge of the cultural, social, political, ethical, and economic worlds. The College provides curricular support of the University's considerable teacher-education function. In all its programs, the College of Letters, Arts, and Social Sciences serves the goals of the University to provide for the intellectual, personal, and professional development of each person and for the enrichment of the communities it serves outside the University. In pursuit of these objectives, Bachelor's degree programs and minors are offered in the performing arts, humanities, behavioral and social sciences, and kinesiology. Master's degrees are offered in economics, English, psychology, and kinesiology. Through its curriculum, research activities, arts performances, and other humane activity, the College of Letters, Arts, and Social Sciences promotes activity integral to processes of inquiry, creativity, learning, and teaching.

In accord with the mission of a comprehensive polytechnic university "preparing students for life, leadership, and careers in a changing, multicultural world," the College of Letters, Arts, and Social Sciences seeks to equip students with lifelong learning skills enabling them more effectively to challenge problems of extraordinary social, technical, and human complexity. These skills include creative and critical thinking, methods of both quantitative and qualitative inquiry, the application of theory to practice, learning through performance-based activities in the humanities, arts and social sciences, and the integration of mind and body in health and wellness activity. In furthering its mission of promoting learning and teaching as broad-based, ongoing, and shared processes, the College of Letters, Arts, and Social Sciences supports initiatives that further the professional development of faculty and staff, that engage students and faculty in active collaboration in the pursuit and dissemination of knowledge, and that integrate the arts, sciences, and technologies. The College thus advances collegiality not only among the various segments of the University, but also with the local and global communities it serves. It promotes access of underrepresented student populations to its programs, resources, and services.

The College of Letters, Arts, and Social Sciences offers 12 Bachelor of Arts degrees, 6 Bachelor of Science degrees, 23 minors, 3 Certificates of Proficiency, 3 Master of Science degrees, and one Master of Arts degree. With other colleges in the University, the College of Letters, Arts, and Social Sciences participates in continuing education in support of the concept of life-long learning. To promote increased multicultural understanding, the College encourages students to investigate opportunities for overseas study through the International Center. For further information about these programs, please contact the individual department.

### COOPERATIVE EDUCATION

Kathleen Massey, Coordinator for College of Letters, Arts, and Social Sciences.

The College of Letters, Arts, and Social Sciences has developed a cooperative education program with industry, business and government. This program is designed to provide alternating periods of full-time study

and full-time work or to combine part-time study and part-time work. A student may earn up to 16 units of academic credit in the Cooperative Education program. The student's job performance is evaluated by both her/his work supervisor and a College of Letters, Arts, and Social Sciences faculty member. The Cooperative Education program provides interested students with four opportunities:

1. To have "real world responsibility and experience" in business, industry and government.
2. To evaluate alternate career opportunities.
3. To earn a salary, in some situations, which will help them pay for their education.
4. To have prospective employers become acquainted with co-op students.

More information may be obtained from the Dean of Letters, Arts, and Social Sciences' office and/or the University's Career Planning and Placement Center.

### COOPERATIVE EDUCATION COURSES

#### SA 470, 471, 472, 473 Cooperative Education (2-4) (2-4) (2-4) (2-4)

On-the-job experience for all majors in the College of Letters, Arts, and Social Sciences. Students alternate one or more quarters of full-time studies in their major with an equal number of quarters of relevant full-time work for pay. Prerequisite: consent of instructor and junior standing. (Courses must be taken in ascending sequence.)

### CERTIFICATE IN CRIMINAL JUSTICE AND CORRECTIONS

A multi-departmental Certificate Program in Criminal Justice and Corrections is offered under the sponsorship of the Dean of the College of Letters, Arts, and Social Sciences. This program (also a minor) is comprised of a multidisciplinary grouping of courses which have been specifically selected to fulfill the needs of students presently working in or planning for careers in law enforcement or corrections. Special advisement for students in any major who are interested in criminal justice or corrections may be obtained from the Criminal Justice Coordinator, Dr. Wayne S. Wooden, Behavioral Sciences Department. (See also Behavioral Sciences section of this catalog for a listing of the courses.)

### Departments and Majors/Minors

#### BEHAVIORAL SCIENCES

Gary A. Cretser, Chair; Behavioral Sciences major (BA); Sociology major (BA) Options in Sociology, Criminology and Social Work; Psychology major (BA); Master of Science in Psychology; Criminal Justice and Corrections minor, Psychology minor, Sociology minor.

#### COMMUNICATION

Richard A. Kallan, Chair; Communication major (BS); Options in Communication Studies, Journalism, and Public Relations and Organizational Communication; Communications minor, Newspaper Journalism minor, Public Relations minor, Speech Communication minor.

#### ECONOMICS

Maureen Burton, Chair; Economics major (BS); Master of Science in Economics; Options in Economic Analysis, Environmental and Natural Resource Economics, and Financial Economics, Economics minor.

#### ENGLISH AND FOREIGN LANGUAGES

George Stavros, Chair; English major (BA); Humanities major (BA); Master of Arts in English; English minor, Spanish minor.

**GEOGRAPHY AND ANTHROPOLOGY**

Richard S. Hyslop, Chair; Social Sciences major (BS); Anthropology major (BS); Geography major (BS); Options in Geography and in Geographic Information Systems; Anthropology minor, Geography minor.

**HISTORY**

Mahmood Ibrahim, Chair; History major (BA), History minor, Latin American Studies minor.

**INSTITUTE OF NEW DANCE and CULTURES**

Gayle M. Fekete, Director; Dance minor.

**KINESIOLOGY AND HEALTH PROMOTION**

Priscilla Stromer, Chair; Kinesiology major (BS); Options in Pedagogy and Sports Medicine; Master of Science in Kinesiology (MS); Option in Sports Nutrition.

**MUSIC**

David Grasmick, Chair; Music major (BA), Music minor.

**PHILOSOPHY**

Laurie Shrage, Chair; Philosophy major (BA), Philosophy minor, Religious Studies minor.

**POLITICAL SCIENCE**

David Speak, Chair; Political Science major (BA); Options in Political Science and Public Administration; Political Science minor, Public Administration minor.

**THEATRE**

William Morse II, Chair; Theatre major (BA); Options in Acting, Dance, General Theatre, and Technical Theatre and Design; Theatre minor.

**College of Letters, Arts, and Social Sciences Related Coursework****SA 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**SA 362 China As a Cultural Entity (4)**

Direct field investigation of China as a cultural entity with attention to the central issues confronting this complex society. These issues include relationship and influence of China's history on the present dynamics of contemporary Chinese culture. Instructional materials, activities, and facilities charges. 4 lectures/problem-solving. Prerequisite: consent of instructor. (Also listed as BUS 362.)

**SA 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**SA 452 Political Economy and Business Practices in China (4)**

Direct field investigation and academic study of historical and current productive/political organization of China. State ownership and the mixed economy; economic objectives and planning. Business organization; incentives and decision-making; and management. Cross-cultural comparison with Western enterprise. International trade. 4 lectures/problem-solving. Instructional materials, activities and facilities charges. Prerequisite: consent of instructor. (Also listed as BUS 452.)

**SA 482 China and the United States: Cross-Cultural Analysis (4)**

Examination of critical areas of U.S. and Chinese cultures that provide insights and understanding of the comparative differences of these two civilizations; historical and contemporary differences. 4 lectures/problem-solving. Instructional materials, activities and facilities charges. Prerequisite: consent of instructor. (Also listed as BUS 482.)

**SA 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

## ANTHROPOLOGY

One of the three majors offered in the Department of Geography and Anthropology is Anthropology. For other programs in the department see Geography, and Social Sciences.

Richard S. Hyslop, Chair, Department of Geography and Anthropology

Harold F. Turnbull, Anthropology Coordinator

Thomas C. Blackburn

David G. Lord

Dorothy D. Wills

The Anthropology degree program, which is housed in the Department of Geography and Anthropology, is designed to provide an understanding of the variety of humankind's cultural and physical environments by examining the dynamic systems (both natural and human) through which these diverse settings are changed or sustained. The student majoring in Anthropology is guided to analyze human problems and apply the distinctive ways in which people in various cultures perceive the world and adapt to it. Attention is given to the relationships between expanding populations, increasing per capita use of resources and recognition of present and potential energy and raw materials crises.

By appraising the sociocultural tensions of modernization and enforced acculturation in various environmental settings, students are brought to deeper insights and practical understanding of their own Californian community and its future in the broad society. Students completing this program receive a Bachelor of Science Degree.

Training in this major, therefore, provides a broad and suitable background for careers requiring an understanding of peoples, groups, and their cultural and regional institutions. Careers specifically related to this program include government employment in various capacities, secondary school teaching, and positions in international or multicultural capacities in business and management. Preparation for graduate training in the discipline is also offered to majors.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Introduction to Biological Anthropology	ANT	101	(4)
Introduction to Cultural Anthropology	ANT	102	(4)
Introduction to Archeology and Prehistory	ANT	103	(4)
Environment, Technology and Culture	ANT	350	(4)
Language and Culture	ANT	353	(4)
Social Anthropology	ANT	358	(4)
History of Anthropological Theory	ANT	380	(4)
Culture Areas of the World	ANT	399	(4)

### SUPPORT COURSES

(Required of all students)

Undergraduate Seminar	SSC	463	(2)
Unrestricted electives			(48)

### GENERAL EDUCATION COURSES

#### Area 1:

Freshman English I	ENG	104	(4)
Public Speaking	COM	100	(4)
Logic and Semantics	PHL	202	(4)

#### Area 2:

A. Elementary Statistics with Applications	STA	120	(4)
B. Principles of Geology	GSC	111/142	(3-5)
C. Basic Biology	BIO	115	(4)
D. Select one course			(4)

#### Area 3:

A. Select one course			(4)
B. Religions of the World	PHL	220	(4)
or Introduction to Religious Studies	PHL	221	
C. Select one course			(4)
D. Select one course			(4)
E. Principles of Sociology	SOC	201	(4)
F. Select one course			(4)
G. Human Nature/Affairs	ANT	201	(4)

#### Area 4:

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

#### Area 5:

12 Upper Division units are required, 4 of which fulfill Area 2D.			(8)
Total units required for degree			(198)

### ANTHROPOLOGY MINOR

Introduction to Biological Anthropology	ANT	101	(4)
Introduction to Cultural Anthropology	ANT	102	(4)
Native Peoples of California	ANT	320	(4)
or Native Peoples of North America	ANT	321	
Environment, Technology and Culture	ANT	350	(4)
or Developmental Anthropology	ANT	352	
or Medical Anthropology	ANT	357	
Psychological Anthropology	ANT	355	(4)
or Anthropology of Religion	ANT	360	
Social Anthropology	ANT	358	(4)
or The Anthropology of Gender	ANT	405	
Field Archaeology	ANT	394/394A	(4)
or Comparative Primatology	ANT	440	
Cultural Areas of the World	ANT	399	(4)
Total units required for minor			(32)

Note: The Anthropology Minor may be taken by Social Sciences Majors.

### ANTHROPOLOGY COURSE DESCRIPTIONS

#### ANT 101 Introduction to Biological Anthropology(4)

Human biology and behavior. The evolution of the human species as an adaptive biological process. Human ecology in evolutionary perspective. Human growth, development and diversity. The evolution and behavior of nonhuman primates. 4 lecture discussions.

#### ANT 102 Introduction to Cultural Anthropology (4)

The nature of culture and cultural phenomena; comparative social organization; religion and value systems of non-literate and folk peoples; cultural and psychological processes in the development of personality. 4 lecture discussions. Meets GE requirements in Area 3E for non-majors.

#### ANT 103 Introduction to Archaeology and Prehistory (4)

Basic methods of archaeological reconstruction and interpretation. Survey of human cultural and technological development from the first appearance of humans to the beginning of the urban lifeways and the formation of world civilizations. 4 lectures/problem-solving.



**ANT 201 Human Nature/Human Affairs: A Biocultural View (4)**

Integrated exploration of both cultural and biological factors affecting critical cultural/ethical issues such as intelligence, aggression and territoriality, sexism, racism, and altruism. Relationship of these issues to individual and cultural systems from a comparative perspective. 4 lecture discussions. Meets "Integrated Being" GE requirement. Area 3G

**ANT 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture and activity or laboratory. Prerequisite: permission of instructor. Corequisites may be required.

**ANT 301/301A Computer Applications in Anthropology (3/1)**

The use of microcomputers for the collection, organization, manipulation, analysis, and presentation of anthropological data. 3 hours lecture, 2 hours activity. Prerequisite: ANT 101 or ANT 102 or ANT 103.

**ANT 320 Native Peoples of California (4)**

Analysis of social, linguistic, ideological and technological diversity among indigenous peoples of California. Emphasis on a broad appreciation of native California lifestyles through a detailed study of representative societies. 4 lecture presentations. Prerequisites: ANT 102 or 103, or permission of instructor. Meets GE requirement in Area 5 for non-majors.

**ANT 321 Native Peoples of North America (4)**

Seminar on aboriginal peoples of North America; analysis of various adaptation and cultural subsystems in original culture areas; the status and role of Native Americans present and future. Extensive student presentations and research. 4 seminars. Prerequisite: ANT 102 or 103, or permission of instructor. Meets GE requirement in Area 5 for non-majors.

**ANT 322 North American Archaeology (4)**

Presents a survey of prehistoric cultural development in North America by synthesizing data recovered through excavations with the ethnographic record. Emphasizes interdisciplinary application to archaeological method and theory. Extensive student presentations and research. 4 seminars. Prerequisites: ANT 102 or ANT 103 or consent of instructor.

**ANT 333 Varieties of American Culture (4)**

Selected forms of cultural life in America. Distinction and coherence in cultural forms such as music, art, architecture, and fashion. Includes personal experience. 4 hours seminar. Meets GE requirement in Area 5 for non-majors. Prerequisites: PLS 201, and HST 202.

**ANT 350 Environment, Technology and Culture (4)**

Student-focused investigation of the interrelationships between a society's subsistence and economic systems, level of sociocultural development, and the natural and social environment inhabited. Tools and techniques utilized by particular societies in their exploitation of their surroundings. 4 hours seminar. Prerequisite: ANT 102, 103, or permission of instructor. Meets GE requirement in Area 2D.

**ANT 352 Development Anthropology (4)**

Economic anthropology; socio-cultural change and the phenomenon of "modernization" throughout the non-Western world. Emphasis on processes and institutional adaptations relating to evolving economic activities in a variety of cultures. Dynamic nature of culture and cultural sub-systems as viewed from a developmental perspective. 4 Seminars. Prerequisite: ANT 102 or permission of instructor.

**ANT 353 Language and Culture (4)**

Seminar on human communication in sociocultural context. Topics explored include nonverbal communication, dialects and social variation in speech communities; pidgins and creoles, multilingualism, language planning, language and socialization of children, ethnographic semantics, social interaction and communicative ritual, inter-cultural communication. 4 hours seminar. Prerequisites: ANT 102 or ENG 320 or permission of instructor.

**ANT 354 Laws, Values, and Culture (4)**

Organization of legal and governmental activities in traditional societies of varying degrees of complexity. Law and the maintenance of order; resolution of conflict; decision-making; political bodies and their ideologies. Political institutions in relationship to other social institutions. 4 lecture discussions. Prerequisite: ANT 102 or permission of instructor.

**ANT 355 Psychological Anthropology (4)**

Sociocultural examination of individual behavior and development; cross-cultural perspective related to "national character," "normalcy," and "abnormalcy," child rearing, and other personality factors. Prerequisite: ANT 102 or permission of instructor. 4 lecture/discussions. Meets GE requirement in Area 5 for non-majors.

**ANT 356 Cultures in Performance: Human Expression in Cross-Cultural Perspective (4)**

Traditional forms of expressive behavior and cultural performance (including mythology and folklore, ritual, festivals, drama, games, and sports) that reflect, reinforce, and reinterpret cultural identity; symbolic communication, aesthetic and cognitive expression, social functions, and cultural reflexivity in different performance genres. 4 lecture/presentations. Prerequisites: junior or senior standing, and ANT 102 or permission of instructor.

**ANT 357 Medical Anthropology (4)**

Cross-cultural survey of health, disease, and medicine. Etiology, epidemiology, nutrition, life cycle problems, and health care programs in Western and non-Western cultures. Emphasis on cultural factors in prevention, diagnosis, and treatment of health problems. 4 lecture presentations. Prerequisites: ANT 101, or ANT 102, or permission of instructor.

**ANT 358 Social Anthropology (4)**

A comparative, functional approach to social organization and social structure in various societies; culture, society, and personality; family, kinship, and marriage; social role and social rank; law and politics; religious systems; social change. 4 lecture discussions. Prerequisite: ANT 102, or permission of instructor. Meets GE requirement in Area 5 for non-majors.

**ANT 359/359A Demographic Anthropology (3/1)**

Demographic theory and methods applied to problems in cultural, archaeological, and biological (physical) anthropology. Human population patterns from prehistoric times to the present. Practice with computer models used in anthropological/demographic research. 3 hours lecture, 2 hours activity. Prerequisites: ANT 101 or ANT 102 or ANT 103 or consent of instructor.

**ANT 360 Anthropology of Religion (4)**

Cross-cultural comparison of religion at all levels of social organization. Student analysis of theories of origin and process including revitalization

movements. Witchcraft, sorcery, and shamanism as social institutions. Involves student presentations and critiques. 4 lecture/problem-solving. Prerequisite: ANT 102 or permission of instructor.

#### **ANT 380 History of Anthropological Theory (4)**

Chronological investigation by students of the major schools of thought within anthropology. Evolution of analytical theory and research methodology in each of the discipline's quadrants. Primary figures in anthropology, their lives and work, their impact on developments in the discipline. 4 hours seminar/discussion. Prerequisites: junior or senior standing, ANT 102 or permission of instructor.

#### **ANT 390 Methods in Anthropology (4)**

Theory and techniques of ethnographic inquiry. Participant observation, directive and open interviewing, integration and interpretation of data; personal response to field commitment. 4 lecture discussions. Prerequisite: ANT 102 or ANT 358 or permission of instructor.

#### **ANT 391/391A Primitive Technologies (2/2)**

Toolmaking and use in pre-industrial societies. Overview of practical and theoretical trends in the development of technology from earliest times to the advent of urban living. "Hands-on" experience in making early tools in various societies. 2 hours lecture/4 hours activity. Corequisites: ANT 391/391A. Prerequisite: ANT 101, ANT 102, or ANT 103, or permission of instructor.

#### **ANT 394/394A Field Archaeology (2/2)**

Introduction to the strategy and techniques of archaeological excavation. Site surveying and mapping; sampling techniques; recording; photography. Excavation of actual archaeological site. 2 lecture/discussions, 4 hours activity. Corequisites: ANT 394/394A. Prerequisite: ANT 102, ANT 103, or permission of instructor.

#### **ANT 395/395A Laboratory Analysis in Anthropology (2/2)**

Methods of collection, processing, description, and analysis of various kinds of anthropological data. Methodological and theoretical foundations; quantitative and qualitative approaches to laboratory studies in anthropology. Emphasis dependent upon available faculty specializations. 2 hours lecture/discussion, 4 hours activity. Corequisites: ANT 395/395A. Prerequisite: ANT 101 or ANT 102 or ANT 103 and permission of instructor. May be repeated twice for credit whenever a new topic is offered.

#### **ANT 397 Cultural Resource Management (4)**

Philosophical and practical aspects of cultural resource management. History and current status of laws and procedures affecting the protection, evaluation, and management of prehistoric, historic, ethnographic, and other cultural resources, with particular emphasis on California. 4 lecture presentations. Prerequisite: junior or senior standing. ANT 102 or ANT 103 or permission of instructor.

#### **ANT 399 Cultural Areas of the World (4)**

Ethnographic and ethnohistorical survey of selected cultural areas depending on available faculty specialization. Analysis of contemporary as well as traditional societies through ethnographic documents and first-hand field data. 4 lecture discussions. Prerequisite: ANT 102 or permission of instructor. May be repeated for additional credit whenever a new area is offered. Meets GE requirement in Area 5 for non-majors.

#### **ANT 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **ANT 405 The Anthropology of Gender (4)**

Student directed cross-cultural examination of gender. Includes biological anthropology of woman; role and status; culture and personality; affective and contractual bonding; future trends in relationships. Student research and presentations. 4 seminars. Prerequisite: ANT 102. Meets GE requirement in Area 5 for non-majors.

#### **ANT 440/440A Comparative Primatology (3/1)**

Multimedia exploration of the Primates. Biosocial traits, distribution, range of variation, ecology, and evolutionary background of prosimians, new world monkeys, old world monkeys, apes, and humans. Humans in a comparative primate perspective. 3 hours lecture, 2 hours activity. Prerequisite: ANT 101.

#### **ANT 445 Human Evolution and Variation (4)**

Student investigation of the origins, evolution, and differentiation of the human species. Critical examination of the varying theories concerning the fossil record of human evolution and the origins and development of racial variation. Analysis of modern biological data relevant to these theories. 4 hours seminar-discussion. Prerequisites: junior or senior standing. ANT 101 or ANT 103 or permission of instructor.

#### **ANT 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Lecture and activity or laboratory. Corequisites may be required. Prerequisite: permission of instructor.

## BEHAVIORAL SCIENCES

One of the three majors offered in the Behavioral Sciences Department is Behavioral Science. For other programs in this department, see Psychology and Sociology. For information on the graduate program in psychology see the "Graduate Studies" section in this catalog.

Gary A. Cretser, Chair

Sonia L. Blackman  
Wayne C. Brown  
Meg Clark  
Mary K.Y. Danico  
Larry Goldman  
Lori Barker Hackett  
Nancy J. Harkey  
Louis J. King  
Marcia E. Lasswell  
Dennis D. Loo

Frederick B. Meeker  
Jeffery S. Mio  
Fernando Parra  
Laurie A. Roades  
Donald V. Shupe  
Susan N. Siaw  
Brett C. Stockdill  
James W. Sturges  
Felicia F. Thomas  
Wayne S. Wooden

The department offers courses leading to the degree of Bachelor of Arts in the Behavioral Sciences. The curriculum for this degree is primarily composed of courses in psychology and sociology.

Instruction in the major is intended to provide a background for understanding human behavior, in both individual and collective aspects, as well as from multicultural perspectives. The interdisciplinary orientation and offerings allow students to select a major curriculum in concert with faculty advisors which best supports their aspirations for post-college employment or advanced education. A minimum number of required courses has been established, in order that a high degree of flexibility can be achieved in personal curriculum planning, with approved electives selected through consultation with faculty advisors. The introductory courses in psychology and sociology are prerequisite to most of the upper division offerings.

Behavioral Science majors may minor in Criminal Justice and Corrections or in any minor degree program offered by another department.

Students majoring in psychology or behavioral science who have a GPA of at least 3.0 overall have the opportunity to join Psi Chi, the National Honor Society in Psychology. Students majoring in sociology or behavioral science who have a GPA of at least 3.0 overall have the opportunity to join Alpha Kappa Delta (AKD), the National Honor Society in Sociology. For additional information contact the department office.

### CRIMINAL JUSTICE AND CORRECTIONS MINOR

The Criminal Justice and Corrections minor (also a certificate program) is a multidisciplinary grouping of courses which have been specifically selected to fulfill the needs of students presently working in or planning for careers in law enforcement or corrections. Special advisement for students in any major who are interested in criminal justice or corrections may be obtained from the department's Criminal Justice coordinator. Detailed information is available from the department office.

Since Behavioral Science is an interdisciplinary major drawn from Psychology and Sociology, students may not double major in Behavioral Science and either of these other two majors.

### PRAXIS PREPARATION

The Behavioral Science major does not enable a student to enter directly into teacher training. First, students must prove competence in a public school teaching area. In order to receive a valid secondary teaching credential in California Public Schools one has to have majored in a

teachable subject, e.g., math, science, history, etc. They also may qualify by taking a national examination, called the Praxis, which proves their subject matter proficiency.

The Behavioral Science major offers sufficient elective units which enables the student to prepare for a subject matter Praxis. The majority of students in this major find the Social Sciences the area most compatible with their major subject.

The graduate who has successfully passed the Praxis exam can then enter training toward the California State Secondary Credential to teach in the eighth through the twelfth grades.

There are specific courses in General Education that would be most helpful in passing the Praxis exam. Please obtain a list of the recommended courses from the department office.

### PHYSIOLOGY MINOR

See "University Programs" section in this catalog.

### QUANTITATIVE RESEARCH MINOR

See "University Programs" section in this catalog.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Principles of Psychology I	.....PSY	202	(4)
Principles of Psychology II	.....PSY	203	(4)
Principles of Sociology I	.....SOC	201	(4)
Principles of Sociology II	.....SOC	202	(4)
Methods in Behavioral Science I	.....BHS	204	(4)
Methods in Behavioral Science II	.....BHS	205	(4)
Social Psychology	.....PSY	401	(4)
Social Organization	.....SOC	310	(4)
or Class, Status and Power	.....SOC	410	
Senior Seminar	.....BHS	498	(4)

Choose one course from group A and B below (not to include courses taken above):

Group A: SOC 310, SOC 322, SOC 350, SOC 402, SOC 405, SOC 410. (4)  
Group B: PSY 303/303L, PSY 334, PSY 402, PSY 410, PSY 433/433L,  
PSY 460/460L. ....(4-5)

Approved electives in BHS, (except for 400 and 402), PSY, SOC, SW, 300-400 level chosen in consultation with advisor ..... (20)

### SUPPORT AND ELECTIVE COURSES

Freshman English I	.....ENG	104	(4)
Logic and Semantics	.....PHL	202	(4)
Public Speaking	.....COM	100	(4)
Writing for the Profession	.....ENG	301	(4)
Upper division electives (300-400 level)			(16)
Courses to complete GE Requirements			(56)
Unrestricted electives			(30)

### CRIMINAL JUSTICE AND CORRECTIONS MINOR

The student must choose a minimum of one course from 4 of the following 5 areas:

#### 1. Management

Personnel Management	.....ABM	402	(4)
Principles of Management	.....MHR	301	(4)
Industrial and Personnel Psychology	.....PSY	332	(4)

## 2. Administration of Justice

Public Administration	PLS	314	(4)
The American Judiciary	PLS	327	(4)
The Criminal Justice System	PLS	304	(4)

## 3. Therapeutic Intervention

Theories of Counseling	PSY	412	(4)
Abnormal Psychology	PSY	415	(4)
Behavioral Management	PSY	450	(4)

## 4. Juvenile Delinquency/Criminology

Criminology	SOC	302	(4)
Juvenile Delinquency	SOC	360	(4)
Corrections	SOC	403	(4)

## 5. Social Work

Contemporary Treatment of Law Violators	SW	318	(4)
Probation and Parole	SW	320	(4)
Family Violence	SW	322	(4)

The student selects four other upper division courses, in consultation with an advisor, from areas 1 through 5 above, and courses listed below:

Laws, Values and Culture	ANT	354	(4)
Writing for the Professions	ENG	301	(4)
Ethnic Identity	EWS	301	(4)
Philosophical Issues in the Law	PHL	420	(4)
Jurisprudence	PLS	405	(4)
Adolescent Psychology	PSY	312	(4)
Human Relations	PSY	314/314A(3/1)	
Psychology of Identity	PSY	321	(4)
Basic Counseling	PSY	417/417A(3/1)	
Introduction to Group Counseling	PSY	418	(2)
Leadership and Motivation	PSY	490	(4)
Ethnic Relations	SOC	320	(4)
or Sociology of Minority Communities	SOC	323	
Total units required in minor			(32)

Note: The Minor in Criminal Justice and Corrections may be taken by Behavioral Science Majors.

## COURSE DESCRIPTIONS

**BHS 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems at freshman and sophomore levels. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**BHS 204 Methods in the Behavioral Sciences I (4)**

Introduction and intermediate exposure to the methods, techniques, and data analysis used in carrying out research in the behavioral sciences. BHS 204 is primarily experimental methods. 4 lecture discussions. Prerequisite: PSY 202.

**BHS 205 Methods in the Behavioral Sciences II (4)**

Introduction and intermediate exposure to the methods, techniques, and data analysis used in carrying out research in the behavioral sciences. BHS 205 teaches primarily non-experimental methods. 4 lecture discussions. Prerequisites: SOC 201.

**BHS 307/307A Statistics for the Behavioral Sciences (3/1)**

Correlational techniques and inferential statistics useful to behavioral scientists. Product moment and rank order correlation coefficients, t-ratios, introduction to analysis of variance, selected non-parametric statistics. Selection application, and interpretation of appropriate statistics for analysis of behavioral data. 3 lectures, 1 two-hour activity. Prerequisites: STA 120, BHS 204, 205. Corequisites: BHS 307 and BHS 307A.

**BHS 328 Women and Men: Changing Sex Roles (4)**

An interdisciplinary survey of gender differences, sex roles; the issues and controversies, causes and consequences of the changes in men's and women's lives particularly in the last two decades. Historical, cross-cultural and future perspectives will be examined. Lecture, small group discussion, class reports. 4 lecture discussions. Prerequisites: PSY 201, PSY 202, SOC 201, or EWS 145.

**BHS 340/340A Computer Methods in Behavioral Science (3/1)**

Survey of computer methods in behavioral science research. Simulations, games, analytic models, humanistic applications, and special techniques. Practice in programming of applied behavioral science problems. 3 lectures, 1 two-hour activity. Prerequisites: BHS 204, BHS 205. Corequisites: BHS 340 and BHS 340A.

**BHS 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, or practicum in selected problem areas. Total credit limited to 6 units with a maximum of 2 units per quarter.

**BHS 402 Field Work (2)**

Students will serve an internship with an organization which has an operation appropriate to their vocational or graduate school interests. Prerequisites: Approval of academic supervisor and placement organization. Course may be repeated for a maximum of 4 units.

**BHS 426/426A Applied Social Psychology/Sociology (3/1)**

Application of methods, concepts and content of sociology and psychology in various settings, including health systems, government agencies, industry and education. Examination of the effects of culture, ethnicity, gender on the effective delivery of services. 3 seminars, 1 two-hour activity. Prerequisites: BHS 204, 205. Corequisites: BHS 426 and 426A.

**BHS 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment or interest. Formal written report required.

**BHS 463 Undergraduate Seminar (2)**

Study and discussion of recent developments in behavioral sciences, contrasted with students' senior project. Prerequisites: BHS 461, 462.

**BHS 498 Senior Seminar (4)**

Contemporary concepts, issues, and studies in the behavioral sciences. 4 seminars. Prerequisites: BHS, PSY, or SOC major and upper division standing.

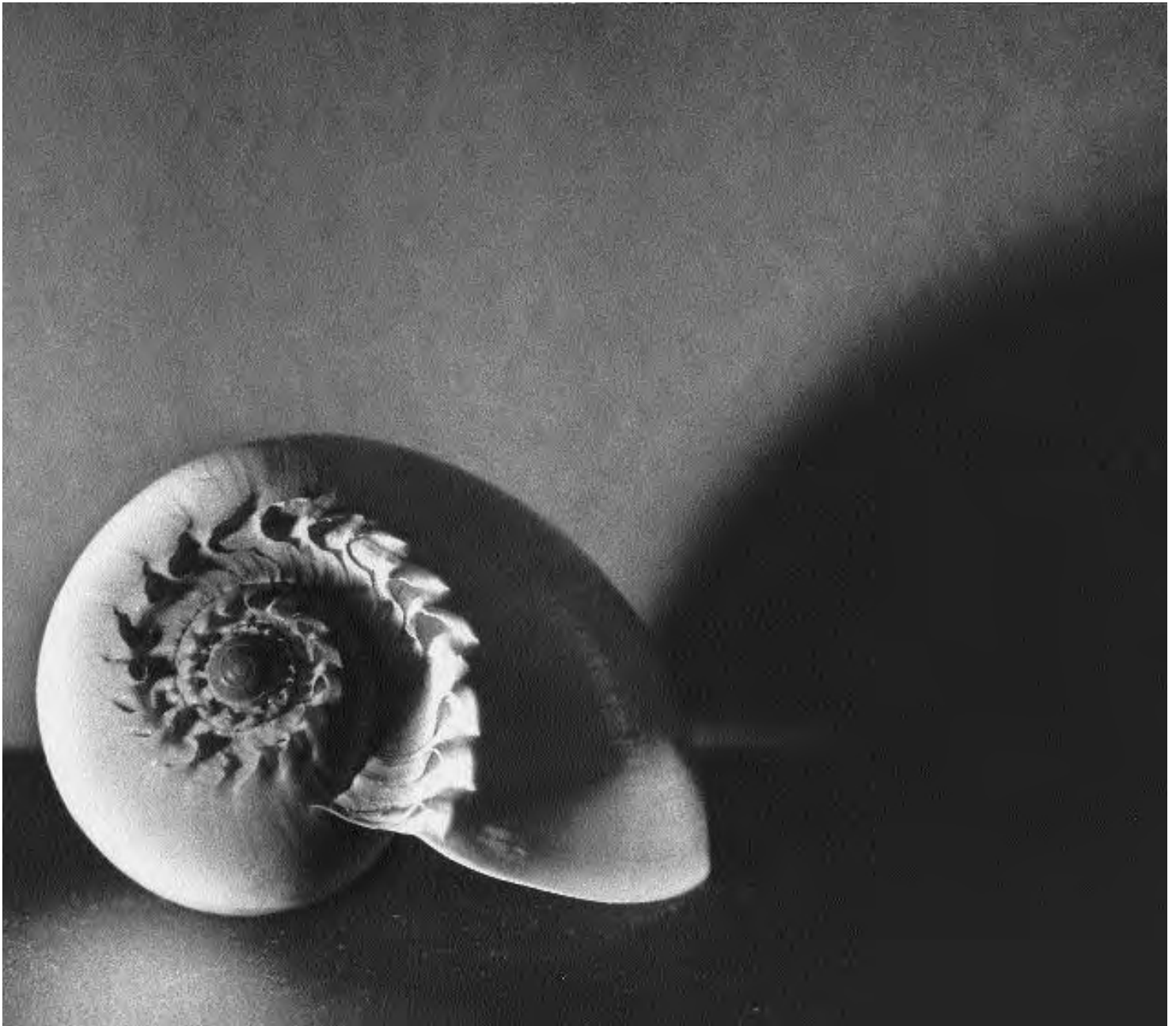
**BHS 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter.



Instruction may be by lecture, activity, laboratory, or a combination.  
Prerequisite: permission of instructor. Corequisites: BHS 499 and 499A  
or 499L (if appropriate).

(For courses in Psychology and Sociology please refer to the appropriate  
sections of this catalog.)



## COMMUNICATION

Richard A. Kallan, Chair

Lalit Acharya	Jane R. Ballinger
Rebecca A. Carrier	Robert L. Charles
Vinita Dhingra	John A. Kaufman
Wayne D. Rowe	Judith A. Sanders
Mary Kay Switzer	

An increasingly complex society needs individuals to inform, interpret and explain to the public the problems of that society. The communication major prepares students to fill positions in the mass media, business, government, and education.

Students select one of three options to complete the major—Communication Studies, Journalism, and Public Relations and Organizational Communication.

The Communication Studies option should be chosen by students who wish to emphasize interpersonal and intercultural communication in preparation for careers in business/industry or in preparation for graduate or professional school.

The Journalism option is designed for students planning careers in editorial and supervisory assignments with newspapers, magazines, industrial publications, and broadcast media.

The Public Relations and Organizational Communication option should be chosen by students planning careers in public relations, advertising, and human resource management which require skills and knowledge in the use of written, oral, visual, and multimedia communication.

The department offers minors in Communication, Newspaper Journalism, Public Relations, and Speech Communication.

The Communication Department sponsors the weekly student newspaper, *The Post*, and the department magazine, *Impressions*. The department also organizes an annual special event, Communication Day, a professional conference planned by students.

### JOURNALISM

Introduction to Mass Communication	.COM	101	(4)
Writing as Media Professionals	.COM	108	(4)
Introduction to Communication Theory	.COM	201	(4)
Print Communication	.COM	206	(4)
Communication Law	.COM	304	(4)
Communication Research	.COM	316/316A	(2,2)
Communication Ethics	.COM	401	(4)
Applied Communication/Internship	.COM	461	(6)
Reporting	.COM	102/102A	(2,2)
Advanced Reporting	.COM	202/202A	(2,2)
Photojournalism	.COM	231/231L	(1,1)
Editing Laboratory	.COM	305L	(2)
Public Opinion, Prop, & Mass Media	.COM	413	(4)

Select either group below: A (Print) or B (Broadcast)

#### Group A

In-Depth Reporting	.COM	307	(4)
Reporting Public Affairs	.COM	309	(4)
Magazine Editing & Production	.COM	312	(4)

#### Group B

Broadcast Journalism	.COM	301/301A	(2,2)
Media Effects	.COM	370	(4)
Advanced Broadcast Journalism	.COM	411/411A	(2,2)

#### Support Courses

Photography	.COM	131/131L	(2,2)
Newspaper Practices	.COM	251A	(6)
or Magazine Practices	.COM	252A	
or Editorial Newspaper Practices	.COM	451A	
or Editorial Magazine Practices	.COM	452A	
or a combination of the above courses (totaling six units—2 units per course)			

Adv Copywriting, Layout & Prod.	.COM	302/302A	(2,2)
Intercultural Communication	.COM	327	(4)
Multimedia Communication	.COM	333/33A	(2,2)
Media Criticism	.COM	448	(4)
Advanced Expository Writing	.ENG	301	(4)
American State & Local Politics	.PLS	328	(4)

### GENERAL EDUCATION COURSES

(72 units) Pick courses from approved lists unless specified.

#### Area 1:

A. Freshman English I	.ENG	104	(4)
B. Advocacy and Argument	.COM	204	(4)
C. Freshman English II	.ENG	105	(4)

#### Area 2:

A. Statistics 120	.STA	120	(4)
B. Any course			(4)
C. Any course			(4)
D. Any course (upper division)			(4)

#### Area 3:

A. Select one course			(4)
B. Select one course			(4)
C. Select one course			(4)
D. Principles of Economics	.EC	202	(4)
E. Principles of Sociology	.SOC	201	(4)
F. Select one course			(4)
G. Select one course			(4)

#### Area 4:

United States History	.HST	202	(4)
Introduction to American Government	.PLS	201	(4)

#### Area 5:

Select 8 upper division units (A total of 12 upper division units required in GE—four in Area 2d and eight in Area 5) See Schedule of Classes for approved courses. Advisor approval required. No COM classes permitted

#### UNRESTRICTED ELECTIVES:

In addition, students are required to complete 30 units of Unrestricted Electives.

### PUBLIC RELATIONS AND ORGANIZATIONAL COMMUNICATION

Intro to Mass Communication	.COM	101	(4)
Writing as Media Professionals	.COM	108	(4)
Intro to Communication Theory	.COM	201	(4)
Print Communication	.COM	206	(4)

Communication Law	COM	304	(4)
Communication Research	COM	316/316A	(2,2)
Communication Ethics	COM	401	(4)
Applied Communication/Internship	COM	461	(6)
Reporting	COM	102/102A	(2,2)
Photography	COM	131/131L	(2,2)
Advanced Copywriting, Layout & Production	COM	302/302A	(2,2)
Magazine Editing & Production	COM	312	(4)
Public Relations Theory	COM	313	(4)
Organizational Communication Theory	COM	314	(4)
Public Relations Tools & Techniques	COM	315	(4)
Public Relations Writing	COM	319	(4)
or Persuasion & Communication	COM	325	(4)
Public Relations Case Studies	COM	414	(4)
Special Events Planning	COM	446/446A	(2,2)

Plus 12 units selected from the following courses:

Professional Selling	IBM	208	(4)
Principles of Marketing Management	IBM	301	(4)
Promotional Strategies	IBM	307	(4)
Marketing of Services	IBM	316	(4)
Buyer Behavior	IBM	411	(4)
Eval Advertising Effectiveness	IBM	433	(4)
Human Resources Management	MHR	311	(4)
Multicultural Organizational Behavior	MHR	318	(4)
Communication for Management	MHR	324	(4)
Training and Development	MHR	405	(4)
Advanced Management Communication Seminar	MHR	424	(4)
Human Relations	PSY	314/314A	(3,1)
Industrial and Personnel Psy	PSY	332	(4)

#### GENERAL EDUCATION COURSES

(72 units) Pick courses from approved lists unless specified.

##### Area 1:

A. Freshman English I	ENG	104	(4)
B. Public Speaking	COM	100	(4)
C. Freshman English II	ENG	105	(4)

##### Area 2:

A. Statistics 120	STA	120	(4)
B. Any course			(4)
C. Any course			(4)
D. Any course (upper division)			(4)

##### Area 3:

A. The Visual Arts	ART	110	(4)
B. Business & Professional Ethics	PHL	205	(4)
C. Select one course			(4)
D. Principles of Economics	EC	202	(4)
E. Principles of Sociology	SOC	201	(4)
F. Select one course			(4)
G. General Psychology	PSY	201	(4)

##### Area 4:

United States History	HST	202	(4)
Introduction to American Gov	PLS	201	(4)

##### Area 5:

Select 8 upper division units (A total of 12 upper division units required in GE—four in Area 2d and eight in Area 5) See Schedule of Classes for

approved courses. Advisor approval required. No COM classes permitted

#### UNRESTRICTED ELECTIVES:

In addition, students are required to complete 18 units of Unrestricted Electives.

#### COMMUNICATION STUDIES

Introduction to Mass Communication	COM	101	(4)
Writing as Media Professionals	COM	108	(4)
Introduction to Communication Theory	COM	201	(4)
Print Communication	COM	206	(4)
Communication Law	COM	304	(4)
Communication Research	COM	316/316A	(2,2)
Communication Ethics	COM	401	(4)
Applied Communication/Internship	COM	461	(6)
Interpersonal Communication	COM	103	(4)
Intercultural Communication	COM	327	(4)
Communication Studies Seminar	COM	463	(4)

Select 8 units from the following courses:

Communication Problem Analysis	COM	321	(4)
Human Communication Theory	COM	328	(4)
Communication in Conflict Resolution	COM	409	(4)
Media Criticism	COM	448	(4)

12 additional units in communication required by contract with approval from advisor.

#### Support Courses:

Public Speaking	COM	100	(4)
Advanced Communication Research	COM	403/403A	(2,2)
Multicultural Organizational Behavior	MHR	318	(4)

Take 12 units from among the following courses:

Language and Culture	ANT	353	(4)
Cultures in Performance	ANT	356	(4)
Social Anthropology	ANT	358	(4)
Cultural Areas of the World	ANT	399	(4)
Anthropology of Gender	ANT	405	(4)
Women & Men: Changing Sex Roles	BHS	328	(4)
Language & Human Behavior	ENG	313	(4)
Ethnic Identity	EWS	301	(4)
Gender, Ethnicity, and Class	EWS	420	(4)
Philosophy & Religion of Japan	PHL	401	(4)
Philosophy & Religion of China	PHL	402	(4)
Philosophy & Religion of India	PHL	403	(4)
Asian-Amer Exp in the U.S.	SSC	301	(4)

#### GENERAL EDUCATION COURSES

(72 units) Pick courses from approved lists unless specified.

##### Area 1:

A. Freshman English I	ENG	104	(4)
B. Public Speaking	COM	100	(4)
C. Freshman English II	ENG	105	(4)

**Area 2:**

A. Statistics 120	STA	120	(4)
B. Any course			(4)
C. Any course			(4)
D. Any course (upper division)			(4)

**Area 3:**

A. The Visual Arts	ART	110	(4)
B. Business & Professional Ethics	PHL	205	(4)
C. Select one course			(4)
D. Principles of Economics	EC	202	(4)
E. Choose one from the following:			
Introduction to Cultural Ant	ANT	102	(4)
Introduction to Ethnic Studies	EWS	140	(4)
Introduction to Study of Women & Men	EWS	145	(4)
in Society			
African American Experience	EWS	201	(4)
Chicano/Latino Experience	EWS	202	(4)
Native American Experience	EWS	203	(4)
Asian American Experience	EWS	204	(4)
Cultural Geography	GEO	102	(4)
F. Select one course			(4)
G. General Psychology	PSY	201	(4)

**Area 4:**

United States History	HST	202	(4)
Introduction to American Government	PLS	201	(4)

**Area 5:**

Select 8 upper division units (A total of 12 upper division units required in GE—four in Area 2d and eight in Area 5) See Schedule of Classes for approved courses. Advisor approval required. No COM classes permitted

**UNRESTRICTED ELECTIVES:**

In addition, students are required to complete 18 units of Unrestricted Electives.

**MINORS****NEWSPAPER JOURNALISM MINOR**

Reporting	COM 102/102A	(2/2)
Advanced Reporting	COM 202/202A	(2/2)
Broadcast Journalism	COM 301	(4)
Communication Law	COM 304	(4)
Communication Ethics	COM 401	(4)
Total Units Required	(24)	

**PUBLIC RELATIONS MINOR**

Introduction to Mass Communication	COM 101	(4)
Reporting	COM 102/102A	(2/2)
*Report Writing	COM 216	(4)
In-Depth Reporting	COM 307	(4)
Public Relations Theory	COM 313	(4)
Public Relation Tools & Techniques	COM 315	(4)
Communication Problem Analysis	COM 321	(4)
or Public Relation Case Studies	COM 414	
Total Units Required	(32)	

\*Completion of the University requirement of ENG 104 is a prerequisite for COM 216.

**COMMUNICATION STUDIES MINOR**

Public Speaking	COM 100	(4)
or Interpersonal Communication	COM 103	
Introduction to Communication Theory	COM 201	(4)
Advocacy and Argument	COM 204	(4)
Org Communication Theory	COM 314	(4)
Intercultural Communication	COM 327	(4)
Group Discussion	COM 337	(4)
Total Units Required	(24)	

**COURSE DESCRIPTIONS****COM 100 Public Speaking (4)**

Theory and practice of speech organization, composition, and delivery. Use of research materials. 4 lectures/problem-solving.

**COM 101 Introduction to Mass Communications (4)**

Survey of contemporary mass media; communications theory, structure and inter-relationships of newspapers, magazines, radio, and television. Analyses of major media content. 4 lectures.

**COM 102/102A Reporting (2/2)**

Basic news-gathering and writing principles. Emphasis on style, sources, interviewing, news leads, and story development. 2 lectures, 2 two-hour activities. Prerequisite: COM 101. Corequisites: COM 102/102A.

**COM 103 Interpersonal Communication (4)**

An introduction to the variables determining communication behavior. Development of understanding through involvement in a variety of structured face-to-face interactions with other students. 4 lectures/problem-solving.

**COM 108 Writing as Media Professionals (4)**

Information resources for creation of written messages targeted at select media audiences to achieve a stated communication objective. Consideration of audience characteristics, appropriate format and style for effective message formulation. Evaluation of feedback to determine communication effectiveness. 4 lectures/problem-solving.

**COM 131/131L Photography (2/2)**

Basic photography techniques, including taking, processing, and selecting good photos. For those with no or limited experience in photography. 2 lectures, 2 three-hour laboratories. Prerequisite: access to camera that uses 35mm, 120 or 620 film and has adjustable shutter speed, f/stop and focusing controls. Corequisites: COM 131/131L.

**COM 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**COM 201 Introduction to Communication Theory (4)**

Study of contributions of rhetorical theory, linguistics, psychology, and sociology to the development of general communication theory. 4 lectures. Prerequisite: COM 101.

**COM 202/202A Advanced Reporting (2/2)**

Advanced news gathering, interviewing and writing principles. Emphasis on multisource interviews and stories, including documents and news features. 2 lectures, 2 two-hour activities. Prerequisites: COM 101 and COM 102/102A. Corequisites: COM 102/102A.



**COM 204 Advocacy and Argument (4)**

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

**COM 206 Print Communication (4)**

Introduction to the principles and theory of typography, layout, and production of material for the print industry. Work with Macintosh computers and learn elements of desktop publishing, including word processing, graphic design, and page composition. 4 lectures/problem-solving.

**COM 216 Report Writing (4)**

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

**COM 230/230L Introduction to Photographic Lighting (1/1)**

Examines the nature and types of light, the tools and techniques of lighting, and the creation of lighting effects in still photography. 1 one-hour lecture, 1 three-hour laboratory. Prerequisites: COM 131/131L. Corequisites: COM 230/230L.

**COM 231/231L Photojournalism (1/1)**

Photography for publication and public relations. Photo-editing, picture stories and illustrations, photo-marketing. 1 lecture, 1 three-hour laboratory. Prerequisites: COM 131/131L. Corequisites: COM 231/231L.

**COM 251A Newspaper Practices (2)**

Newspaper laboratory for beginning newspaper staff members. For students interested in gaining practical newspaper experience. Minimum of 4 hours of activity a week. Prerequisite: COM 101 and COM 102/102A or permission of instructor. Total credit in COM 251A, 252A, 254L limited to 6 units.

**COM 252A Magazine Practices (2)**

Magazine production course for beginning staff members; includes writing, layout, and production activity. Minimum of 4 hours activity a week. Prerequisite: COM 101 and COM 102/102A. Total credit in COM 251/251A, 252/252A, 254L limited to 6 units.

**COM 254L Television Practices (2)**

Television production experience for broadcasting option students. Minimum of 6 hours of production activity a week. Prerequisites: COM 101, COM 131/131L and COM 252/252A. Total credit in COM 251A, 252A, 254L limited to 6 units.

**COM 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Corequisites may be required.

**COM 301/301A Broadcast Journalism (2/2)**

Gathering and writing of news for the broadcast media. Introduction to broadcast news production. Beginning field production. 2 lectures/problem-solving; 2 two-hour activities. Prerequisites: COM 101, COM 102/102A, COM 131/131L and COM 242/242A. Corequisites: COM 301/301A.

**COM 302/302A Advertising Copywriting, Layout and Production (2/2)**

Examination of advertising and specific creative problems in various media. Preparation of copy, planning and layout, and study of media as related to creativity. 2 lectures, 2 two-hour activities. Prerequisite: COM 206. Corequisites: COM 302/302A.

**COM 304 Communication Law (4)**

Constitutional, statutory and case law governing freedom of speech and press, libel, privacy, journalist's confidential sources, subpoena, search warrant, contempt, newsgathering and freedom of information, free press and fair trial, obscenity, and access to the media. 4 lectures. Prerequisite: COM 101.

**COM 305L Editing Laboratory (2)**

Copy editing, headline writing, layout, and page makeup. 2 three-hour laboratories. Prerequisites: COM 101 and COM 102/102A.

**COM 307 In-Depth Reporting (4)**

In-depth reporting principles and development, including investigative, interpretive, series and personality stories. Students required to research background for story assignments. 4 lectures/problem-solving. Prerequisites: COM 101, COM 102/102A and COM 202/202A.

**COM 309 Reporting Public Affairs (4)**

Gathering material and writing newspaper stories pertaining to government and courts; emphasis on organization and procedure of governmental institutions. Students required to research background for story assignments. 4 lectures/problem-solving. Prerequisites: COM 101, COM 102/102A and COM 202/202A.

**COM 312 Magazine Editing and Production (4)**

Analysis and history of various types of publications produced in magazine format. Class works on design and production of several magazine-styled publications using the latest in computer technology and desktop publishing software. Includes lectures, demonstrations and critiques of student projects. 4 lectures/problem-solving. Prerequisites: COM 101, COM 102/102A, COM 131/131L, COM 206, COM 305L.

**COM 313 Public Relations Theory (4)**

The effects of organized information on public thinking; dissemination of ideas by commercial, industrial, social, and governmental organizations; the use of various publicity tools. 4 lectures. Prerequisite: ENG 104 or COM 216.

**COM 314 Organizational Communication Theory (4)**

Role of communications in organizations. Variables that affect communications in this environment. Study of skills, strategies, and tactics to improve overall organizational communications. 4 lecture discussions.

**COM 315 Public Relations Tools and Techniques (4)**

The importance and use of public relations tools including the methods of producing press releases, public service announcements for radio and television, press kits, house organs and public relations materials. 4 lectures/problem-solving. Prerequisites: COM 101, COM 102/102A, COM 313, and ENG 104.

**COM 316/316A Communication Research (2/2)**

Research methods used to measure the content, process and effects of communications on attitudes, knowledge and behavior. Research design,

data analysis and evaluation in quantitative and qualitative communication research methodology. 2 lectures/problem-solving, 2 two-hour activities. Prerequisites: COM 101 and COM 201. Corequisites: COM 316/316A.

#### **COM 319 Public Relations Writing (4)**

Examines the format and style for writing public relations materials. Emphasis on writing the various types of public relations copy. 4 lectures/problem-solving. Prerequisites: COM 101, COM 102/102A, COM 202/202A, COM 313, and ENG 104.

#### **COM 321 Communication Problem Analysis (4)**

Analysis of breakdowns in communications systems; identification of barriers and constraints to effective message transmission. Emphasis on practical and creative problem-solving. 4 lectures. Prerequisite: sophomore standing.

#### **COM 325 Persuasion and Communication (4)**

Persuasion is examined as affected by messages in various communication contexts. The process is studied through differing aspects of source, channel(s) and receiver(s). Emphasis on contributions from behavioral theorists. 4 lecture presentations. Prerequisites: COM 101 and COM 201.

#### **COM 327 Intercultural Communication (4)**

Examines the role of communication in a multicultural context. Through lectures and problem-solving exercises, students explore the ways in which cultural differences impact various kinds of communicative interactions, including interpersonal, organizational, and international settings. Significant writing. 4 lectures/problem-solving.

#### **COM 328 Human Communication Theory (4)**

An interdisciplinary, behaviorally-oriented examination of the constituent processes of human communication. 4 lectures/problem-solving. Prerequisite: COM 100 or COM 204.

#### **COM 333/333A Multimedia Communication (2/2)**

The theoretical and practical use of various media techniques for communication in journalistic, public relations and organizational areas. Course combines conceptual elements with practical illustrations, including video tape, slides, photographs, and computer applications. 2 one-hour lectures/problem-solving, 2 two-hour activities. Prerequisites: COM 101 and COM 131/131L. Corequisites: COM 333/333A.

#### **COM 337 Group Discussion (4)**

Variables of communication within problem-solving groups; development of conference and discussion skills. Secondary emphasis on group psychology as it relates to problem-solving discussions. 4 lectures/problem-solving.

#### **COM 370 Media Effects (4)**

Effects of television, radio, print and other telecommunications media on society; their significance as social institutions. 4 lecture presentations. Prerequisites: COM 101 and COM 201.

#### **COM 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **COM 401 Communication Ethics (4)**

Responsibility of the mass media and the journalist in today's society. 4 lectures. Prerequisites: COM 101 and COM 304.

#### **COM 403/403A Advanced Communication Research (2/2)**

Advanced communication research, design, analysis, inference and evaluation, including multivariate methods. Use of computer packages for data analyses. Each student will design, implement and report a research project. 2 lectures/problem-solving, 2 two-hour activities. Prerequisites: COM 101, COM 201, BHS 204 or PLS 205, STAT 120, COM 316. Corequisites: COM 403/403A.

#### **COM 409 Communication in Conflict Resolution (4)**

The role of communication in the productive settlement of interpersonal and organizational disputes. The course examines effective communication strategies used in negotiation and bargaining situations. 4 lectures/problem-solving. Prerequisites: COM 101, COM 103, COM 201, and COM 314.

#### **COM 411/411A Advanced Broadcast Journalism (2/2)**

Survey of principles and practices of interpretive reporting and commentary in electronic media; organization, writing, delivery of news analyses; production of commentary programs on news, leading to their use on radio and television stations. 2 lectures, 2 two-hour activities. Prerequisites: COM 101, COM 102/102A, COM 131/131L and COM 301/301A. Corequisites: COM 411/411A.

#### **COM 413 Public Opinion, Propaganda and the Mass Media (4)**

Critical study and evaluation of the techniques of psychopolitical persuasion, mass media and public opinion in America; developments in international propaganda. 4 lectures.

#### **COM 414 Public Relations Case Studies (4)**

Discussion of current public relations practices in businesses and institutions; development of public relations campaigns for specific situations. 4 lecture discussions. Prerequisites: COM 101, COM 201, 313, 315, senior standing and ENG 104.

#### **COM 446/446A Special Events Planning (2/2)**

Application of public relations techniques to planning special events. Participation in planning, organization, and implementation of selected events. 2 lecture presentations, 2 two-hour activities. Prerequisites: upper class standing. Corequisites: COM 446/446A.

#### **COM 448 Media Criticism (4)**

Analysis and criticism of broadcast media. Examination of popular literature on the media and the study of selected programming to determine the state of the art. Writing critical analysis of current programs. 4 lectures. Prerequisites: COM 101 and COM 201.

#### **COM 451A Editorial Newspaper Practices (2)**

Newspaper laboratory for students who want experientially-based guidance in newspaper editorial and management practices. Minimum of 4 hours of production activity. Prerequisites: COM 101, COM 102/102A. Total credit hours in COM 451A, 452A, 454L limited to 6 units.

#### **COM 452A Editorial Magazine Practices (2)**

Magazine production course for students in editorial and management positions. Minimum of 4 hours activity a week. Prerequisites: COM 101, COM 102/102A. Total credit in COM 451A, 452A, 454L limited to 6 units.

**COM 454L Advanced Television Practices (2)**

Advanced video production course. Minimum of 6 hours of production activity a week. Prerequisites: 2 units of COM 254L, 354L. Total credit in COM 254L, 354L, and 454L limited to 6 units.

**COM 461 Applied Communication/Internship (6)**

An intensive communications internship or other individual/group study of the communications process as specified by each option. Total credit required 6 units, with 2-6 units per quarter. Maximum of 6 units. Mandatory Credit/No credit. Prerequisite: senior standing.

**COM 463 Communication Studies Seminar (4)**

Review and discussion of contemporary issues and research in communication. Students will review and discuss literature and present written and oral reports. 4 seminars. Prerequisites: Communication major and senior standing.

**COM 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Corequisites may be required.



## ECONOMICS

Maureen Burton, Chair

Taha Al-Sabea	Nestor M. Ruiz
Sidney M. Blumner	Lynda M. Rush
Robert T. Bray	Mohammad R. Safarzadeh
Anne E. Bresnock	Laurence Shute
Franklin Y. Ho	James E. Sutton
David G. Jaques	

The department serves students of all colleges and schools and develops vocational proficiencies to meet the needs of the undergraduate economics majors. A curriculum leading to the master of science degree in economics is also offered in the department. Requirements for this degree may be found in the graduate listings.

The curriculum in economics, while offering a broad background of general education and traditional undergraduate courses, lends itself to considerable flexibility. Students consult with a faculty advisor to select courses suitable for a program relevant to personal goals. Eleven possible areas of concentration in economics are: international, environmental and resource, financial, labor, economic history, urban/regional, welfare, public sector, business and government, and economics for management.

The undergraduate major in economics has three objectives: first, to prepare economic analysts for positions in business, industry, agriculture, and government; second, to prepare students for research or management trainee positions in fields such as public administration, labor unions, industry, finance, and insurance; third, to furnish undergraduate preparation for students who may wish to pursue graduate work in the field of economics.

The minor in economics serves other departments of the university by providing their students with a well-defined and generally recognized set of courses. For many majors the minor will enhance their employability upon graduation. It will also provide a structure for those seeking basic understanding of economic theory and its application. For others it will facilitate their graduate work.

### Quantitative Research Minor

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Economics. A full description of this minor is included in the "University Programs" section of this catalog.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Accounting for Decision Making I	ACC	204	(4)
Accounting for Decision Making II	ACC	205	(4)
Economic Statistics	EC 321/321A	(3/1)	
Economic Statistics	EC 322/322A	(3/1)	
Completion of COM 216 (See Support Classes) or permission of instructor to enter upper division classes.			

### Track A Core Classes

Money and Banking	EC	308	(4)
Intermediate Microeconomic Theory	EC	311	(4)
Distribution of Income	EC	312	(4)
Intermediate Macroeconomic Theory	EC	313	(4)
History of Economic Thought	EC	407	(4)
Senior Seminar	EC	462	(4)
Senior Seminar	EC	463	(4)
Advanced Economics (400 level).		(32)	
or Advanced Economics.		(28)	
and Advanced Math (Calculus and above)		(4)	

### Track B Core Classes

Money and Banking	EC	308	(4)
Intermediate Microeconomic Theory	EC	311	(4)
Distribution of Income	EC	312	(4)
Intermediate Macroeconomic Theory	EC	313	(4)
Introduction to Mathematical Economics	EC	406	(4)
History of Economic Thought	EC	407	(4)
Introduction to Econometric Methods	EC	421/421A(3/1)	
Senior Seminar	EC	462	(4)
Senior Seminar	EC	463	(4)
Analytical Geometry and Calculus	MAT	114	(4)
Analytical Geometry and Calculus	MAT	115	(4)
Advanced Economics (400 level).		(16)	

### SUPPORT AND ELECTIVE COURSES

(Required of all students)

Report Writing	COM	216	(4)
Freshman English II	ENG	105	(4)
KIN, 100 series #		(2)	

### GENERAL EDUCATION COURSES

(72 units) Pick courses from approved lists unless specified.

#### Area 1:

A. Freshman English I	ENG	104	(4)
B. Public Speaking	COM	100	(4)
C. Logic and Semantics	PHL	202	(4)

#### Area 2: —16 units

A. College Algebra	MAT	105	(4)
B. Any course.		(4)	
C. Any course		(4)	
D. Any course.		(4)	

#### Area 3:

A. Select one course.	(4)		
B. Select one course.	(4)		
C. Select one course.	(4)		
D. Select one course.	(4)		
E. Select one course.	(4)		
F. Select one course.	(4)		
G. Select one course.	(4)		

#### Area 4:

United States History	HST	202	(4)
Introduction to American Government	PLS	201	(4)

#### Area 5:

Select 12 upper division units from approved list. A 400-level Economics course from the list may also be included.



**ECONOMICS MINOR**

Principles of Economics	.EC	201	(4)
Principles of Economics	.EC	202	(4)
Money and Banking	.EC	308	(4)
Intermediate Microeconomic Theory	.EC	311	(4)
Intermediate Macroeconomic Theory	.EC	313	(4)

The student must also select 12 units from the following 300 and/or 400 level courses. The following series of topic concentrations are suggested. The student may tailor courses across the listed concentrations to fit their needs.

## 1. Quantitative Economics:

Economic Statistics	.EC	321/321A(3/1)	
Economic Statistics	.EC	322/322A(3/1)	
Introduction to Mathematical Economics	.EC	406	(4)
Introductory Econometric Methods	.EC	421/421A(3/1)	
Economic Forecasting	.EC	422/422A(3/1)	
Economic Programming and Optimization Analysis	.EC	423/423A(3/1)	

## 2. Economic History:

History of Economic Thought	.EC	407	(4)
Economic History of the U.S.	.EC	409	(4)
Comparative Economic Systems	.EC	412	(4)
Economic History of Europe	.EC	413	(4)

## 3. International Economics:

International Trade Theory and Policy	.EC	404	(4)
International Finance and Open Economy Macroeconomics	.EC	405	(4)
Economic Development	.EC	411	(4)
Countrywide Economic Studies	.EC	437	(4)

## 4. Business and Government:

Public Finance	.EC	410	(4)
Seminar in Urban Economics	.EC	432	(4)
Economics of Transportation	.EC	433	(4)
Economics of Public Utilities	.EC	434	(4)
Seminar in Environmental Economics	.EC	435	(4)
Industrial Organization	.EC	440	(4)
Economics of Poverty and Discrimination	.EC	437	(4)

## 5. Economics and Finance:

International Finance and Open Economy Macroeconomics	.EC	405	(4)
Public Finance	.EC	410	(4)
Economics of Capital Markets	.EC	450	(4)
American Industry	.EC	441	(4)

## 6. Environmental and Resource Economics:

Seminar in Land Economics	.EC	419	(4)
Seminar in Natural Resource Economics	.EC	429	(4)
Seminar in Environmental Economics	.EC	435	(4)
Seminar in Air Resource Economics	.EC	436	(4)
Seminar in Waste Managements Economics	.EC	438	(4)
Seminar in Water Resource Economics	.EC	439	(4)

## 7. Urban and Regional Economics:

Seminar in Land Economics	.EC	419	(4)
Seminar in Urban Economics	.EC	432	(4)
Economics of Poverty and Discrimination	.EC	437	(4)
Seminar in Natural Resource Economics	.EC	429	(4)
Economics of Transportation	.EC	433	(4)
Seminar in Environmental Economics	.EC	435	(4)

**COURSE DESCRIPTIONS****EC 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**EC 201 Principles of Economics (4)**

Introduction to microeconomics. How an economic system works to solve the problems of choice among alternative allocations, utilizations, and distributions of resources. Applications of economic principles to domestic and international economic problems. 4 lecture discussions.

**EC 202 Principles of Economics (4)**

Introduction to macroeconomics. Determinants of national income, output, employment, and price levels. Monetary and fiscal policy. International economics. Applications of economic principles to domestic and international economic problems. 4 lecture discussions.

**EC 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

**EC 308 Money and Banking (4)**

Relation of money and banking to the general economy; interrelationships between money and banking, production and distribution. 4 lecture discussions. Prerequisite: EC 202.

**EC 311 Intermediate Microeconomic Theory (4)**

Student investigation of the role of prices in final output markets; principles of production; and business behavior under various market conditions. 4 lectures/problem-solving. Prerequisite: EC 201.

**EC 312 Distribution of Income and Factor Pricing (4)**

Theory of the functional and personal distribution of income. Determination of wages, rent, interest, and profits under various market conditions. 4 lectures/problem-solving. Prerequisite: EC 311.

**EC 313 Intermediate Macroeconomic Theory (4)**

Student investigation and presentation of the determination of growth and fluctuations in national income; effects of consumers, firms, and government decisions on employment and price levels. 4 lectures/problem-solving. Prerequisite: EC 202.

**EC 321/321A, EC 322/322A Economic Statistics (3/1) (3/1)**

Statistical methods and techniques in economic analysis. Analysis of time series, index number construction, regression and correlation analysis, probability and other statistical distributions; related economic topics. 3 lectures/problem-solving; 1 two-hour activity. Prerequisite: STA 120 or equivalent MAT statistics. Prerequisite for EC 322: EC 321/321A or its equivalent.

**EC 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisites: EC 201 and EC 202.

**EC 404 International Trade Theory and Policy (4)**

Analysis of the causes of patterns of trade; the effects of tariffs and quotas; the effects of trade on domestic income patterns; the effects of international investment and the effects of trade on economic growth. 4 lectures/problem-solving. Prerequisites: EC 201 and EC 202 and EC 311 recommended.

**EC 405 International Finance and Open Economy Macroeconomics(4)**

Analysis of the international monetary system; problems of exchange rate dynamics; problems in Balance of Payments; problems in achieving internal and external balance; the role of capital markets and interest rates; international monetary effects on domestic prices and output. 4 lectures/problem-solving. Prerequisites: EC 201 and EC 202; EC 313 and EC 404 recommended.

**EC 406 Introduction to Mathematical Economics (4)**

Mathematical description and derivation of micro- and macro-economic theory. 4 lecture discussions. Prerequisites: EC 201 and EC 202 and one of the following: MAT 114 or MAT 125 or MAT 130.

**EC 407 History of Economic Thought (4)**

History of the development of economic ideas and doctrines from Greek writers through the classical and neoclassical schools to the present. 4 lecture presentations. Prerequisites: EC 201 and EC 202.

**EC 409 Economic History of the U.S. (4)**

Analysis of growth and economic well-being of the U.S. economy in historical perspective. Interplay of economic forces and historical conditions. 4 lecture presentations. Prerequisites: EC 201 and EC 202.

**EC 410 Public Finance (4)**

Principles of government financing and its various economic and social effects; collecting, spending, and administration of public funds. 4 lecture discussions. Prerequisite: EC 201.

**EC 411 Economic Development (4)**

Preconditions and processes of economic growth and development in developing countries, analyzed in light of economic theory and historical experience of advanced Western economies. Political, cultural, and social problems of developing countries and their relationship to Western experiences. 4 lecture presentations. Prerequisites: EC 201 and EC 202.

**EC 412 Comparative Economic Systems (4)**

Examination of alternative economic organizations, ranging from free enterprise to fully-planned economies. 4 lecture presentations. Prerequisite: EC 201 and EC 202.

**EC 413 Economic History of Europe (4)**

Economic development of Europe from the fall of the Roman Empire to the formation of the Common Market; growth of economic institutions antecedent to those of modern Europe. Bearing of European economic development upon that of the United States. 4 lecture presentations. Prerequisites: EC 201 and EC 202.

**EC 414 Labor Economics (4)**

The structure and theory of labor markets. The influence of unionism on income distribution. Effects of collective bargaining on economic welfare and efficiency. Government policy's role in the labor market. Job and union security under changing economic institutions. 4 lecture presentations. Prerequisites: EC 201 and EC 202.

**EC 419 Seminar in Land Economics (4)**

Analysis of the utilization and conservation of land; urban land uses; market forces; factors affecting the locations of enterprises; and patterns of urban and regional growth. 4 seminars. Prerequisites: EC 201 or EC 202.

**EC 421/421A Introductory Econometric Methods (3/1)**

Introductory course in econometric problem-solving techniques. Students required to do quantitative model-building; estimation, verification, and prediction of economic variables in class exercises. 3 lectures/problem-solving, 1 two-hour activity. Prerequisites: EC 321/321A; EC 322/322A, EC 406; EC 311, EC 312, and EC 313 strongly recommended.

**EC 422/422A Economic Forecasting (3/1)**

Techniques and procedures of statistical analysis of macroeconomic and microeconomic conditions. In-class exercises emphasize problem-solving, forecasting and model-building methods. 3 lectures/problem-solving; 1 two-hour activity. Prerequisites: EC 321/321A and EC 322/322A.

**EC 423/423A Economic Programming and Optimization Analysis (3/1)**

Optimization analysis and programming techniques, including linear and nonlinear methods. Students work on case studies, deterministic model-building. Application of computer facilities and programming. 3 lectures/problem-solving, 1 two-hour activity. Prerequisites: EC 201, EC 202 and EC 406.

**EC 429 Seminar in Natural Resource Economics (4)**

Intensive study of natural resource availability, natural resource management problems, and the roles of markets and government in the development and allocation of natural resources over time. Focus on key natural resource sectors including: energy, nonenergy minerals, forestry, and fisheries. 4 seminars. Prerequisites: EC 201 or EC 202.

**EC 432 Seminar in Urban Economics (4)**

Analysis of the distribution and stability of income in urban areas; economic development of California cities; physical distribution and urban transportation problems. 4 seminars. Prerequisites: EC 201 or EC 202.

**EC 433 Economics of Transportation (4)**

The economic characteristics of transport; the functions of the differing transportation agencies; transportation pricing; problems of state and federal regulation; coordination of facilities; current transportation problems. 4 lectures/problem-solving. Prerequisite: EC 201 or EC 202.

**EC 434 Economics of Public Utilities (4)**

Economics of public service corporations. Problems of rate determination and other regulations. State and national problems arising from the development of public utilities. 4 lectures/problem-solving. Prerequisite: EC 201 or EC 202.

**EC 435 Seminar in Environmental Economics (4)**

An examination of the relationship between environmental problems and economic institutions. The theory of externalities and market failure are studied with application to air, water, and waste management topics. 4 seminars. Prerequisites: EC 201 or EC 202

**EC 436 Seminar in Air Resource Economics (4)**

Intensive study of air pollution, statute control of air pollution, economic ramifications of control and non-control on quality of life, income, employment, and growth; study tradeoffs involved with control. 4 seminars. Prerequisite: EC 201 or EC 202.

**EC 437 Economics of Poverty and Discrimination (4)**

The scope and nature of poverty and discrimination. Economic sources of changes in, and attempts at alleviation of poverty and discrimination. Analysis of poverty programs and anti-discriminatory public policies. 4 lecture/presentations. Prerequisite: EC 201 or EC 202.

**EC 438 Seminar in Waste Management Economics (4)**

Intensive study of solid, hazardous, and nuclear waste statute law. Economic ramifications of control and non-control on quality of life, income, employment and growth; study tradeoffs involved with economic choices of control. 4 seminars. Prerequisite: EC 201 or EC 202.

**EC 439 Seminar in Water Resource Economics (4)**

Intensive study of water allocation, water pollution, statute law governing water use and pollution, and economic implications of control and non-control. Will analyze impact on quality of life, income, employment, and growth. 4 seminars. Prerequisite: EC 201 or EC 202.

**EC 440 Industrial Organization (4)**

Evaluation and analysis of government regulation of the private sector aimed at creating a more competitive economy. 4 lecture presentations. Prerequisites: EC 201 and EC 202.

**EC 441 American Industry (4)**

Examination of number and size distribution of sellers in selected American industries. Conduct and performance of firms in the context of the industry structure. Examination of actual and optimal government policy in each industry. 4 lecture discussions. Prerequisite: EC 201 or EC 202.

**EC 442 Economywide Country Studies (4)**

In-depth analysis of the socio-economic aspects of a country or group of countries. Key topics include the targeted country's or countries' trade and investment with the United States, growth and development, current economic problems, issues, and performance. 4 seminars. Prerequisite: EC 202

**EC 450 Economics of Capital Markets (4)**

Further expansion of monetary theory and capital markets topics to prepare students for advanced studies. Intensive focus on the theoretical and mathematical tools necessary for the analysis of bank and financial institution portfolios, and the effectiveness of monetary policy. 4 lectures/problem-solving. Prerequisites: EC 201, EC 202, and EC 308

**EC 462, 463 Senior Seminar (4) (4)**

Intensive study of the pragmatic applications of the various techniques of economic analysis across various intra-economics subject areas. 4 seminars. Prerequisites: EC 321, EC 322, EC 311 and EC 313.

**EC 499 Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: EC 201 and 202. Instruction is by lecture, laboratory, or a combination.

Graduate courses are listed in the "Graduate Studies" section of this catalog.

## ENGLISH AND FOREIGN LANGUAGES

David Fite, Liliane Fucaloro, Donald Kraemer, Harold Levitt, Victor Okada,  
Executive Committee

Leo Berg	John R. Maitino
Isabel M. Bustamante-Lopez	M. Kathleen Massey
Stanley J. Cook	William McAdams
Thomas J. Elliott	Robert E. Morsberger
Joseph R. Farrell	Andrew I. Moss
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Liliane M. Fucaloro	Larry K. Robinson
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Susana Hernandez-Araico	Ben Siegel
Sharon Hilles	Anne B. Simpson
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Theodore C. Humphrey	Joseph H. Stodder
Carola M. Kaplan	Richard W. Suter
Donald J. Kraemer, Jr.	Frank I. Torres
Deirdre E. Lashgari	Stephen V. Whaley
Harold P. Levitt	

The program in English and Foreign Languages encourages students not only to improve verbal skills, but also to develop a fuller understanding of themselves and their culture. The program offers courses leading to the Bachelor of Arts in English. Within this major, two emphasis areas are offered.

The first, Literature and Language, offers intensive study in the language and literature of both Britain and the United States. Graduates are prepared to enter advanced-degree work in English, American Studies, or related areas. Additional opportunities exist in law, business management, journalism, and other fields welcoming those with a liberal education and communication skills.

The curriculum for the Literature and Language emphasis is patterned as follows: in the freshman year courses in composition and in the methods of reading literature; in the sophomore year a broad survey of English and American literature and world literature; in the junior year a study of linguistics and the principal genres; and in the senior year relatively intensive work in individual authors or small groups of authors.

The second emphasis, English Education, also offers intensive study of language and literature with a choice of three tracks: Literature, Communication Studies, or Theatre Arts. In each case, students are given thorough preparation for entrance into a secondary credential program in English.





In addition, the department lists elementary and intermediate sequences in French, German, and Spanish language and culture, and elementary sequences in Latin, Mandarin, Chinese, and Japanese language and culture. Courses in English composition and literature serve the general university community. These include study in English as a second language and in the literature-language aspects of African-American, Latino, and Native American Studies.

In addition to the major in Spanish, a minor in Spanish language and culture is intended to prepare students to communicate in Spanish, to appreciate more fully the cultural heritage of the Southwest, and to communicate more effectively with increasing Hispanic populations. Employment possibilities in students' major fields will be appropriately enhanced. This minor is open to all majors, including English.

The Humanities major and the graduate program in English are listed separately.

The Rho Xi Chapter of Sigma Tau Delta, the national English honor society, is open to upper division English majors if they have completed two or more English courses beyond freshman composition with a 3.0 average and if they rank in the upper one-third of their class overall.

Graduate students in English are admitted if they have completed 12 or more units of graduate English with a 3.5 or better GPA. For additional information, contact Dr. Theodore C. Humphrey in the Department of English and Foreign Languages.

### CORE COURSES FOR ENGLISH MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Advanced Expository Writing	ENG	303	(4)
Grammar of Modern English	ENG	321	(4)
Literary Theory	ENG	350	(4)
Shakespeare	ENG	404	(4)

### LITERATURE AND LANGUAGE EMPHASIS

Four of the following (must include one British, one American, one World Literature) (16 units):

Survey of British Literature I	ENG	207	(4)
Survey of British Literature II	ENG	208	(4)
Survey of American Literature I	ENG	211	(4)
Survey of American Literature II	ENG	212	(4)
Ethnic Literatures of the U.S.	ENG	213	(4)
World Literature I	ENG	217	(4)
World Literature II	ENG	218	(4)

Two of the following (8 units):

The Novel in English to 1880	ENG	305	(4)
The Modern British Novel	ENG	306	(4)
The English Drama to 1890	ENG	307	(4)
The Modern Drama	ENG	308	(4)
The English Poem	ENG	309	(4)

Two of the following (8 units):

Language and Human Behavior	ENG	313	(4)
Structure of Language	ENG	320	(4)
Development of Modern English	ENG	322	(4)

Two of the following (8 units):

Chaucer	ENG	401	(4)
Milton and His Age	ENG	402	(4)
Shakespeare	ENG	403	(4)

Eight units from the following:

English Renaissance	ENG	440	(4)
English Enlightenment	ENG	442	(4)
English Romanticism	ENG	444	(4)
Victorian Writers	ENG	448	(4)
American Renaissance	ENG	452	(4)
American Realism	ENG	454	(4)
Nineteenth-Century European Novel	ENG	457	(4)
The Novel in the Modern World	ENG	458	(4)

Senior Paper	ENG	461, 462	(2)(2)
Upper division units from ENG or FL offerings			(12)

### ENGLISH EDUCATION EMPHASIS

Required of all students (16 units):

Ethnic Literatures of the United States	ENG	213	(4)
Language Acquisition	ENG	323	(4)
Multimedia Practicum	ENG	464	(4)
Assessment Seminar	ENG	465	(4)

Choose one from each of the following (12 units):

Survey of British Literature	ENG	207 or 208	(4)
Survey of American Literature	ENG	211 or 212	(4)
World Literature	ENG	217 or 218	(4)

Choose one of the following (4 units):

The Novel in English to 1880	ENG	305	(4)
The Modern British Novel	ENG	306	(4)
The English Drama to 1890	ENG	307	(4)
The Modern Drama	ENG	308	(4)
The English Poem	ENG	309	(4)

Choose one of the following (4 units):

Chaucer	ENG	401	(4)
Milton and His Age	ENG	402	(4)
Shakespeare	ENG	403	(4)

Choose two of the following (one course must be in a literary period before 1900) (8 units):

English Renaissance	ENG	440	(4)
English Enlightenment	ENG	442	(4)
English Romanticism	ENG	444	(4)
Victorian Writers	ENG	448	(4)
Twentieth-Century British Literature	ENG	450	(4)
American Renaissance	ENG	452	(4)
American Realism	ENG	454	(4)
Twentieth-Century American Literature	ENG	456	(4)
Nineteenth-Century European Novel	ENG	457	(4)
The Novel in the Modern World	ENG	458	(4)

**English Education Tracks**

Choose one of the following tracks:

**Track A - Literature (24 units)**

Choose one of the following (4 units):

Language and Human Behavior	ENG	313	(4)
Structure of Language	ENG	320	(4)
Development of Modern English	ENG	322	(4)

Choose five of the following (20 units):

Children's Literature	ENG	324	(4)
Adolescent Literature	ENG	326	(4)
Race and Gender in Modern Literature	ENG	345	(4)
Texts and Images of the Holocaust	ENG	420	(4)
The Literature of Exile	ENG	425	(4)
Narrative in Literature and Film	ENG	430	(4)
Modernism and Postmodernism	ENG	451	(4)
Literature of the "Third World"	ENG	459	(4)
Modern Critical Theory	ENG	460	(4)
Latin American Women Writers in Translation	ENG	485	(4)

**Track B - Communication Studies (minimum of 22 units)**

Public Speaking	COM	100	(4)
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Choose at least eight units from the following:

Communication Problem Analysis	COM	321	(4)
Intercultural Communication	COM	327	(4)
Group Discussion	COM	337	(4)

Choose at least ten units from the following:

Reporting	COM	102/102A	(2,2)
Advanced Reporting	COM	202/202A	(2,2)
Newspaper Practices	COM	251A	(2)
Magazine Practices	COM	252A	(2)
Professional Editing	ENG	432	(4)
Editorial Staffs, <i>Spring Harvest, Storyteller, Portfolio</i>	SA	470	(2-4)

**Track C - Theatre Arts (minimum of 23 units)**

Acting I	TH	151/151L	(2,2)
Acting II	TH	152/152L	(2,2)
Technical Production III	TH	231/231A	(2,2)
Directing	TH	356/356L	(2,2)
Advanced Projects in Theatre	TH	441/441L	(1)

Choose at least six units from the following:

Acting III	TH	153/153L	(2,2)
History of Theatre I	TH	311	(4)
History of Theatre II	TH	312	(4)
History of Theatre III	TH	313	(4)
Scene Design	TH	337/337A	(2,2)
Improvisation for the Theatre	TH	355/355L	(1,1)
Stage Costume Design and Construction	TH	381/381L	(2,2)
Advanced Projects in Theatre	TH	441/441L	(2-4)

Creative Drama	TH	471/471A	(2,2)
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**SUPPORT COURSES (required of all students)**

Foreign Language (200-level course)			(4)
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**GENERAL EDUCATION COURSES****Area 1:**

a) Freshman English I	ENG	104	(4)
b) Advocacy and Argument	COM	204	(4)
c) Freshman English II	ENG	105	(4)

**Area 2: (must include one laboratory science)**

a) Select one course			(4)
b) Select one course			(4)
c) Select one course			(4)
d) Select one course			(4)

**Area 3:**

a) Select any course			(4)
b) Select any course			(4)
c) Select any course			(4)
d) Select any course			(4)
e) Select any course			(4)
f) Select any course			(4)
g) Select any course			(4)

**Area 4:**

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

**Area 5: (Upper Division)**

Select only two listed courses.			(8)
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UNRESTRICTED ELECTIVES . . . . . 26-34 units

**ENGLISH MINOR**

The student must select 8 units from the following:

Survey of British Literature I	ENG	207	(4)*
Survey of British Literature II	ENG	208	(4)*
Survey of American Literature I	ENG	211	(4)*
Survey of American Literature II	ENG	212	(4)*

\* Prerequisite: ENG 104 or equivalent

The student must select 24 units from the following (at least 12 units upper division):

Freshman English II	ENG	105	(4)
Writing about Literature	ENG	108	(4)
Grammar, Punctuation and Usage	ENG	125	(2)
Introduction to Modern Fiction	ENG	201	(4)
Introduction to Poetry or Modern Drama	ENG	202	(4)
Introduction to Shakespeare	ENG	203	(4)
Modern Fiction for Speakers of English as a Second Language	ENG	204	(4)
Black Literature in America	ENG	205	(4)
Introduction to Contemporary Literature	ENG	206	(4)
Survey of British Literature I	ENG	207	(4)
Survey of British Literature II	ENG	208	(4)
Survey of American Literature I	ENG	211	(4)
Survey of American Literature II	ENG	212	(4)
Ethnic Literatures of the United States	ENG	213	(4)
Latino Literature in America	ENG	215	(4)
The Bible as Literature	ENG	216	(4)
World Literature I	ENG	217	(4)

World Literature II . . . . .	ENG	218	(4)
The Literature of Science Fiction . . . . .	ENG	222	(4)
Introduction to Folklore . . . . .	ENG	231	(4)
Women Writers . . . . .	ENG	240	(4)
Writing for the Professions . . . . .	ENG	301	(4)
Creative Writing–Fiction . . . . .	ENG	302	(4)
Advanced Expository Writing . . . . .	ENG	303	(4)
The Novel in English to 1880 . . . . .	ENG	305	(4)
The Modern British Novel . . . . .	ENG	306	(4)
The English Drama to 1890 . . . . .	ENG	307	(4)
The Modern Drama . . . . .	ENG	308	(4)
The English Poem . . . . .	ENG	309	(4)
Language and Human Behavior . . . . .	ENG	313	(4)
Structure of Language . . . . .	ENG	320	(4)
Grammar of Modern English . . . . .	ENG	321	(4)
Development of Modern English . . . . .	ENG	322	(4)
Language Acquisition . . . . .	ENG	323	(4)
Children's Literature . . . . .	ENG	324	(4)
Adolescent Literature . . . . .	ENG	326	(4)
Race and Gender in Modern Literature . . . . .	ENG	345	(4)
Literary Theory . . . . .	ENG	350	(4)
Chaucer . . . . .	ENG	401	(4)
Milton and His Age . . . . .	ENG	402	(4)
Shakespeare . . . . .	ENG	403	(4)
Shakespeare . . . . .	ENG	404	(4)
Shakespeare Performance I . . . . .	ENG	406	(2)
Shakespeare Performance II . . . . .	ENG	407	(4)
Texts and Images of the Holocaust . . . . .	ENG	420	(4)
The Literature of Exile . . . . .	ENG	425	(4)
Narrative in Literature and Film . . . . .	ENG	430	(4)
Professional Editing . . . . .	ENG	432	(4)
English Renaissance . . . . .	ENG	440	(4)
English Enlightenment . . . . .	ENG	442	(4)
English Romanticism . . . . .	ENG	444	(4)
Victorian Writers . . . . .	ENG	448	(4)
Twentieth-Century British Literature . . . . .	ENG	450	(4)
Modernism and Postmodernism . . . . .	ENG	451	(4)
American Renaissance . . . . .	ENG	452	(4)
American Realism . . . . .	ENG	454	(4)
Twentieth-Century American Literature . . . . .	ENG	456	(4)
The Nineteenth-Century European Novel . . . . .	ENG	457	(4)
The Novel in the Modern World . . . . .	ENG	458	(4)
Literatures of the "Third World" . . . . .	ENG	459	(4)
Modern Critical Theory . . . . .	ENG	460	(4)
Senior Paper . . . . .	ENG	461	(2)
Senior Paper . . . . .	ENG	462	(2)
Senior Seminar . . . . .	ENG	463	(2)
Latin American Women Writers in Translation . . . . .	ENG	485	(4)

## SPANISH MAJOR

The major provides a broad curricular base that encourages students to develop and enhance their communicative skills--both oral and written--in Spanish, the fourth most widely spoken language in the world and the second in the Southwest. By gaining insight into and appreciation of the cultures of the Spanish-speaking world, students will develop a fuller understanding of themselves and their own culture.

The Bachelor of Arts in Spanish prepares students to enter a wide variety of careers. The State of California's recent foreign language requirements for high school graduation and for admission into the CSU will increase the demand for teachers of Spanish in the public schools. The major will prepare students to enter teacher-preparation programs as well as advanced-degree graduate programs. In addition,

the Spanish major would benefit careers in international business, management, the media, law enforcement, tourism, publishing, interpreting, translation, public relations, advertising, and social sciences. The federal government seeks out Spanish-speaking graduates for employment in civil service and diplomatic areas.

## Preparation for the major

One year of elementary college-level Spanish (FL 151, 152 and 153) or the equivalent (two years of high school Spanish, etc.) is required for admission into the major. In addition, all majors must pass a written and oral proficiency test upon entrance to the program and another at the beginning of the junior year.

## CORE COURSES FOR THE MAJOR\*

(64 units required of all students)

Intermediate Spanish Reading . . . . .	FL	252	(4)
Intermediate Spanish Conversation . . . . .	FL	253	(4)
Intermediate Spanish Composition . . . . .	FL	254	(4)
Introduction to Modern Fiction . . . . .	FL	256	(4)
Advanced Conversation . . . . .	FL	350	(4)
Advanced Composition . . . . .	FL	351	(4)
Spanish Civilization . . . . .	FL	352	(4)
Latin American Civilization . . . . .	FL	354	(4)
Contemporary Latin American Civilization . . . . .	FL	355	(4)
Survey of Spanish Literature . . . . .	FL	356	(4)
Survey of Spanish American Literature . . . . .	FL	358	(4)
Syntactical Analysis . . . . .	FL	450	(4)
Spanish Applied Linguistics . . . . .	FL	451	(4)
Spanish Golden Age Literature . . . . .	FL	454	(4)
Literature of Mexico . . . . .	FL	455	(4)
Latin American Women Writers . . . . .	FL	456	(4)

## SUPPORT COURSES FOR THE MAJOR

(8 units require of all students)

Structure of Language . . . . .	ENG	320	(4)
Language Acquisition . . . . .	ENG	323	(4)

\*A 2.0 cumulative GPA is required in core courses in order to receive a degree in this major.

## GENERAL EDUCATION COURSES

(Required of all students)

The G.E. requirements will be selected from the approved lists of university G.E. courses. There will be no required courses in the G.E. section.

## UNRESTRICTED ELECTIVES 42\*\*

In consultation with their advisor, students select 42 units of electives from any courses in the university catalog deemed appropriate.

\*\*The total curriculum must include 60 units of upper division courses.

## SPANISH MINOR

Lower division work is completed with three intermediate courses, one of which must be FL 254. May be taken by English majors and all others.

Intermediate Spanish . . . . .	FL	251	(4)
Intermediate Spanish Reading . . . . .	FL	252	(4)
Intermediate Spanish Conversation . . . . .	FL	253	(4)
Intermediate Spanish Composition . . . . .	FL	254	(4)
Introduction to Modern Fiction . . . . .	FL	256	(4)

Three upper division courses are required, at least one from group A and one from group B.

**GROUP A:**

Survey of Spanish Literature . . . . .	FL	356	(4)
Survey of Spanish-American Literature . . . . .	FL	358	(4)
Spanish Golden Age Literature . . . . .	FL	454	(4)
Literature of Mexico . . . . .	FL	455	(4)
Latin American Women Writers . . . . .	FL	456	(4)

**GROUP B:**

Spanish Civilization . . . . .	FL	352	(4)
Latin American Civilization . . . . .	FL	354	(4)
Contemporary Latin American Civilization . . . . .	FL	355	(4)

Total units required in minor . . . . . (24)

**COURSE DESCRIPTIONS****ENG 095/095L Basic Communication Skills I (4/1)**

Communication skills program for students needing intensive and individualized writing and reading instruction. Analysis of students' reading and writing; lectures; individual tutorial programs. Passing grade in both reading and writing components required. 4 hours discussion, 3 hours laboratory. Students must take English Placement Test (EPT) in order to enroll. Does not count towards the bachelor's degree. Corequisites: ENG 095/095L.

**ENG 096 Basic Communication Skills II (4)**

Communication skills instruction at a more advanced level than ENG 095/095L. Students required to take ENG 096 must pass course before enrolling in ENG 104. Passing grade in both reading and writing components required. 4 hours discussion. Students must take English Placement Test (EPT) or equivalent in order to enroll. Does not count towards the bachelor's degree.

**ENG 097 Basic Communication Skills III (4)**

Review and practice of basic reading and writing skills. 4 lectures/problem-solving. Students required to take ENG 097 must pass course before enrolling in ENG 104. Prerequisite: ENG 096. Does not count towards the bachelor's degree.

**ENG 098 Basic Skills for English as a Second Language (4)**

Intensive work in listening, comprehension, reading, vocabulary, grammar, and writing for speakers of English as a second language. 4 lectures/problem-solving. Students must take English Placement Test (EPT) to enroll. Does not count towards the bachelor's degree.

**ENG 099 Basic Grammar and Writing for Speakers of English as a Second Language (4)**

Intensive work in grammar and composition for speakers of English as a second language. 4 lectures/problem-solving. Students must take English Placement Test or equivalent to enroll. Does not count towards the bachelor's degree.

**ENG 102 College Composition for Speakers of English as a Second Language I (4)**

English composition for speakers of English as a second language. Drills in selected problems in English structure. Frequent exercises in composition. 4 lectures/problem-solving. Satisfactory score on the English Placement Test (EPT) or equivalent needed to enroll. ENG 102

and 103 together are equivalent to ENG 104.

**ENG 103 College Composition for Speakers of English as a Second Language II (4)**

English composition for speakers of English as a second language. Frequent writing stressing exposition and logic. Drills in selected problems in English structure. Some techniques of library research. 4 lectures/problem-solving. Prerequisite: ENG 102. ENG 102 and 103 together are equivalent to ENG 104.

**ENG 104 Freshman English I (4)**

Introduction to expository writing and critical reading. Frequent papers. 4 lectures/problem-solving. ENG 102 and 103 may be substituted. Students must receive a satisfactory score on the English Placement Test (EPT) or equivalent to enroll. All speakers of English as a second language who have not achieved the minimum EPT score for ENG 104 must take ENG 102 and 103 in place of ENG 104.

**ENG 105 Freshman English II (4)**

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

**ENG 108 Writing about Literature (4)**

Introduction to literary studies. Readings in fiction, drama, and poetry. Frequent short papers. Techniques of library research. 4 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

**ENG 125 Grammar, Punctuation, and Usage (2)**

Systematic and detailed study of grammar, punctuation, and usage. Frequent exercises; not a composition course. 2 lectures/problem-solving.

**ENG 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**ENG 201 Introduction to Modern Fiction (4)**

Readings chiefly in the 20th-century short story and novel. Emphasis on enduring and universal ideas, such as the search for knowledge, self-understanding, and values. For majors other than English. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 202 Introduction to Poetry or Modern Drama (4)**

Readings in either poetry or 20th-century drama from America and other countries, specific offerings to be determined by instructor. Emphasis on the search for knowledge, self-understanding, and values. For majors other than English. 4 lecture presentations. Prerequisite: ENG 104 or equivalent. May be repeated once for credit.

**ENG 203 Introduction to Shakespeare (4)**

Selected plays from the works of Shakespeare. For majors other than English. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 205 Black Literature in America (4)**

Analysis and evaluation of the works of major Black writers in America—from Phillis Wheatley to the present—in the light of cultural, political and social history. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.



**ENG 206 Introduction to Contemporary Literature (4)**

Readings, primarily novels, of important contemporary writers. Emphasis on controversial moral, social, and cultural issues. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 207 Survey of British Literature I (4)**

British literature, as exemplifying the history of ideas, from its beginnings to the late 18th century, with emphasis on the major works. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 208 Survey of British Literature II (4)**

British literature, as exemplifying the history of ideas, from the late 18th century to the present, with emphasis on the major works. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 211 Survey of American Literature I (4)**

Philosophical, religious, and literary ideas in American writing from colonial times through the mid-19th century. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 212 Survey of American Literature II (4)**

Philosophical, religious, political, and literary ideas in American writing from the mid- to late-19th century to the present. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 213 Ethnic Literatures of the U.S. (4)**

Introduction to ethnicity in literature; the role of ethnic identification and tensions in shaping literatures by U.S. writers of African, Asian, European, Hispanic, and Native American heritage. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 215 Latino Literature in America (4)**

Study of works by, and about, Latinos in America, within a broad historical and cultural context. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 216 The Bible as Literature (4)**

Old and New Testament narrative, poetry, and wisdom literature in the King James Version. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 217 World Literature I (4)**

Major themes in selected literary masterpieces from ancient cultures, western and nonwestern, up to the 11th century of the Common era, read within thematic and cultural contexts. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 218 World Literature II (4)**

Major themes in selected literary masterpieces from different cultures, both western and nonwestern, from the 11th century of the Common era to the present, read within thematic and cultural contexts. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 222 The Literature of Science Fiction (4)**

Science fiction as a literary genre. The history of science fiction. Seminal works (novels and short stories); major writers. The significance of science fiction in contemporary life and thought. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 231 Introduction to Folklore (4)**

Introduction to folklore. Narrative, song, folklife, ballads, customs, beliefs, games, folk speech, and other genres. Collecting. Significance of folklore phenomena in life and literature from different cultures. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

**ENG 240 Women Writers (4)**

Selected readings in the works of major women writers. Emphasis on the contribution to literature by women authors. 4 lecture presentations. Prerequisite: ENG 104 or permission of instructor.

**ENG 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

**ENG 301 Writing for the Professions (4)**

Written work of the kind the student may be asked to do in his or her profession, including reports, investigative papers, and articles similar to those appearing in professional journals. 4 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

**ENG 302 Creative Writing—Fiction (4)**

The fundamentals of short-story writing. Exercises in plotting, characterization, dialog, description, narration, and point of view. Readings; analysis of stories and exercises. 4 lectures/problem-solving. Prerequisite: a 200-level literature course.

**ENG 303 Advanced Expository Writing (4)**

Current practices in such forms as the essay, commentary, magazine article. 4 lectures/problem-solving. Prerequisite: ENG 105 or 108 or equivalent.

**ENG 305 The Novel in English to 1880 (4)**

Development of the novel in England and America to the rise of Naturalism; Defoe to Hardy. 4 lecture presentations. Prerequisite: a 200-level literature course.

**ENG 306 The Modern British Novel (4)**

Developments and directions in the novel since 1880; novelists such as Butler, Hardy, Forster, Huxley, Woolf, Rhys, Greene, Lessing. 4 lecture presentations. Prerequisite: a 200-level literature course.

**ENG 307 The English Drama to 1890 (4)**

Development of English drama from medieval mystery and morality plays to late 19th century drama, with an emphasis on non-Shakespearean Renaissance plays. 4 lecture presentations. Prerequisite: a 200-level literature course.

**ENG 308 The Modern Drama (4)**

Continental, British, and American dramatic trends from the rise of Naturalism. 4 lecture presentations. Prerequisite: a 200-level literature course.

**ENG 309 The English Poem (4)**

Critical analysis and evaluation of genres and single works, other than dramatic. 4 lecture presentations. Prerequisite: a 200-level literature course.

**ENG 313 Language and Human Behavior (4)**

The reciprocal relations between uses of language and cultural practices. 4 lectures/problem-solving. Prerequisite: a 200-level literature course.

**ENG 320 Structure of Language (4)**

Study of phonology and morphology, with special emphasis on English. Includes work in phonetic transcription; phonological and morphological analysis. 4 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

**ENG 321 Grammar of Modern English (4)**

Modern English syntax; emphasis on standard English. Other social and regional dialects; work with various grammars and dictionaries. 4 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

**ENG 322 Development of Modern English (4)**

Principles of language change as an aid to understanding present-day pronunciation, spelling, word formation, grammar, and usage in English. Social and cultural influences on the language. 4 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

**ENG 323 Language Acquisition (4)**

Development of the first language from birth through adolescence. Adult and child acquisition of second and subsequent languages. Linguistic, biological, and social factors that facilitate and retard language learning. 4 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

**ENG 324 Children's Literature (4)**

Readings in myth and folklore and in children's classics from the 18th century to the present. 4 lecture presentations. Prerequisite: a 200-level literature course.

**ENG 326 Adolescent Literature (4)**

Selected readings in literature for the adolescent. Discussion of the nature and reading stages of the adolescent, criteria and sources for selecting adolescent literature, and effective methods of classroom presentation. 4 lecture/presentations. Prerequisite: a 200-level literature course.

**ENG 345 Race and Gender in Modern Literature (4)**

Fiction, poetry, drama, and nonfiction in which both race and gender are present as a major theme, strategy, or narrative effect. Writers such as Larsen, Wright, Walker, Kingston, Lorde, Moraga, Hansberry, Broner. 4 lecture presentations. Prerequisite: a 200-level literature course.

**ENG 350 Literary Theory (4)**

Analysis of the works of selected major critics, with emphasis on the moderns. Application of principles in original critical essays. 4 lecture presentations. Prerequisite: a 200-level literature course.

**ENG 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**ENG 401 Chaucer (4)**

Chaucer's principal works, with special emphasis on *The Canterbury Tales* and *Troilus and Criseyde*. Cultural background. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 402 Milton and His Age (4)**

*Paradise Lost*, *Samson Agonistes*. Prose and minor poems. Selected works by such contemporaries of Milton as Andrew Marvell. Historical background. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 403 Shakespeare (4)**

Selected plays through *Hamlet*. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 404 Shakespeare (4)**

Selected plays after *Hamlet*. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 406 Shakespeare Performance I (2)**

Initial examination of a complete Shakespeare play text through performance techniques. Analysis of critical and scholarly commentary, including performance-centered works. Performance workshops. 2 seminars. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: a 200-level literature course.

**ENG 407 Shakespeare Performance II (4)**

Concluding examination of a complete Shakespeare play through performance techniques. Analysis of critical commentary, including student-generated essays. Performance workshops. 4 seminars. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: ENG 406.

**ENG 420 Texts and Images of the Holocaust (4)**

Historical and religious backgrounds of the Holocaust. Essays, fiction, poetry, and drama by writers such as Wiesel, Kosinski, Levi, Ozick, Steiner, Arendt, Hochhuth. 4 seminars. Prerequisite: 200-level literature course or permission of instructor.

**ENG 425 The Literature of Exile (4)**

Literature produced by writers who live and write outside their homelands; the influence of expatriate or exile status on that literature and on national and international literary movements. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 430 Narrative in Literature and Film (4)**

Analysis of narrative conventions in works of literary fiction and in film, with attention to similarities and differences between literary and film art. 4 lecture/presentations. Prerequisite: a 200-level literature course.

**ENG 432 Professional Editing (4)**

Roles played by various editors in the development of books. Steps and schedules involved in production. Professional conduct in dealing with authors. Copy-editing to industry standards. 4 lectures/problem-solving. Prerequisite: ENG 321 or permission of instructor.

**ENG 440 English Renaissance (4)**

Poets, 1500-1660, such as Spenser, Sidney, Jonson, Donne. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 442 English Enlightenment (4)**

Writers, 1660-1800, such as Dryden, Pope, Swift, Johnson. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 444 English Romanticism (4)**

Writers such as Blake, Wordsworth, Coleridge, Byron, Shelley, Keats. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 448 Victorian Writers (4)**

Poetry and nonfiction prose of such authors as Carlyle, Arnold, Ruskin, Tennyson, Browning. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 450 Twentieth-Century British Literature (4)**

Writers such as Joyce, Yeats, Woolf, Lawrence, Orwell, Beckett, Lessing, Spark, Drabble. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 451 Modernism and Postmodernism (4)**

Literary developments shaped by artistic innovation and response to the complex events, theories, political upheavals, and radically new technologies that have marked the 20th century. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 452 American Renaissance (4)**

Writers such as Hawthorne, Emerson, Thoreau, Melville, Whitman, Dickinson. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 454 American Realism (4)**

Writers such as Twain, Crane, Norris, London, James. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 456 Twentieth-Century American Literature (4)**

Writers such as Faulkner, Fitzgerald, Hemingway, O'Neill, Frost. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 457 The Nineteenth-Century European Novel (4)**

The 19th-century novel, especially in France, Germany, Portugal, Russia, and Spain, with attention to its predecessors. Writers such as Balzac, Dostoevsky, Eça, Flaubert, Fontane, Galdos, Goethe, Stendhal, Tolstoy, and Zola. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 458 The Novel in the Modern World (4)**

The 20th-century novel outside the U.S. and Great Britain, with attention to its predecessors. Writers such as Allende, Cela, Emecheta, Ginzburg, Gordimer, Kawabata, Kundera, Moravia, and Sarraute. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 459 Literatures of the "Third World" (4)**

Literatures of Africa, Asia, Latin America, and/or the Middle East. Issues including colonialism, post-colonialism, nationhood, and cultural identity. Writers such as Achebe, Can Xue, Desai, Fuentes, Garcia Marquez, Head, Mahfouz, al-Mala'ika, Oz, Poniatowska, Rushdie, and Soyinka. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 460 Modern Critical Theory (4)**

Intensive study of recent developments in literary criticism, such as post-structuralist, feminist, reader-response, Marxist, and psychoanalytic theory. 4 seminars. Prerequisite: ENG 350 or permission of instructor.

**ENG 461, 462 Senior Paper (2) (2)**

First quarter: research on a subject in literature or language, under the direction of a faculty tutor. Second quarter: completion of a paper.

Especially recommended for prospective graduate students. Prerequisite: senior standing.

**ENG 463 Senior Seminar (2)**

Study and discussion of specially selected topics. 2 lectures. Prerequisite: senior standing.

**ENG 464 Multimedia Practicum (4)**

Introduction to available technologies in the discipline of English, which support reading, writing, grammar, language, linguistics, literature, speech, and critical thinking. 4 lectures/problem-solving. Prerequisites: completion of lower-division course work and a declared major in English Education.

**ENG 465 Assessment Seminar (4)**

Assessment of subject matter competence of students preparing for careers in the teaching of English at the secondary level. Development and evaluation of a capstone project, 30 hours of public school classroom observation, portfolio, shorter written projects, and in-class presentations. 4 seminars. Prerequisites: completion of English Education Core and Breadth and Perspective requirements.

**ENG 485 Latin American Women Writers in Translation (4)**

Female authors spanning several centuries of literary productivity in Latin America. 4 seminars. Prerequisite: a 200-level literature course.

**ENG 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

Graduate courses are listed in the "Graduate Studies" section of this catalog.

**Chinese (Mandarin)****FL 171 Elementary Chinese I (4)**

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar, within a cultural context. 4 lecture-recitations.

**FL 172. Elementary Chinese II (4)**

Extension of fundamentals of pronunciation, grammar, and conversation, within a cultural context, for the continuing student. 4 lecture-recitations. Prerequisite: FL 171 or equivalent

**FL 173 Elementary Chinese III (4)**

Extension of fundamentals of pronunciation, intonation, grammar, and conversation, within a cultural context, for the continuing student. 4 lecture-recitations. Prerequisite FL 172 or equivalent

**French****FL 101 Elementary French I (4)**

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar within a cultural context. 4 lecture/recitations.

**FL 102 Elementary French II (4)**

Extension of fundamentals of pronunciation and grammar within a cultural context for the continuing student. 4 lecture/recitations. Prerequisite: FL 101 or equivalent.

**FL 103 Elementary French III (4)**

Advanced grammatical patterns and pronunciation within a cultural context for the continuing student. 4 lecture/recitations. Prerequisite: FL 102 or equivalent.

**FL 201 Intermediate French (4)**

Review of grammar. Additional elements of French structure. Readings. 4 lecture/recitations. Prerequisite: FL 103 or equivalent.

**FL 202 Intermediate French Reading (4)**

Reading of varied short texts; establishing a steadily increasing vocabulary. Introduction to literary texts. Recommended for prospective graduate students. 4 lecture/recitations. Prerequisite: FL 103 or equivalent.

**FL 203 Intermediate French Composition and Conversation (4)**

French composition, both oral and written. Frequent original presentations. 4 lecture/recitations. Prerequisite: FL 103 or equivalent.

**FL 307 French Civilization (4)**

Survey of French culture and social customs to the 20th century. Conducted in French. 4 lecture/recitations. Prerequisite: FL 103 or equivalent.

**FL 308 Contemporary France (4)**

Culture of 20th-century France, including art, music, history, literature, social customs, and the systems of government and education. Conducted in French. 4 lecture/recitations. Prerequisite: FL 202 or equivalent.

**German****FL 111 Elementary German I (4)**

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar, within a Cultural context. 4 lecture/recitations.

**FL 112 Elementary German II (4)**

Extension of fundamentals of pronunciation and grammar within a cultural context for the continuing student. 4 lecture/recitations. Prerequisite: FL 111 or equivalent.

**FL 113 Elementary German III (4)**

Advanced grammatical patterns and pronunciation within a cultural context for the continuing student. 4 lecture/recitations. Prerequisite: FL 112 or equivalent.

**FL 211 Intermediate German (4)**

Review of grammar; conversation; readings in original German. 4 lecture/recitations. Prerequisite: FL 113 or equivalent.

**FL 212 Intermediate German Reading (4)**

Development of reading proficiency in German; analysis and discussion of texts; some translation. Recommended for prospective graduate students. 4 lecture/recitations. Prerequisite: FL 113 or equivalent.

**FL 213 Intermediate German Composition and Conversation (4)**

Fundamentals of German composition; intensive practice in conversation; idiomatic German; vocabulary building. Frequent oral and written original presentations. 4 lecture/recitations. Prerequisite: FL 113 or equivalent.

**FL 317 German Civilization (4)**

Survey of German culture and social customs. Conducted in German. 4 lecture/recitations. Prerequisite: FL 211 or equivalent.

**Latin****FL 131 Elementary Latin I (4)**

Essential vocabulary, grammar, and syntax of classical Latin for the beginner. Basic translation. Introduction to Roman culture. FL 131, 132 and 133 together are equivalent to two years of high school Latin. 4 lecture/recitations.

**FL 132 Elementary Latin II (4)**

Extension of fundamental vocabulary, grammar, and syntax for the continuing student. Intermediate-level translation. Continued study of Roman culture. FL 131, 132, and 133 together are equivalent to two years of high school Latin. 4 lecture/recitations. Prerequisite: FL 131 or equivalent.

**FL 133 Elementary Latin III (4)**

Advanced vocabulary, grammar, and syntax for the continuing student. Advanced-level translation. Continued study of Roman culture. FL 131, 132, and 133 together are equivalent to two years of high school Latin. 4 lecture/recitations. Prerequisite: FL 132 or equivalent.

**Spanish****FL 151 Elementary Spanish I (4)**

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation and grammar, within a cultural context. 4 lecture-recitations.

**FL 152 Elementary Spanish II (4)**

Extension of fundamentals of the spoken and written language within a cultural context for the continuing student. 4 lecture-recitations. Prerequisite: FL 151 or equivalent.

**FL 153 Elementary Spanish III (4)**

Advanced grammatical patterns and pronunciation within a cultural context for the continuing student. Four lecture-recitations. Prerequisite: FL 152 or equivalent.

**FL 154 Spanish for Spanish Speakers I (4)**

Development of all four basic skills in Spanish: comprehension, speaking, reading and writing. Emphasis on orthography, written style, and ability to distinguish between substandard dialects and general Latin American Spanish. 4 lecture-recitations. Prerequisite: ability to communicate in spoken Spanish.

**FL 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: permission of instructor.



**FL 250 Spanish for Spanish Speakers II (4)**

Further development of all four basic skills in Spanish: comprehension, speaking, reading and writing. Emphasis on orthography, written style, and ability to distinguish between substandard dialects and general Latin American Spanish. 4 lecture-recitations. Prerequisite: FL 154 or equivalent.

**FL 251 Intermediate Spanish (4)**

Review of grammar and additional elements of Spanish structure presented within the context of Hispanic cultures. 4 lecture-recitations. Prerequisite: FL 153 or equivalent

**FL 252 Intermediate Spanish Reading (4)**

Development of reading comprehension skills for interpreting journalistic and literary styles within a cultural context. Vocabulary building. Decoding of complex discourse structures. 4 lecture/problem solving. Prerequisite: FL 153 or equivalent.

**FL 253 Intermediate Spanish Conversation (4)**

Intensive practice in comprehension and production of oral Spanish within the framework of Hispanic cultures. Group discussions and oral presentations. 4 lecture-recitations. Prerequisite: FL 153 or equivalent.

**FL 254 Intermediate Spanish Composition (4)**

Concentration on practical writing within the framework of Hispanic cultures. Four lecture/problem-solving. Prerequisite: a 200-level Spanish course or equivalent.

**FL 256 Introduction to Modern Fiction (4)**

Readings in the Spanish/Spanish American short story. Analysis and discussion of texts within a cultural context. 4 lecture/problem-solving. Prerequisite: FL 252 or equivalent.

**FL 299 Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Credit limited to 8 units, with a maximum of 4 units per quarter. Lecture, laboratory, or a combination of both. Corequisites may be required. Prerequisite: permission of instructor.

**FL 350 Advanced Spanish Conversation (4)**

Further development of oral proficiency. Continued practice in group discussions with emphasis on refining rhetorical strategies and selecting vocabulary for contextual variety. 4 lectures/problem-solving. Prerequisite: FL 253 or equivalent.

**FL 351 Advanced Spanish Composition (4)**

Advanced writing, with emphasis on stylistics, the essay, and the research paper, within the framework of Hispanic cultures. 4 lecture/problem-solving. Prerequisite: FL 254.

**FL 352 Spanish Civilization (4)**

Culture of Spain, including art, music, history, customs, and world outlook. 4 lecture/recitations. Prerequisite: FL 254 or equivalent.

**FL 354 Latin American Civilization (4)**

Culture of Latin America, including pre-Columbian civilizations, colonial, and early national periods. 4 lecture/problem-solving. Prerequisite: FL 254 or equivalent.

**FL 355 Contemporary Latin American Civilization (4)**

Culture of present-day Latin America, including art, music, history, and customs. Relations with the United States. 4 lecture/problem-solving. Prerequisite: FL 254 or equivalent.

**FL 356 Survey of Spanish Literature (4)**

Introduction to the history and evolution of Spanish literature. Selected readings in a variety of genres, from the medieval epic to twentieth-century postmodern poetry, prose, and/or drama. 4 lectures/problem-solving. Prerequisite: FL 254 or equivalent.

**FL 358 Survey of Spanish-American Literature (4)**

Philosophical, religious, political, and literary ideas in Spanish American writing, from its beginning to the present, with emphasis on major works. 4 lecture/problem-solving. Prerequisite: FL 254 or equivalent.

**FL 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: senior standing or permission of instructor.

**FL 450 Syntactical Analysis (4)**

Analysis of the linguistic logic which underlies Spanish syntax. Developing and stating generalizations about Spanish structure. Some fieldwork. 4 lectures/problem solving. Prerequisite: FL 351 or equivalent.

**FL 451 Spanish Applied Linguistics (4)**

Introduction to the phonological, morphological and syntactical problems involved in acquiring Spanish as a second language. An overview of regional dialects and social differentiation. 4 lectures/problem solving. Prerequisites: ENG 320 and FL 450.

**FL 454 Spanish Golden Age Literature (4)**

Renaissance and Baroque authors such as Cervantes, Teresa de Avila, and Lope de Vega. Overview of historical factors in sixteenth- and seventeenth-century Spain: the picaresque novel, lyric poetry, and the theater. 4 lectures/problem-solving. Prerequisite: FL 351 or equivalent.

**FL 455 Literature of Mexico (4)**

The evolution of Mexican literature with emphasis on ancient lyric poetry and didactic prose, viceregal Renaissance and Baroque masters such as Sor Juana, and twentieth-century authors such as Octavio Paz and Rosario Castellanos. 4 lectures/problem-solving. Prerequisite: FL 351 or equivalent.

**FL 456 Latin American Women Writers (4)**

The role of women in cultural production in the Spanish-speaking western hemisphere and their marginalization from the literary canon. Close examination of texts in drama, poetry, and prose, with an emphasis on the seventeenth, nineteenth, and twentieth centuries. 4 lectures/problem-solving. Prerequisite: FL 351 or equivalent.

**FL 499 Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Credit limited to 8 units, with a maximum of 4 units per quarter. Lecture, laboratory, or a combination of both. Corequisites may be required. Prerequisite: permission of instructor.

## Japanese

### x Elementary Japanese I (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar, within a cultural context. 4 lecture/recitations.

### FL 162 Elementary Japanese II (4)

Extension of fundamentals of pronunciation, grammar, and conversation, within a cultural context, for the continuing student. 4 lecture/recitations. Prerequisite: FL 161 or equivalent.

### FL 163 Elementary Japanese III (4)

Advanced grammatical patterns and pronunciation, within a cultural context, for the continuing student. 4 lecture/recitations. Prerequisite: FL 162 or equivalent.

### FL 261 Intermediate Japanese (4)

Review of grammar. Additional elements of Japanese structure. Readings. 4 lecture/recitations. Prerequisite: FL 163 or equivalent.

### FL 262 Intermediate Japanese Reading (4)

Development of reading proficiency in Japanese; analysis and discussion of texts; some translation. Recommended for prospective graduate students. 4 lecture/recitations. Prerequisite: FL 163 or equivalent.

### FL 263 Intermediate Japanese Conversation (4)

Intensive practice in comprehension and production of oral Japanese within the framework of Japanese cultures. 4 lecture/recitations. Prerequisite: FL 163 or equivalent.

## Special Topics Courses in Foreign Languages

### FL 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### FL 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

### FL 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### FL 499/499A/499L Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

## GEOGRAPHY

One of the three majors offered in the Department of Geography and Anthropology is Geography. For other programs in the department see Anthropology, and Social Sciences.

Richard S. Hyslop, Chair, Department of Geography and Anthropology

Lin Wu, Geography Coordinator

The Geography degree program, which is housed in the Department of Geography and Anthropology, is designed to provide an understanding of humankind's cultural and physical environments by examining the dynamic systems (both natural and human) through which these diverse settings are changed or sustained. The student majoring or minoring in Geography is guided to study the regions of the world from a spatial perspective. He or she learns to recognize problems on cultural or physical landscapes and to compare solutions which have been attempted in various parts of the world. Attention is given to the relationships between expanding populations, increasing per capita use of resources and recognition of present and potential energy and raw materials crises.

Majors may choose between the traditional Geography Option, which blends physical, cultural and regional geography courses with field work, and the Geographic Information Systems Option, which emphasizes the acquisition of technical skills such as air photo interpretation, computer cartography and geographic information systems. Students completing this program receive a Bachelor of Science Degree.

Training in this major provides a broad and suitable background for careers requiring an understanding of peoples, groups, and their cultural and regional institutions. Careers specifically related to this program include government employment in various capacities, secondary school teaching, and positions in international or multicultural capacities in business and management. Preparation for graduate training in this discipline is also offered to majors.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Physical Geography	.GEO	101	(4)
Cultural Geography	.GEO	102	(4)
Image and Map Interpretation	.GEO	103	(4)
Computer Geographics	.GEO	104	(4)
Economic Geography	.GEO	312	(4)
Urban Geography	.GEO	315	(4)
Multimedia Mapping	.GEO	430	(3/1)
Principles of Ecology	.BIO	325/L	(3/1)
Geomorphology	.GSC	323/323L	(3/1)

### GEOGRAPHY OPTION

Field Geography	.GEO	309	(4)
Political Geography	.GEO	313	(4)
or Travel Geography	.GEO	345	
Advanced Field Techniques	.GEO	409	(4)
Videogeographics	.GEO	450	(4)
Field Studies in the Southwest	.BIO	415L	(6)
Plant Ecology	.BOT	421/421L	(3/1)
Economics of Transportation	.EC	433	(4)
Ten units of upper-division regional geography, special problems or special topics in geography courses			(10)

### SUPPORT COURSES

(Required of all students in the Geography Option)

Climatology	.GEO	303	(4)
Seminar in Land Economics	.EC	419	(4)

Two of the following courses should be taken:

Environment, Technology and Culture	.ANT	350	(4)
Developmental Anthropology	.ANT	352	(4)
Language and Culture	.ANT	353	(4)
Cultural Areas of the World	.ANT	399	(4)
Unrestricted electives			(34)

### OPTION IN GEOGRAPHIC INFORMATION SYSTEMS

Courses required to complete the core:

Field Geography	.GEO	309	(4)
Advanced Field Techniques	.GEO	409	(4)
Photographic Remote Sensing	.GEO	410	(4)
Digital Image Processing	.GEO	420	(4)
Computer Cartography	.GEO	421/421L	(4)
Geographic Information Systems I	.GEO	440	(4)
Internship in Geographic Information Systems	.GEO	441	(4)
Geographic Information Systems II	.GEO	442	(4)
Geographic Information Systems III	.GEO	443	(4)
Videogeographics	.GEO	450	(4)

### SUPPORT COURSES

(Required of all students in Geographic Information Systems Option)

Introduction to Computers for non-CS majors	.CS	101	(4)
or Introduction to Computer Graphics	.CS	245	
Climatology	.GEO	303	(4)
College Algebra	.MAT	105	(4)
Trigonometry	.MAT	106	(4)

One upper division regional geography course chosen

in consultation with advisor			(4)
Unrestricted electives			(30)

### GENERAL EDUCATION COURSES

#### Area 1:

A. Freshman English I	.ENG	104	(4)
B. Public Speaking	.COM	100	(4)
C. Logic and Semantics	.PHL	202	(4)

#### Area 2:

A. Elementary Statistics with Applications	.STA	120	(4)
B. Principles of Geology	.GSC	111/142	(3-5)
C. Basic Biology	.BIO	115	(4)
D. Select one course			(4)

#### Area 3:

A. Select one course			(4)
B. Religions of the World	.PHL	220	(4)
or Introduction to Religious Studies	.PHL	221	
C. Select one course			(4)
D. Principles of Economics	.EC	201	(4)
or Principles of Economics	.EC	202	
E. Principles of Sociology	.SOC	201	(4)
F. Select one course			(4)
G. Human Nature/Human Affairs	.ANT	201	(4)

#### Area 4:

Introduction to American Government	.PLS	201	(4)
United States History	.HST	202	(4)

**Area 5:**

12 Upper Division units are required, 4 of which fulfill Area 2D. . . . (8)  
 Total units required for degree . . . . . (198)

**GEOGRAPHY MINOR**

Physical Geography . . . . .	GEO	101	(4)
Cultural Geography . . . . .	GEO	102	(4)
Image and Map Interpretation . . . . .	GEO	103	(4)
Computer Geographics . . . . .	GEO	104	(4)

The student must select two of the following courses: . . . . . (8)

Field Geography . . . . .	GEO	309	(4)
Economic Geography . . . . .	GEO	312	(4)
Political Geography . . . . .	GEO	313	(4)
Urban Geography . . . . .	GEO	315	(4)

The student must select two of the following courses: . . . . . (18)

Travel Geography . . . . .	GEO	345	(4)
U.S. and Canada Geography . . . . .	GEO	350	(4)
Geography of California . . . . .	GEO	351	(4)
Geography of Latin America . . . . .	GEO	352	(4)
Russia: Environment and People . . . . .	GEO	353	(4)
Europe: Land and People . . . . .	GEO	359	(4)

Total units required for minor. . . . . (32)

NOTE: The Geography Minor may be taken by Social Sciences majors.

**COURSE DESCRIPTIONS****GEO 101 Physical Geography (4)**

Basic principles of physical geography. Significance of earth-related distribution patterns with reference to their effect on human activities. 4 lecture discussions. Meets GE requirement in Area 2B for non-majors.

**GEO 102 Cultural Geography (4)**

Basic principles of cultural geography. Significance of people-related distribution patterns with reference to their effect on human activities. 4 lecture discussions. Meets G.E. requirement in Area 3E for non-majors.

**GEO 103 Image and Map Interpretation (4)**

Fundamental techniques of airphoto and satellite image interpretation and reading of general reference and thematic maps as they apply to understanding both physical and cultural features depicted in images and maps. Student analyses and presentation of their findings. 4 lectures/problem-solving.

**GEO 104 Computer Geographics (4)**

Introduction to the utilization of computer hardware and software in geography with emphasis on microcomputer applications in cartography, desktop mapping, geographic information systems, remote sensing and videography. 4 lectures/problem-solving.

**GEO 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**GEO 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture and activity or laboratory. Corequisites may be required.

**GEO 303 Climatology (4)**

Introduction to weather-producing processes, including Earth's heat budget, thermodynamics of the atmosphere, and the global distribution of climactic types. Modern theories of climactic change caused by orbital variations, carbon dioxide, and other factors, impact of climate on society. 4 lectures/problem-solving. Meets GE requirement in Area 5 for non-majors.

**GEO 309 Field Geography (4)**

Extensive student participation in basic methods of geographic field analysis of small areas, including rural and urban types, and physical and cultural aspects. Theory and practice in field sampling. 4 lectures/problem-solving.

**GEO 312 Economic Geography (4)**

Introduction to the substance and issues of economic geography. Topics addressed include the distribution and control of resources, the diversity of political/economic systems and the international exchange of labor and goods. 4 lectures/problem-solving. Prerequisite: ENG 104. Meets GE requirement in Area 5 for non-majors.

**GEO 313 Legal and Political Geography (4)**

Spatial aspects of political systems and units. Territorial configurations and disputes at all levels, on all continents. 4 lectures/problem-solving. Prerequisite: ENG 104.

**GEO 315 Urban Geography (4)**

Student analysis and presentation of the problems in the origin and evolution of cities. Includes size, functions, distribution patterns, supporting and tributary areas, and roles within the whole political, social and economic structure of a region; includes suburbs and problems of metropolitan areas. 4 lectures/problem-solving. Prerequisite: ENG 104. Meets GE requirement in Area 5 for non-majors.

**GEO 345 Travel Geography (4)**

The geography of tourism and recreation in selected regions of the world. Aspects of physical and cultural geography that directly affect the tourist industry. 4 seminars. Prerequisite: ENG 104.

**GEO 350 U.S. and Canada Geography (4)**

Student analysis and presentations of topics and problems in the physical, cultural and regional patterns of the United States and Canada with emphasis on the economic geography. 4 lectures/problem-solving. Prerequisite: ENG 104.

**GEO 351 Geography of California (4)**

Location and description of California's natural and human resources. The influence of physical features upon the economic activities and sequence of occupation of California, with particular attention to the relationship of current California problems to their geographical causes. 4 lecture discussions. Prerequisite: ENG 104. Meets GE requirement in Area 5 for non-majors.



**GEO 352 Geography of Latin America (4)**

Physical, cultural, regional patterns of Mexico, Central America, South America, and the islands of the Caribbean. 4 lecture discussions. Prerequisite: ENG 104.

**GEO 357 Geography of Asia (4)**

Non-Soviet Asia from the Middle East to Japan and southward to Indonesia. Emphasis on environmental, cultural and political patterns and their relevance to current problems. 4 lecture discussions. Prerequisite: ENG 104. Meets GE requirement in Area 5 for non-majors

**GEO 358 Geography of Africa (4)**

Physical, cultural, and regional patterns of the nations of Africa. Emphasis within regions on development patterns of the new countries in Africa. 4 lecture discussions. Prerequisite: ENG 104. Meets GE requirement in Area 5 for non-majors.

**GEO 359 Europe: Land and People (4)**

Student analysis and presentations of issues in the natural environment and the cultural landscape of Europe. Major current trends in social, cultural, economic and political developments in Western and Eastern Europe; relationship between historical and geographical diversity. 4 lectures/problem-solving. Prerequisite: ENG 104.

**GEO 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**GEO 409 Advanced Field Techniques (4)**

Guidance and critiquing of student work in the analysis and evaluation of the geographical characteristics of the natural environment and its human use. Includes field mapping, systematic and random sampling of spatial phenomena, and environmental impact reporting. 4 lectures/problem-solving. Prerequisite: GEO 309 or permission of instructor.

**GEO 410 Photographic Remote Sensing (4)**

Student interpretation of spatial and spectral information from imagery produced in the photo-sensitive region of the electromagnetic spectrum. Experimentation with multispectral photography of the environment. Radial-line maps and mosaics from air photos and satellite photos. 4 lectures/problem-solving. Prerequisite: GEO 103 or permission of instructor. Meets GE requirement in Area 5 for non-majors.

**GEO 420 Digital Image Processing (4)**

Students solve problems in the use of computers in remote sensing. Analysis and interpretation through aerial photographs and scanner images digitally processed to examine the ground scene. Key concepts: spectral reflectance/emittance of terrain features; multispectral scanners; image restoration, enhancement, classification, and storage; spectral pattern recognition. 4 lectures/problem-solving. Prerequisites: CS 101 or CIS 110, GEO 104 and GEO 410 or permission of instructor. Meets GE requirement in Area 5 for non-majors.

**GEO 421/421L Computer Cartography (3/1)**

Extensive student presentations on the utilization of computers to draw maps. Use of digitizers, scanners, and other computer mapping input devices; computer mapping software using line printers and plotters as output devices. Application of geographic information systems. 3 lectures/problem-solving, 1 three-hour laboratory. Corequisites: GEO 421/421L. Prerequisites: CS 101 or CIS 110 and GEO 104 or permission of instructor.

**GEO 430/430A Multimedia Mapping (3/1)**

Concepts and techniques utilizing the computer to combine and convert cartographics, sound, animation, video and film from analog to digital media to produce interactive multimedia maps and atlases. Students author and produce linear and nonlinear, cartographic and geographic hypermedia and hypertext. 3 lectures/problem-solving, 2 hours activity. Prerequisites: GEO 101, 102, and 104.

**GEO 440 Geographic Information Systems (4)**

Concepts in the framework of geographic information systems. Basic techniques for the computer processing of geographical systems analysis and modeling. 4 lectures/problem-solving. Prerequisites: GEO 420 or 421 or permission of instructor.

**GEO 441 Internship in Geographic Information Systems (4)**

On-the-job training in cartography and/or image interpretation for at least 10 hours per week or a minimum of 100 hours per academic quarter. Prerequisites: senior standing and the consent of the internship coordinator.

**GEO 442 Geographic Information Systems II (4)**

Technical issues of geographic information, including data structure, database models, error estimation and product generation. 4 lectures/problem-solving. Prerequisite: GEO 440 or consent of instructor.

**GEO 443 Geographic Information Systems III (4)**

Applications in geographic information systems. Topics include resource management, urban planning, demographic and network applications and systems design and implementation. 4 lectures/problem-solving. Prerequisite: GEO 440 or consent of instructor.

**GEO 499 Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Seminar. Prerequisite: permission of instructor. Corequisites may be required.

## HISTORY

Mahmood Ibrahim, Chair

Judith Anderson	John A. Moore, Jr.
Anthony L. Brundage	Amanda Podany
Stephen F. Englehart	Tara Sethia
Richard Johnson	David R. Smith
James G. Kamusikiri	Elise K. Wirtschafter
Daniel K. Lewis	

The History Department offers a major in history leading to the bachelor of arts degree as well as basic courses in general education. The History Department also offers a minor in history and a minor in Latin American Studies. Courses are designed to encourage students to seek out relationships between the past and contemporary social, political, and cultural issues, and to provide historical perspective on materials studied in other departments of the university.

Students have a choice of two tracks in the major. The first track offers a flexible curriculum for students wanting a history major with a maximum choice of general education courses and electives. It provides a foundation for those seeking pre-professional training in law, business, civil service, and graduate work leading to a master's degree or doctorate.

The second track has been approved by the California State Commission on Teacher Credentialing. It provides a major in history with a pre-credential social science emphasis for students pursuing a history subject matter program in social sciences to teach in middle or high schools. They may meet the subject matter program requirement for the appropriate teaching credential (the Single Subject Credential) either by passing a subject matter examination in social science that has been adopted by the Commission on Teacher Credentialing, or by following the History Department's Track Two curriculum, which has been approved by the Commission on Teacher Credentialing.

Please note that subject matter preparation programs for prospective teachers should not be confused with undergraduate degree programs of colleges and universities. The Commission on Teacher Credentialing sets standards for academic programs that lead to the issuance of credentials. An applicant for a teaching credential must have earned a baccalaureate or higher degree from an accredited institution, but the degree program may or may not fulfill the Commission's standards for the subject matter preparation of teachers. Completing a subject matter program that satisfies the standards enables a candidate to qualify for a fifth-year credential program. Track Two satisfies the standards; Track One does not. Track One is designed for students who have career goals other than teaching.

Students qualifying for Single Subject Credentials in other fields (i.e., English, Mathematics, etc.) may obtain a supplemental authorization to teach history or social studies up to the ninth grade by completing the requirements which have been established for such additional authorizations. For further information, see Professor Judith Anderson in the History Department.

Students majoring in history have the opportunity of joining the Cal Poly Pomona History Club and the local chapter of Phi Alpha Theta, the International Honor Society in History.

For additional information, please see the Department Chair.

### I. TRACK ONE

Recommended for students seeking a broad liberal education, pre-professional training in law, business, or civil service, and graduate study. Students should take at least one foreign language, especially those who expect to pursue graduate study.

### Core Courses

(Required of all students in Track One) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

History of World Civilization: Ancient Period . . . . .HST	101	(4)
History of World Civilization: Middle Period . . . . .HST	102	(4)
History of World Civilization: Modern Period . . . . .HST	103	(4)
United States History . . . . .HST	201	(4)
History Methods . . . . .HST	300	(4)
History and Historians . . . . .HST	390	(4)
Senior Thesis . . . . .HST	461	(4)
Senior Thesis . . . . .HST	462	(32)
Additional upper-division history courses. . . . .		(36)
General Education (choose from approved list). . . . .		(72)
Unrestricted Electives . . . . .		(46)
Total Units . . . . .		(186)

### II. TRACK TWO

Successful completion of Track Two of the history major meets the subject matter competency requirement for prospective teachers seeking a California Single Subject Credential in Social Sciences.

### Core Courses

(Required of all students in Track Two) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

History of World Civilization: Ancient Period . . . . .HST	101	(4)
History of World Civilization: Middle Period . . . . .HST	102	(4)
History of World Civilization: Modern Period . . . . .HST	103	(4)
United States History . . . . .HST	201	(4)
History Methods . . . . .HST	300	(4)
California History . . . . .HST	370	(4)
History and Historians . . . . .HST	390	(4)
Senior Thesis . . . . .HST	461	(4)
Senior Thesis . . . . .HST	462	(4)
Undergraduate Seminar . . . . .HST	463	(2)
Total Core Units . . . . .		(38)

### Area Studies Series

Select 12 units from list with consent of advisor: HST 301, 302, 303, 305, 306, 307, 309, 310, 311, 312, 313, 314, 315, 399, 329, 330, 331, 332, 333, 335, 336, 337, 361, 362, 363, 365, 441

### American History Series

Select 8 units from list with consent of advisor: HST 341, 342, 343, 344, 345, 347, 371, 374, 375, 376, 401, 402, 403, 405, 406, 410, 413, 414

### European History Series

Select 12 units from list with consent of advisor: HST 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 351, 352, 354, 355, 356, 359, 399, 421, 425

Topics in World Civilization HST 431 may be applied to any series  
Total Area Studies Units. . . . . (32)

### General Education Courses from Track B:

(Required of all students in Track Two)

### Area 1:

Freshman English I . . . . .ENG	104	(4)
Freshman English II . . . . .ENG	105	(4)
Advocacy and Argument . . . . .COM	204	(4)

**Area 2:**

B. Physical Geography	.GEO	110	(4)
Select one course from each of the other subareas			(12)

**Area 3:**

A. Any course on list			(4)
B. Religions of the World	.PHL	220	(4)
or Introduction to Religious Studies	.PHL	221	
C. Any course on list			(4)
D. Principles of Economics	.EC	201	(4)
E. Introduction to Cultural Anthropology	.ANT	102	(4)
F. Comparative Political Systems	.PLS	202	(4)
G. General Psychology	.PSY	201	(4)

**Area 4:**

Introduction to American Government	.PLS	201	(4)
United States History	.HST	202	(4)

**Area 5:**

Ethnic Identity	.EWS	301	(4)
or Gender, Ethnicity, and Class	.EWS	420	(4)
American State and Local Politics	.PLS	328	(4)

**SUPPORT COURSES:**

(Required of all students in Track Two)

Introduction to Social Sciences	.SSC	101	(4)
Principles of Economics	.EC	202	(4)
Cultural Geography	.GEO	102	(4)
U.S. and Canada Geography	.GEO	350	(4)
Money and Banking	.EC	308	(4)
History of Economic Thought	.EC	407	(4)
Economic History of the U.S.	.EC	409	(4)
Economics of Poverty and Discrimination	.EC	437	(4)

Total Support units	(20)
Unrestricted electives	(24)

**Total units for the major** (186)

**III. HISTORY MINOR**

Required of all students:

History of World Civilization: Ancient Period	.HST	101	(4)
History of World Civilization: Middle Period	.HST	102	(4)
History of World Civilization: Modern Period	.HST	103	(4)
Total units			(12)

Twenty additional units in History will be selected in consultation with a History Department faculty advisor. Consideration will be given to student interests and vocational goals. Suggested groups of courses include American history, European history, non-Western history, minorities in American history, modern world history, etc. The minor must include at least 12 upper division units. (20)

Total units required (32)

**IV. LATIN AMERICAN STUDIES MINOR**

Required of all students:

Cultural Areas of the World (Latin America)	.ANT	399	(4)
Geography of Latin America	.GEO	352	(4)
Latin America: The Colonial Period	.HST	335	(4)
Latin America: The Era of Nation Building	.HST	336	(4)
Com. Latin American Government and Politics	.PLS	444	(4)

Select 8 units from the following:

Development Anthropology	.ANT	352	(4)
U.S.-Latin American Relations	.PLS	454	(4)
Latin America: Problems of the 20th Century	.HST	337	(4)
History of Brazil	.HST	361	(4)
Colonial Mexican History	.HST	362	(4)
or Mexican History since 1810	.HST	363	
Literature of Mexico	.FL	351	(4)
Spanish-American Literature	.FL	355	(4)
Music of Mexico	.MU	311	(4)

Twenty-eight units are required for the minor. The Latin American Studies minor may be taken by history majors. Students in the minor are encouraged to have language competency in Spanish or, if possible, Portuguese. For further information on the minor, please see the History Department Chair.

**COURSE DESCRIPTIONS**

All upper-division courses may be taken on a CR/NC basis except for HST 300, 400, 461, 462.

**HST 101 History of World Civilization: The Ancient Period (4)**

Origin and development of world civilizations in Southeast Asia, Mediterranean Basin, Inner Asia, India, China, Europe, Polynesia, the Americas and Sub Saharan Africa. Integrative study of ancient political, economic, and social organizations, technological achievements, and mythological, religious, and artistic expressions. 4 lecture discussions.

**HST 102 History of World Civilization: The Middle Period (4)**

Cross-cultural study of Western Christendom, Byzantium, Islam, India, East Asia, Africa and Americas. Impact of Central Asian nomads on Eurasian civilizations. Medieval origins of European science and technology. European Renaissance, Reformation, and expansion into Africa, Asia, and Americas. 4 lecture discussions.

**HST 103 History of World Civilization: The Modern Period (4)**

Rise of sovereign and national states; development of capitalist and industrial economy and scientific and secular culture in Europe; revolution in traditional society, values, and culture. Western Imperialism and revolt of Third World. 4 lecture discussions.

**HST 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**HST 201 United States History (4)**

History of the United States from earliest settlement to the end of Reconstruction (1877), with emphasis on the political, social, cultural and economic trends and episodes which molded and characterized the early American nation. 4 lecture discussions.

**HST 202 United States History (4)**

History of the United States from the end of Reconstruction (1877), to the present. Ethnic and gender diversity and democratization of the United States. Emphasis on political, social, cultural and economic trends which have molded and characterized America as a modern nation and world power. Meets the U.S. History part of U.S. History and Institutions requirement for graduation. 4 lecture discussions.

**HST 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

**HST 300 History Methods (4)**

Writing the history research paper; introduction to research and writing techniques through completion of a project under faculty supervision. 4 seminars. Prerequisite: Eng 104 and 105 or permission of instructor.

**HST 301 East Asia to 1800 (4)**

Summary of historical developments: analysis of social, economic, and political institutions, foreign policy, and evaluation of intellectual and aesthetic traditions of China, Japan, and Korea from the ancient period to the 19th Century. 4 lecture discussions.

**HST 302 East Asia in 19th Century (4)**

China, Japan, and Korea in the 19th Century, with particular emphasis on the analysis of social, economic, and political institutions, foreign policy, and evaluation of intellectual and aesthetic traditions. 4 lecture discussions.

**HST 303 East Asia in 20th Century (4)**

China, Japan, and Korea in the 20th Century, with particular emphasis on the analysis of social, economic, and political institutions, foreign policy, and evaluation of intellectual and aesthetic traditions. 4 lecture discussions.

**HST 305 Ancient and Medieval India (4)**

Tradition and transformation in the political, social and economic history of India beginning with the Indus Valley Civilization and ending with the Mughal Empire. Rise of various religions and philosophies. Artistic and creative trends. India and the outside world. 4 lecture presentations. Prerequisite: junior standing or permission of instructor.

**HST 306 Modern India (4)**

History of Modern India from the end of the Mughal Empire to the present. The pressures of tradition and modernity. The interaction between colonialism and nationalism. Communal separatism versus national integration. Democracy and development, population and poverty in post-independent India. 4 lecture presentations. Prerequisite: junior standing or permission of instructor.

**HST 307 South Asia (4)**

History of South Asian nations: India, Pakistan, Sri Lanka and Bangladesh since the 1940s. Social, political and economic trends: religion and politics, communal and ethnic conflict, women's movements, challenges to democracy and development. South Asia in global perspective. 4 lecture presentations. Prerequisite: junior standing or permission of instructor.

**HST 309 Modern Southeast Asia (4)**

History of Southeast Asian nations (Myanmar, Cambodia, Laos, Vietnam, Indonesia, Malaysia, Singapore, and the Philippines) from the 17th century to the present. Indian and Chinese influences; Commerce, Christianity and Conquest; Imperialism, Nationalism and Communism; and Challenges to development and democracy. 4 lecture/presentations. or permission of instructor.

**HST 310 Ancient Mesopotamia (4)**

The city-states and kingdoms of Mesopotamia and its environs in the Bronze Age (ca. 3100-1200 B.C.). The origins of cities and the relations between them; the development of writing, law, mathematics, astronomy, and literature. 4 lecture presentations. Prerequisite: junior standing or permission of instructor.

**HST 311 Ancient Egypt (4)**

The society, political and religious institutions of Egypt from the unification of the land to the end of the New Kingdom (3100-1085 B.C.). Cultural conservatism within Egypt and increasing contact with states of the Mediterranean and Africa. 4 lecture presentations. Prerequisites: junior standing or permission of instructor.

**HST 312 Ancient Israel and Middle Eastern Empires (4)**

The ancient Near East from the end of the Egyptian New Kingdom to the end of the Persian Empire (ca. 1100-323 B.C.). The development of monotheism in Israel. Governments and economies of the Near East empires and their legacies. 4 lecture presentations. Prerequisites: junior standing or permission of instructor.

**HST 313 Middle East: The Rise of Islam (4)**

Muhammad and the rise of Islam. The Islamic expansion and the establishment of the Caliphate. Social, economic and religious institutions. Development of Islamic sects, doctrine, law and Sufism. Political decentralization, advent of Shi'i domination and the waning of Arab hegemony. 4 lecture presentations. Prerequisite: junior standing or permission of instructor.

**HST 314 Middle East: The Ottoman Empire (4)**

The Saljuk Turks and the revival of Sunnism. The Crusades and the Mongol invasion. The Mamluks in Egypt and Syria, the Safavids in Iran and the Ottomans in Anatolia. Developments in Middle Eastern society until the end of the 18th century. 4 lecture presentations. Prerequisite: junior standing or permission of instructor.

**HST 315 Middle East: Problems of the 20th Century (4)**

The Middle East since the collapse of the Ottoman Empire. Western Imperialism. Rise of Arab nationalism and state building. Zionism and Israel. The Arab-Israeli conflict and the Palestine Question. Turkey and Iran. Economic, political, social, and cultural problems of the region. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 317 Ancient Greece (4)**

Aspects of ancient Greece, including the Homeric question, rise of classical Greece; appearance of historiography, tragedy, and other literary forms; Athenian vs. Spartan imperialism; the Socratic problem and the failure of the city-state. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 318 Hellenistic Greece and Republican Rome (4)**

Comparative cultural aspects of Hellenistic Greece and Republican Rome. Impact of Alexander's conquest on Greek Society; Hellenistic scientific, technical and cultural achievements and their influence on Rome. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 319 Imperial Rome (4)**

Political, social and cultural aspects of the Roman Empire. Formation of the empire; provincial governance and economies; rise of bureaucracy



and army; Christian beginnings; intellectual and social developments. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 320 Europe 300-1100: Early Middle Ages (4)**

Cultural, social, intellectual, political, and economic history of Western Europe from A.D. 300 to 1100. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 321 Europe 1100-1450: High and Late Middle Ages (4)**

Cultural, social, intellectual, political, and economic history of Western Europe from 1100 to 1500. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 322 Europe 1450-1648: Renaissance, Reformation, and Wars of Religion (4)**

Europe from the 15th to mid-17th Centuries. Italian city states, Humanism. Origins of European Empires, rise of competitive sovereign states, development of capitalism, breakdown of Christian unity. Cultural achievements of the Renaissance and Reformation, including origins of modern science. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 323 Europe 1648-1789: Enlightenment, Absolutism, and Constitutionalism (4)**

Europe from Treaty of Westphalia to French Revolution: struggle over absolute and constitutional forms of monarchy; origins of liberalism; Atlantic powers' struggle for empire; the Enlightenment; social and economic changes on eve of Industrial Revolution; origins of French Revolution. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 324 Europe 1789-1850: Revolution and Reaction (4)**

Origins, development, and impact of French Revolution and Napoleon on Europe. Revolutions of 1830 and 1848. Impact of early industrialization and revolutionary aspirations on social structure, political systems, and cultural values, including formation of modern ideologies like Marxism. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 325 Europe 1850-1914: Nationalism, Imperialism, and Industrialization (4)**

Europe's world hegemony. Impact of rapid industrialization on social structure, political systems, and cultural values. Impact of unification of Italy and Germany on international system; origins of World War I. Origin of modernism in the arts. Critique of liberalism. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 326 Europe 1900-1945: World Wars and the Crisis of Liberalism (4)**

European imperialism, modernism in the arts, World Wars I and II, the Great Depression, the Holocaust, and the challenge of Fascism, Nazism and Communism to liberal democracy, humanism, and the Enlightenment. 4 lecture discussions.

### **HST 327 Europe Since 1945: Cold War, Unity, and New Order (4)**

Political, economic, and cultural developments in Europe since World War II: the Cold War, ideological conflicts, the economical revival and unification of Western Europe, reemergence of nationalism and regionalism, and the dissolution of communism in East Central Europe. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 331 Pre-Colonial Africa (4)**

Indigenous cultural, political, and economic institutions of African societies. Rise and fall of various ancient African kingdoms; their characteristic cultures, contributions, and problems, from the earliest times to the advent of the colonial era. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 329-Pre-modern History of North Africa**

Pre-Islamic North Africa, its people and culture. Arabization and Islamization. North Africa and Islamic Spain after the rise of Berber dynasties. Contacts with the Mediterranean world and West Africa. Unity and division on the eve of the Ottoman conquest. 4 lecture discussions. Prerequisite: Junior standing or permission of instructor.

### **HST 330-Modern History of North Africa**

North Africa from the Sixteenth century to the present. Political, social and economic transformations from Ottoman rule to French colonialism, nationalism and independence. Problems of decolonization. Islamism, secularism and democracy.

### **HST 332 Colonial Africa (4)**

From earliest contact between Africans and Europeans to dawn of African nationalism. Atlantic slave trade; diaspora to New World; 1884-1885 Berlin Conference and partition of Africa; European colonial policies and African response. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 333 African Nationalism and Decolonization (4)**

Period of trusteeship; emergence of contemporary African nationalist movements; decline of European colonization; African independence; social, political, and economic aspects of contemporary African nations. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 335 Latin America: The Colonial Period (4)**

Latin America from its pre-Columbian origins to the era of the Wars of Independence. Emphasis on the social and cultural factors which characterized the colonial period. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 336 Latin America: The Era of Nation Building (4)**

Latin America during the 19th century (1810-1910) with emphasis on the socio-political factors, which were important in the creation of the Latin American nations. Special focus on the developments of the Rio de la Plata, and the Andean nations. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 337 Latin America: Problems of the 20th Century (4)**

Current problems of Latin America such as land tenure and use; the power elite and their role in society; the Latin American university. Foreign interests in Latin America and their effect on economic and political development. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

### **HST 341 Colonial America (4)**

Native American civilizations and early European colonization efforts up to the Revolutionary War, including conflict and cooperation among diverse groups, the origins of American slavery, and other key formative influences and events. Seminar examination of primary source materials and competing interpretations. 4 one-hour seminars. Prerequisite: HST 201 or HST 202.

**HST 342 America in the Federal Period (4)**

Analysis of origins and content of American revolutionary ideology that formed the Declaration of Independence and Constitution; seminar examination of primary source materials and competing interpretations. 4 seminars. Prerequisite: HST 201 or HST 202.

**HST 343 The Age of Jackson (4)**

Extended analysis of the transformation of America from a revolutionary, republican, homogeneous society to an expansionist, democratic and diverse society; student examination of primary source materials and competing interpretations. 4 one-hour seminars. Prerequisite: HST 201 or HST 202.

**HST 344 Civil War and Reconstruction (4)**

Analysis of origins of the critical years 1860-90 and resulting institutional changes, especially the redefinition of American citizenship and the status and aspirations of African-Americans. Includes student report on primary source materials and competing interpretations. 4 one-hour seminars. Prerequisite: HST 201 or HST 202.

**HST 345 America Comes of Age 1890-1945 (4)**

Analysis of historical events in the United States during the last decade of the 19th century to the conclusion of World War II and examination of selected problems in that period. 4 lecture presentations. Prerequisite: HST 201 or HST 202.

**HST 347 United States since 1945 (4)**

Analysis of critical issues affecting American society, politics, economy, and culture since the end of World War II. Emphasis on primary source materials focusing on the themes of intervention and reaction, change and continuity, and the growing ethnic and cultural diversity of the U.S. population. 4 one-hour seminars. Prerequisite: HST 201 or HST 202.

**HST 351 England to 1689 (4)**

English history to the Civil War. Celtic, Roman, Anglo-Saxon, and Norman foundations. Development of monarchy, parliament, and common law. Nationalism. Renaissance and Reformation, emphasizing Henry VIII and Elizabeth I. First colonial ventures. Causes of the Civil War. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 352 England since 1689 (4)**

England since the Civil War. Development of limited monarchy and oligarchic dominance. Transformations in agriculture, technology, and industry. Constitutional and social reforms. Rise and fall of the Empire. Victorian culture. Socialism and the emergence of the welfare state. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 354 Medieval Russia (to 1700) (4)**

Economic, social, political, and cultural development of the Russian lands to 1700. The first Russian state at Kiev. Appanage Rus and Mongol rule. Development of the Muscovite autocracy. New social and political order of the 17th century. 4 lecture presentations. Prerequisite: junior standing or permission of instructor.

**HST 355 Imperial Russia, 1700-1917 (4)**

Economic, social, political and cultural development of the Russian empire. Reforms of Peter the Great. Consolidation of the bureaucratic empire. Napoleonic and Crimean Wars. Great Reforms, emancipation

and secondary reforms. Revolutionary movement. Industrialization. Revolutions of 1905-1907 and 1917. 4 lecture presentations. Prerequisite: junior standing or permission of instructor.

**HST 356 The Soviet Union (4)**

Bolshevik Revolution, Soviet constitution, development of political institutions, major economic and diplomatic developments since 1917. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 359 East Central Europe (4)**

Economic, social, political, and cultural developments in East Central Europe beginning with the medieval kingdoms and ending with the disintegration of the Communist regimes. Emphasis on historical themes shared by the diverse peoples of this region. 4 lecture presentations. Prerequisites: junior standing or permission of instructor.

**HST 361 Brazil (4)**

Survey of political, social, and economic growth. Focus on the demographic and social movements that created modern Brazil. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 362 Colonial Mexican History (4)**

A survey of the history of Mexico from its Pre-Columbian origins through the initial phases of the struggle for Independence after 1810. 4 lectures/problem-solving. Prerequisite: none.

**HST 363 Mexican History since 1810 (4)**

A survey of the history of Mexico from the end of its Colonial Era to recent times. 4 lectures/problem-solving. Prerequisite: none.

**HST 365 China Since 1949 (4)**

The Chinese Communist movement from 1921 to the present. Emphasis on major political, economic, social, ideological, and international developments. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 370 California (4)**

From Spanish beginnings to the present. Missions and ranchos; the gold rush; railroads; development of agriculture and industry. Politics, water development, education, technology, immigration, minorities, utopias, interaction with nation and world, new life-styles, and contemporary issues. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 371 History of Southern California (4)**

History of Southern California as a distinctive geographical, economic, cultural, social, and political entity. Interrelation of the region with the state, nation, and world. Origins of cities, inhabitants, and institutions of the area. 4 lecture discussions. Prerequisite: HST 370 or permission of instructor.

**HST 374 The American West (4)**

The impact of the West on American democratic ideals and institutions. The role of the trapper, trader, Indian, cowboy, miner, and farmer. The frontier in literature, mythology, and the American conscience. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 375 The American Southwest (4)**

The history of the Southwest from 1848, especially the Anglo impact on the multicultural inhabitants of the region. Economic influences on patterns of life and political behavior; the contemporary struggle for identity of Chicanos. 4 lecture discussions. Prerequisite: upper division standing or permission of instructor.

**HST 390 History and Historians (4)**

Critical and analytical examination of traditional and contemporary approaches to historiography. Short essays and a research paper on a single historian, a particular methodology, or a school of historical interpretation required. 4 seminars. Prerequisite: HST 300 or permission of instructor.

**HST 399 History of Modern Nation States (4)**

Analysis of events and developments that shaped a modern nation state, selected in advance and based on faculty specialization. Topics include cultural achievements, nationalism, regionalism and separatism, ethnic and religious minorities, social class, ideology, modernization, and imperialism. 4 lecture presentations. Prerequisite: junior standing or permission of instructor. May be repeated whenever a different historical period of the nation or a new nation is offered.

**HST 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**HST 401 History of the African American I (4)**

The historical experience and contributions of African Americans from the diaspora through World War I, focusing on the impact and significance of slavery, the Civil War and Reconstruction, the Industrial Revolution, urbanization and World War I. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 402 History of the African American II (4)**

From World War I to the present. The Pan-African movement and its influence upon African American nationalist movements, civil rights, and other current African American movements. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 403 History of the Native American (4)**

Origins of Native Americans; archaeological remains of major North American regions; European contacts and cultural cross-fertilization; development of federal Indian policy; recent and contemporary status; relation of Indian conceptions of the universe to the ecological crisis. 4 lecture discussions.

**HST 405 Immigrants in American Life (4)**

European and Asian immigrants; their role in the contributions to the political, economic, social, and cultural life. Problems of assimilation and the myth of the "melting pot." 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 406 Women in the United States (4)**

Contributions of individual women and women's groups. Their roles in Colonial America, along the moving frontier, in urban reform and organized labor, and in the marketplace. Emphasis on questions of sexual stereotyping and historic legal rights of women. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 409 History of War and American Society (4)**

Examination of the many ways society affects and is affected by war and military institutions, as shown in selected wars. Topics include historical overview, military strategy, perspectives of the "opposition," ethical issues, and healing and reconstruction. 4 seminars. Prerequisite: Hst 201, 202, PLS 201, or permission of instructor.

**HST 410 The Twentieth Century American Political Biography (4)**

Leading American statesmen as seen through the best of their biographers, with the examination of making and unmaking of American heroes and changing fashions in the art of biography. 4 lecture discussions. Prerequisite: PLS 201 and HST 202.

**HST 413 Religion in American History (4)**

Social and theological roots of American religions. Beliefs of Native Americans; contributions of Protestants, Catholics, and Jews. The unique qualities of each tradition and common cultural influences upon each. Recent developments. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 414 Diplomatic History of the United States (4)**

Seminar investigating controversial historical problems in U.S. foreign relations; motivations for policy-decisions; Revolutionary diplomacy; Monroe Doctrine; 19th century imperialism; the World Wars; U.S. and Latin America, East Asia, Europe, the Middle East, Soviet Union. 4 seminars. Prerequisite: Category VI.

**HST 415 American Intellectual History (4)**

Seminar investigating major themes in the intellectual history of the United States, highlighting the latest scholarship and the most pressing issues in today's conversation about the meaning of the American experience. Pertinent topics and influential thinkers from the Founding generation to the present. Prerequisites: HST 202 and PLS 201

**HST 421 The Scientific Revolution (4)**

Study of the revolution in Western man's perception and understanding of nature between the time of Copernicus and Newton. Emergence of science during a time of political, social, and religious upheaval. Relationship to art, the occult, philosophy, and technology. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 425 Great Britain in the Industrial Revolution (4)**

Transformation of the economy, social structure, political and intellectual life, 1783-1914. Effects of industrialization and urbanization; development of democracy, parties, and centralized bureaucracy; social and educational reforms; emergence of socialism and imperialism. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**HST 431 Topics in World Civilization (4)**

In-depth analysis of a specific global historical trend transforming world civilization, such as the emergence of a world system(s); formation of ethnic, racial and national identities; capitalism, colonialism and development; ecological imperialism, religious movements; industrialization and modernization. 4 lecture/presentations. Prerequisite: HST 101 or HST 102 or HST 103, and junior standing or permission of instructor.

**HST 441 Women in Asia (4)**

History of women in 20th-century China, Japan, India, and Southeast Asia. Course themes include: women, family and political economy:

women in traditional and modernizing societies: women, colonialism and nationalism: women, democracy and human rights: and women, ecology and development. 4 lecture presentations.

#### **HST 461 Senior Thesis in History (4)**

Researching a senior thesis in history under faculty supervision. Detailed outline of thesis required, based on extensive research in the sources. 4 units directed research. Prerequisite: HST 300.

#### **HST 462 Senior Thesis in History (4)**

Researching and writing a senior thesis in history under faculty supervision. Formal report required, based on extensive research in the sources. 4 units directed research. Prerequisite: HST 300 and HST 461.

#### **HST 463 Undergraduate Seminar (2)**

Study and discussion by students of recent developments in the students' History major field of focus.

#### **HST 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

#### **HST 510 Teaching History (4)**

Internship in teaching a history class. Includes mentor experience in all aspects of teaching and classroom preparation, study of different teaching and assessment techniques. Prerequisite: graduate standing.





## HUMANITIES

George Stavros, Chair, English and Foreign Languages

The major in Humanities explores humanistic culture, its origins, values, and changing status. It seeks to define humanistic activity within its varied and traditional settings: not only in the visual, musical, literary, and other arts, but also in their theoretical foundations in political, religious, philosophical, and other thought.

Like the humanities themselves, the curriculum is necessarily cross-disciplinary, multi-dimensional, open-ended. It fosters critical inquiry into the problematical situation of humanistic enterprise itself in a contemporary world in which technology, multiculturalism, social and political conflict, and other urgent realities all enter competing claims. At the same time, the major in Humanities prepares students to reflect resourcefully on the nature and values of their own humanist assumptions.

The curriculum combines breadth with depth. In the core, survey courses in world literature and the study of the humanities provide preparation for more intensive study within a single 24-unit emphasis. Allowing broad choices among courses in a variety of related disciplines—including Anthropology, Art, English and Foreign Languages, Ethnic and Women's Studies, History, Music, Philosophy, Sociology, and Theatre—each of these emphases lists courses (specified below) relative to a given focus. Emphases from which to choose are as follows: the North American Experience; European; Black/African-American; Hispanic/American; Asian/American; Women; Forms of Order, Organization, and Action in the Contemporary World.

Focus is further provided by 4 units of study in 200-level foreign language or literature, by a 76-unit general education curriculum including the 32-unit Interdisciplinary General Education Program, and by 12 units of culminating writing and coursework, including Senior Paper (ENG 461, 462). Choice of a minor, if the student elects, is facilitated by 34 units of unrestricted electives.

The Humanities major is designed for students whose main goal as undergraduates is the acquisition of liberal education as well as for those preparing for a career in law, business, or other fields, or for graduate or professional school.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Introduction to the Humanities	HUM	201	(4)
History and Ideas of Humanism and the Humanities	HUM	202	(4)
World Literature I	ENG	217	(4)
World Literature II	ENG	218	(4)
Foreign Language (satisfactory completion of a 200-level course)			(4)
Advanced Expository Writing	ENG	303	(4)
The 19th-Century European Novel or The Novel in the Modern World	ENG	457	(4)
	ENG	458	

Choice of 1 course from each of these groups: (16)

A. Language and Human Behavior	ENG	313
Race and Gender in Modern Literature	ENG	345
Literary Theory	ENG	350
Modernism and Postmodernism	ENG	451
B. Philosophy of the Arts	PHL	301

Moral Philosophy	PHL	309
History of Ancient Philosophy	PHL	312
History of Medieval Philosophy	PHL	313
History of Modern Philosophy	PHL	314
Contemporary Philosophy	PHL	315
C. Ancient Greece	HST	317
Renaissance, Reformation, and Wars of Religion	HST	322
The Scientific Revolution	HST	421
D. Language and Culture	ANT	353
Cultures in Performance: Human Expression in Cross-Cultural Perspective	ANT	356
Social Anthropology	ANT	358
Anthropology of Religion	ANT	360

(Please note: some of the courses above also appear as options in the emphasis areas of the core of the humanities major. When a course is listed in both places, it may not be used to satisfy both this requirement and the 24-unit requirement of the emphasis area.)

Choice of 6 courses (24 units), not more than 2 within a single department, within any ONE of the following Emphasis areas (full listings given at end of curriculum): (1) The North American Experience (including Native American); (2) The European Experience (including Classical and England); (3) The Black/African American Experience; (4) The Hispanic American Experience; (5) The Asian American Experience; (6) The Experience of Women; (7) Forms of Order, Organization, and Action in the Contemporary World

Senior Paper	ENG	461	(2)
Senior Paper	ENG	462	(2)
Two approved upper-division Special Topics courses, seminars, or Cooperative Education projects (8 units)			

### GENERAL EDUCATION COURSES

Participation in the Interdisciplinary General Education (IGE) Program, for 32 units of credit, is required of freshmen entering the University in the Humanities major. Transfer students or students who wish to follow Track B of the General Education Program should consult a department faculty advisor.

Consciousness and Community	IGE	120	(4)
Rationalism and Revelation	IGE	121	(4)
Authority and Faith	IGE	122	(4)
Culture and Contact	IGE	220	(4)
Reform and Revolution	IGE	221	(4)
Individualism and Collectivism	IGE	222	(4)
Promise and Crisis	IGE	223	(4)
Connections Seminar	IGE	224	(4)

#### Area 1:

Advocacy and Argument	COM	204	(4)
Freshman English II	ENG	105	(4)

#### Area 2:

Select from university approved GE list, Track B. (16)

#### Area 3:

Any course from A, B, C, D, and F			(4)
3e Introduction to Cultural Anthropology	ANT	102	(4)
3g requirement satisfied by IGE sequence			

#### Area 4:

Requirement satisfied by IGE sequence

#### Area 5:

Any two courses from list (8)

**UNRESTRICTED ELECTIVES (34 units)**

**EMPHASES:** 24 units in the core curriculum (above) are to be taken in any ONE of the following 7 Emphases. Not more than 2 courses may be taken in the same department. Courses, especially FL, may require prerequisites. Students are responsible for meeting all prerequisites. The total curriculum must include 60 units of upper division courses.

**Emphasis: The North American Experience**

(Including Native American Experience)

Native Peoples of California	ANT	320
Native Peoples of North America	ANT	321
Varieties of American Culture	ANT	333
Art of the United States	ART	310
Economic History of the United States	EC	409
American Renaissance	ENG	452
American Realism	ENG	454
Twentieth Century American Literature	ENG	456
Native American Experience	EWS	203
Native American Contemporary Issues	EWS	403
Ethnic Thought and Values	EWS	430
Ethnic Thought and Values	EWS	431
U.S. and Canada Geography	GEO	350

Not more than 2 History courses, 200-level and above, concerned with the history of North America and the United States

Role of Sport in Contemporary Society	KIN	450
Introduction to Jazz Styles	MU	110
American Indian Thought and Religion	PHL	307
American Philosophy	PHL	320
American State and Local Politics	PLS	328
American Political Thought	PLS	433
Contemporary Social Problems	SOC	301
Contemporary American Scene	SSC	401
Twentieth Century American Theatre	TH	410

**Emphasis: The European Experience**

(Including Classical and England)

Foundations of Modern Art	ART	312
Contemporary Art	ART	313
Art of the Ancient Near East	ART	315
Art of the Classical World	ART	316
Art of the Middle Ages	ART	317
Art of the Italian Renaissance	ART	318
Economic History of Europe	EC	413

Not more than 2 upper-division ENG courses concerned with the literature of England or continental Europe (other than ENG 457 or 458)

French Civilization	FL	307
Contemporary France	FL	308
German Civilization	FL	317
Spanish Civilization	FL	352
Spanish Golden Age Literature	FL	356
Europe: Land and People	GEO	359

Not more than 2 upper-division History courses concerned with the history of Europe (including eastern Europe and Russia)

History of Music to 1750	MU	404
History of Music 1750 to 1900	MU	405
History of Twentieth Century Music	MU	406

Not more than 2 Philosophy courses from the following: PHL 203, 306, 312, 313, 314, 315, 318, 319, 469

Introduction to Political Thought	PLS	204
Ancient and Medieval Political Thought	PLS	431
Modern Political Thought	PLS	432
Comparative European Governments and Politics	PLS	441
Government and Politics of the Russian Republic	PLS	447
History of the Theatre I	TH	311
History of the Theatre II	TH	312
History of the Theatre III	TH	313

**Emphasis: The Black/African American Experience**

History of Tribal Arts	ART	211
Economics of Underrepresented Groups	EC	497
Black Literature in America	ENG	205
African American Experience	EWS	201
Ethnic Women	EWS	390
African American Contemporary Issues	EWS	401
Gender, Ethnicity, and Class	EWS	420
Ethnic Thought and Values	EWS	430
Ethnic Thought and Values	EWS	431
Geography of Africa	GEO	358
Pre-Colonial Africa	HST	331
Colonial Africa	HST	332
African Nationalism and Decolonization	HST	333
Civil War and Reconstruction	HST	344
History of the African American I	HST	401
History of the African American II	HST	402
Introduction to Jazz Styles	MU	110
American Ethnic Politics	PLS	323
Comparative Sub-Saharan African Governments and Politics	PLS	442
Ethnic Relations in America	SOC	320
Sociology of Minority Communities	SOC	323

**Emphasis: The Hispanic American Experience**

Art of Mexico, Central and South America	ART	314
Economics of Underrepresented Groups	EC	497
Latino Literature in America	ENG	215
Chicano/Latino Experience	EWS	202
The Ethnic Woman	EWS	390
Chicano/Latino Contemporary Issues	EWS	402
Gender, Ethnicity, and Class	EWS	420
Ethnic Thought and Values	EWS	430
Ethnic Thought and Values	EWS	431
Hispanic and American Indian Folklore of the Southwest	FL	255
Literature of Mexico	FL	351
Latin American Civilization	FL	353
Contemporary Latin American Civilization	FL	354
Survey of Spanish-American Literature	FL	355
Geography of Latin America	GEO	352
Latin America: The Colonial Period	HST	335
Latin America: The Era of Nation Building	HST	336
Latin America: Problems of the 20th Century	HST	337
Brazil	HST	361
Mexico	HST	362
California	HST	370
History of Southern California	HST	371
The American Southwest	HST	375
Music of Mexico	MU	311
American Ethnic Politics	PLS	323

Comparative Latin American Governments and Politics . . . . .	PLS	444
U.S.-Latin American Relations . . . . .	PLS	454
Ethnic Relations in America . . . . .	SOC	320
Sociology of Minority Communities . . . . .	SOC	323

#### Emphasis: The Asian American Experience

History of Asian Art . . . . .	ART	216
Economics of Underrepresented Groups . . . . .	EC	497
Asian American Experience . . . . .	EWS	204
The Ethnic Woman . . . . .	EWS	390
Asian American Contemporary Issues . . . . .	EWS	404
Gender, Ethnicity, and Class . . . . .	EWS	420
Ethnic Thought and Values . . . . .	EWS	430
Ethnic Thought and Values . . . . .	EWS	431
Geography of Asia . . . . .	GEO	357
East Asia to 1800 . . . . .	HST	301
East Asia in 19th Century . . . . .	HST	302
East Asia in 20th Century . . . . .	HST	303
Ancient and Medieval India . . . . .	HST	305
Modern India . . . . .	HST	306
South Asia . . . . .	HST	307
Modern Southeast Asia . . . . .	HST	309
Middle East: Rise of Islam . . . . .	HST	313
Middle East: Ottoman Empire . . . . .	HST	314
Middle East: 20th Century . . . . .	HST	315
China since 1949 . . . . .	HST	365
Immigrants in American Life . . . . .	HST	405
Philosophy and Religion of Japan . . . . .	PHL	401
Philosophy and Religion of China . . . . .	PHL	402
Philosophy and Religion of India . . . . .	PHL	403
American Ethnic Politics . . . . .	PLS	323
Comparative East Asian Governments and Politics . . . . .	PLS	448
Comparative Southeast Asian Governments and Politics . . . . .	PLS	449
Ethnic Relations in America . . . . .	SOC	320
Sociology of Minority Communities . . . . .	SOC	323
Asian-American Experience in the United States . . . . .	SSC	301

#### Emphasis: The Experience of Women

The Anthropology of Gender . . . . .	ANT	405
Women and Men: Changing Sex Roles . . . . .	BHS	328
Women Writers . . . . .	ENG	240
Introduction to the Study of Women and Men in Society . . . . .	EWS	145
U.S. Women in Contemporary Global Context . . . . .	EWS	380
Ethnic Women . . . . .	EWS	390
Gender, Ethnicity, and Class . . . . .	EWS	420
Female and Ethnic Development . . . . .	EWS	440
Women in the United States . . . . .	HST	406
History of Women in Sport . . . . .	KIN	469
Women and Politics in America . . . . .	PLS	425

#### Emphasis: Forms of Order, Organization, and Action in the Contemporary World

Varieties of American Culture . . . . .	ANT	333
Environment, Technology and Culture . . . . .	ANT	350
Development Anthropology . . . . .	ANT	352
Cultural Areas of the World . . . . .	ANT	399
Contemporary Art . . . . .	ART	313
Intercultural Communication . . . . .	COM	327
Human Communication Theory . . . . .	COM	328
Communication Ethics . . . . .	COM	401
Public Opinion, Propaganda, and the Mass Media . . . . .	COM	413

Seminar in Land Economics . . . . .	EC	419
Seminar in Urban Economics . . . . .	EC	432
Seminar in Environmental Economics . . . . .	EC	435
Industrial Organization . . . . .	EC	440
Economic Geography . . . . .	GEO	312
Legal and Political Geography . . . . .	GEO	313
Urban Geography . . . . .	GEO	315
United States since 1945 . . . . .	HST	347
History of Modern Nation States . . . . .	HST	399
The Scientific Revolution . . . . .	HST	421
Great Britain and the Industrial Revolution . . . . .	HST	425
Modern Religious Trends . . . . .	PHL	306
Moral Philosophy . . . . .	PHL	309
Philosophical Issues in the Law . . . . .	PHL	420
Bioethics . . . . .	PHL	433
Social Philosophy . . . . .	PHL	480
Public Administration . . . . .	PLS	314
Politics of Public Policy . . . . .	PLS	315
Business and Public Policy . . . . .	PLS	318
Politics of Developing Areas . . . . .	PLS	342
Twentieth-Century Political Thought . . . . .	PLS	436
Psychology of Politics . . . . .	PLS	438
International Organization . . . . .	PLS	453
Social Psychology . . . . .	PSY	401
Principles of Behavioral Management . . . . .	PSY	450
Contemporary Social Problems . . . . .	SOC	301
Social Organization . . . . .	SOC	310
Family as a Social Institution . . . . .	SOC	321
Collective Behavior and Social Movements . . . . .	SOC	350
Urban Sociology . . . . .	SOC	401
Contemporary American Scene . . . . .	SSC	401

#### COURSE DESCRIPTIONS

##### HUM 201 Introduction to the Humanities (4)

Introduction to concepts and practices of the humanities, with emphasis on the condition of the humanities and humanist ideals in the modern era. Overview of traditional humanism. Selected philosophical, artistic, and literary texts. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

##### HUM 202 History and Ideas of Humanism and the Humanities (4)

The history and ideas of humanism and the humanities, from the ancient Greeks through the 19th century. Selected philosophical, artistic, and literary texts. 4 lecture presentations. Prerequisite: ENG 104 or equivalent.

## KINESIOLOGY AND HEALTH PROMOTION

The Department of Kinesiology and Health Promotion offers a bachelor of science and a master of science degree in kinesiology.

Priscilla F. Stromer, Chair

Stanley L. Bassin	Barbara H. Ford
Kristine Brown	Michele K. Le Blanc
Bruce Coulter	Gregory H. Marks
Roy C. Easley	G.S. Don Morris
George Eisen	Wanda Rainbolt
	Leo H. Teghtmeyer

The department offers an undergraduate curriculum divided into two options, pedagogy and sports medicine, which are designed to meet a variety of student needs and interests. Within each option there are three different tracks from which students may choose, depending on their career goals and interests.

The tracks in the pedagogy option include secondary, elementary, and adapted physical education. In addition to obtaining the bachelor's degree, most students who elect the pedagogy option will obtain a California teaching credential which will qualify them to teach physical education in the state's public and private schools at either the elementary or secondary level. Those who elect the adapted physical education track will become qualified to obtain the adapted physical education specialist credential. The department also provides selected coursework which qualifies students with a major other than kinesiology to earn a physical education teaching credential (a supplementary authorization). Students may prepare themselves to coach athletic teams by selecting appropriate courses.

The three tracks in the sports medicine option are athletic training, exercise science and allied health, and health promotion. The curriculum in the athletic training track is designed to prepare students to work as a trainer for athletic teams at the school, college, or the professional level or in medical clinics which deal with the care and prevention of sports-related injuries and medical problems. By completing this curriculum they can qualify to take the certification exam offered by the National Athletic Trainers' Association. The exercise science and allied health track prepares students for advanced degree programs in exercise science or for entrance to professional schools in such areas as physical therapy, physician's assistant, or medicine. The health promotion track is designed for those students interested in planning, conducting, and managing various health promotion activities and programs in a variety of settings such as public and private clubs, corporate programs, health agencies and medical facilities.

In addition to serving its own majors, the department's curriculum provides required and elective courses in kinesiology and health to meet the educational needs of students throughout the University.

The department also offers a curriculum which leads to a Master of Science degree in kinesiology. A description of this program can be found in the "Graduate Studies" section of this catalog.

### PHYSIOLOGY MINOR

The physiology minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students to facilitate their pursuit of careers in biomedical fields which utilize a knowledge of physiology. It is particularly appropriate for students in the sports medicine option. A full description of the minor is located in the University Programs section of this catalog.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Anatomical Kinesiology	.KIN	302	(4)
Physiology of Exercise	.KIN	303/303L	(3/1)
Biomechanical Kinesiology	.KIN		(3/1)
Tests and Measurements in Physical Education	.KIN	425/425A	(3/1)
Human Anatomy	.ZOO	234/234L	(2/2)
Human Physiology	.ZOO	235/235L	(3/1)
Designated Emphasis			(78-98)

### GENERAL EDUCATION COURSES

(Required of all students)

#### Area 1:

A. Freshman English	.ENG	104	(4)
B. Select one course			(4)
C. Select one course			(4)

#### Area 2:

A. Select one course			(4)
B. Fundamentals of Chemistry	.CHM	103	(4)
or General Chemistry and	.CHM	121	
General Chemistry Lab	.CHM	121L	
or Fundamentals of Physics	.PHY	102	
or Fundamentals of Earth Science	.GSC	101	
C. Basic Biology	.BIO	115/115L	(3/2)
D. Select one course			(4)

#### Area 3:

A. Introduction to Dance	.DAN	202	(4)
B. Introduction to Philosophy	.PHL	201	(4)
or Ethics	.PHL	204	
or Business and Professional Ethics	.PHL	205	
C. Select one course			(4)
D. Select one course			(4)
E. Select one course			(4)
F. Select one course			(4)
G. Health, Nutrition, and the Integrated Being	.KIN/FN	203	(4)
or General Psychology	.PSY	201	(4)

#### Area 4:

Introduction to American Government	.PLS	201	(4)
United States History	.HST	202	(4)

#### Area 5:

Upper Division. Select 8 units from approved list.

### PEDAGOGY OPTION

(Required of all students in the Pedagogy Option)

Introduction to Kinesiology	.KIN	201	(4)
Field Work for Prospective			
Physical Education Teachers	.KIN	204/204A	(1/2)
First Aid	.KIN	205/205A	(2/1)
Introduction to Adapted Physical Education	.KIN	206	(3)
History of Physical Education and Sport	.KIN	210	(4)
Philosophy of Physical Education	.KIN	310	(3)
Life Span Motor Development	.KIN	312/312A	(3/1)
Developmental Movement for Children	.KIN	328/328A	(2/1)
Computer Applications in Kinesiology	.KIN	375/375A	(2/2)
Movement Analysis	.KIN	414/414A	(2/1)
Management Principles Kinesiology and Sport	.KIN	420	(4)
Motor Learning and Human Performance	.KIN	430/430L	(3/1)



The Physical Education Curriculum .....	KIN	440	(4)
Senior Seminar .....	KIN	463	(4)
or Senior Project .....	KIN	461	(2)
and Senior Project .....	KIN	462	(2)
Contemporary Nutrition .....	FN	205	(4)

Students in the Pedagogy Option must complete the courses listed in one of the following tracks:

**Single Subject Track**

Folk and Square Dance Theory .....	KIN	217/217A	(2/1)
Basketball Theory for Teachers .....	KIN	250/250A	(1/1)
Soccer Theory for Teachers .....	KIN	252/252A	(1/1)
Softball Theory for Teachers .....	KIN	254/254A	(1/1)
Volleyball Theory for Teachers .....	KIN	256/256A	(1/1)
Gymnastics and Tumbling Theory for Teachers ..	KIN	260/260A	(1/1)
Racket Sports Theory for Teachers .....	KIN	262/262A	(1/1)
Swimming Theory Theory for Teachers .....	KIN	264/264A	(1/1)
Track and Field Theory for Teachers .....	KIN	266/266A	(1/1)
Weight-Training and Aerobic Exercise Theory for Teachers .....	KIN	268/268A	(1/1)
Psychological Aspects of Physical Activity and Sport .....	KIN	363	(4)
Secondary School Health Education .....	KIN	442	(3)
Role of Sport in Contemporary Society .....	KIN	450	(4)

**Elementary Track**

Psychological Aspects of Physical Activity and Sport .....	KIN	363	(4)
Motor Assessment for Individuals with Disabilities .....	KIN	401/401A	(3/1)
Rhythms and Dance for Movement Education ..	KIN	404/404A	(2/1)
Adapted Physical Education Fieldwork .....	KIN	405/405A	(2/1)
Developmental Games for Children .....	KIN	415/415A	(2/1)
Developmental Gymnastics for Children .....	KIN	416/416A	(2/1)
Elementary School Health Education .....	KIN	441	(3)
Role of Sport in Contemporary Society .....	KIN	450	(4)

Select 9 units from the following:

Folk and Square Dance Theory .....	KIN	217/217A	(2/1)
Basketball Theory for Teachers .....	KIN	250/250A	(1/1)
Soccer Theory for Teachers .....	KIN	252/252A	(1/1)
Softball Theory for Teachers .....	KIN	254/254A	(1/1)
Volleyball Theory for Teachers .....	KIN	256/256A	(1/1)
Gymnastics and Tumbling Theory for Teachers ..	KIN	260/260A	(1/1)
Racket Sports Theory for Teachers .....	KIN	262/262A	(1/1)
Swimming Theory Theory for Teachers .....	KIN	264/264A	(1/1)
Track and Field Theory for Teachers .....	KIN	266/266A	(1/1)
Weight-Training and Aerobic Exercise Theory for Teachers .....	KIN	268/268A	(1/1)

**Adapted Track**

Psychological Aspects of Physical Activity and Sport .....	KIN	363	(4)
or Role of Sport in Contemporary Society .....	KIN	450	(4)
Motor Assessment for Special Populations .....	KIN	401/401A	(3/1)
Adapted Physical Education Fieldwork .....	KIN	405/405A	(2/1)
(repeat course once)			
Physical Education for Orthopedically and Health-Impaired .....	KIN	406/406A	(3/1)
Physical Activity for Individuals with Severe Disabilities .....	KIN	410/410A	(3/1)
Elementary School Health Education .....	KIN	441	(3)

Select 9 units from the following:

Folk and Square Dance Theory .....	KIN	217/217A	(2/1)
Basketball Theory for Teachers .....	KIN	250/250A	(1/1)
Soccer Theory for Teachers .....	KIN	252/252A	(1/1)
Softball Theory for Teachers .....	KIN	254/254A	(1/1)
Volleyball Theory for Teachers .....	KIN	256/256A	(1/1)
Gymnastics and Tumbling Theory for Teachers ..	KIN	260/260A	(1/1)
Racket Sports Theory for Teachers .....	KIN	262/262A	(1/1)
Swimming Theory for Teachers .....	KIN	264/264A	(1/1)
Track and Field Theory for Teachers .....	KIN	266/266A	(1/1)
Weight-Training and Aerobic Exercise Theory for Teachers .....	KIN	268/268A	(1/1)

Select 6 units from the following:

Rhythms and Dance for Movement Education ..	KIN	404/404A	(2/1)
Developmental Games for Children .....	KIN	415/415A	(2/1)
Developmental Gymnastics for Children .....	KIN	416/416A	(2/1)

**SPORTS MEDICINE OPTION**

(Required of all students in the Sports Medicine Option)

First Aid .....	KIN	205/205A	(2/1)
Introduction of Athletic Training .....	KIN	240/240A	(2/1)
Lifespan Motor Development .....	KIN	312/312A	(3/1)
Management of Athletic Injuries .....	KIN	340/340A	(3/1)
Physiology of Exercise II .....	KIN	403/403L	(3/1)
Principles of Health/Fitness Programs .....	KIN	453	(3)
Sports Medicine .....	KIN	455	(4)
Exercise Metabolism and Weight Control .....	KIN	456	(3)
Senior Project .....	KIN	461/462	(2/2)

Students in the Sports Medicine Option must complete the courses listed in one of the following tracks.

**Athletic Training Track**

Drug Education .....	KIN	308	(4)
Psychological Aspects of Physical Activity and Sport .....	KIN	363	(4)
Computer Applications in Kinesiology .....	KIN	375/375A	(2/2)
Management Principles Kinesiology and Sport ..	KIN	420	(4)
Motor Learning and Human Performance .....	KIN	430/430L	(3/1)
Advanced Athletic Training .....	KIN	433	(3)
Athletic Training Therapy and Modalities .....	KIN	435/435A	(2/1)
Athletic Training Practicum .....	KIN	437A	(2)
Contemporary Nutrition .....	FN	205	(4)

Select 14 units from the following:

Introduction to Kinesiology .....	KIN	201	(4)
Introduction to Adapted Physical Education ..	KIN	206	(3)
History of Physical Education and Sport .....	KIN	210	(4)
Philosophy of Physical Education .....	KIN	310	(3)
Stress Management for Healthy Living .....	KIN	370	(4)
Physical Education for Orthopedically and Health-Impaired .....	KIN	406/406A	(3/1)
Role of Sport in Contemporary Society .....	KIN	450	(4)
Senior Seminar .....	KIN	463	(4)

**Exercise Science and Allied Health Track**

Vertebrate Zoology .....	ZOO	138/138L	(3/2)
Basic Microbiology .....	MIC	201/201L	(3/2)
Genetics .....	BIO	303	(4)
Cell, Molecular, and Developmental Biology ..	BIO	310	(4)

College Physics	PHY	121,2,3	(3)(3)(3)
College Physics Laboratory	PHY	141,2,3L	(1)(1)(1)
General Chemistry	CHM	122, 123	(3)(3)
General Chemistry Laboratory	CHM	122L, 123L	(1)(1)
Elements of Organic Chemistry	CHM	201/250L	(3/1)
Elements of Biochemistry	CHM	321/321L	(3/1)
Nutrition	FN	235/236L	(3/1)
Principles of Behavior Management	PSY	450	(4)

Select 12 units from the following:

Motor Learning and Human Performance	KIN	430/430L	(3/1)
Advanced Athletic Training	KIN	433	(3)
Athletic Training Therapy and Modalities	KIN	435/435A	(2/1)
Exercise Physiology Fieldwork	KIN	458/458A	(1/2)
Advanced Nutrition	FN	433	(4)
Advanced Nutrition	FN	434	(4)
Nutritional Assessment Methods	FN	435/435L	(1/1)
Biometrics	BIO	211	(3)
Human Embryology	ZOO	415	(4)
General Epidemiology	MIC	330	(4)
Hematology	MIC	444/444L	(3/1)
Human Relations	PSY	314/314A	(3/1)
Abnormal Psychology	PSY	415	(4)
Basic Counseling	PSY	417/417A	(3/1)

### Health Promotion Track

Psychological Aspects of Physical Activity and Sport	KIN	363	(4)
Stress Management for Healthy Living	KIN	370	(4)
Computer Applications in Kinesiology	KIN	375/375A	(2/2)
Exercise Physiology Fieldwork	KIN	458/458A	(1/2)
Health/Fitness Instructor	KIN	459	(3)
Contemporary Nutrition	FN	205	(4)
Nutrition of the Life Cycle	FN	335	(4)
Principles of Behavioral Management	PSY	450	(4)
Report Writing	COM	216	(4)
or Writing for the Professions	ENG	301	(4)

Select 15 units from the following:

Introduction to Kinesiology	KIN	201	(4)
Introduction to Adapted Physical Education	KIN	206	(3)
History of Physical Education and Sport	KIN	210	(4)
Motor Learning and Human Performance	KIN	430/430L	(3/1)
Role of Sport in Contemporary Society	KIN	450	(4)

Select 12 units from the following:

Management Principles Kinesiology and Sport	KIN	420	(4)
Principles of Management	MHR	301	(4)
Human Resources Management	MHR	311	(4)
Principles of Marketing Management	IBM	301	(4)
Marketing of Services	IBM	316	(4)
Marketing for Small Business Organizations	IBM	404	(4)
Accounting for Decision-Making I	ACC	204	(4)

### COURSE DESCRIPTIONS

NOTE: KIN 100A-169A and KIN 179A courses may be repeated for additional credit as long as normal academic progress is maintained, and may be taken on a credit/no credit basis. On the first class day of each new quarter all activity classes meet in the main gymnasium, Building 43.

### KIN 100A Adaptive Activities (1)

Activity programs designed to meet the needs of students who do not participate in regular physical education activity classes. Will aid students with special needs (permanent or temporary) to achieve physical, mental, emotional and social growth. 2 hours activity.

### KIN 101A Backpacking (1)

Basic techniques of backpacking including instruction in equipment, map and compass reading, food selection, physical conditioning, safety, and trail etiquette. Activities involve day and overnight field trips. 2 hours activity.

### KIN 102A Basketball (1)

Instruction in basketball skills, techniques, rules, offensive and defensive strategies, and team play. 2 hours activity.

### KIN 105A Bicycling (1)

Basic techniques in bicycling including instruction in the purchase, care, and adjustment of equipment for both road and off-road riding, and bicycling safety. Field trips on local cycle trails. Students must furnish bicycle and helmet. 2 hours activity.

### KIN 106A Bowling (1)

Instruction and skill development including techniques, strategies, scoring, and equipment. Held at off-campus facility. Fee required. 2 hours activity.

### KIN 111A Social Dance (1)

Knowledge and instruction in social/ballroom dancing, and skill development for dances such as line dancing, country western, waltz, swing, and selected Latin dances. 2 hours activity.

### KIN 114A Aerobic Exercise (1)

Concepts and performance of aerobic dance exercise including techniques for variable intensity and impact levels, and an introduction to methods and benefits of cardiovascular conditioning for healthier living. 2 hours activity.

### KIN 115A Step Aerobics (1)

Concepts and performance of aerobic exercise utilizing a step apparatus. An effective aerobic modality for individuals preferring low impact exercise. Includes an introduction to methods and benefits of cardiovascular conditioning for healthier living. 2 hours activity.

### KIN 119A Jogging (1)

Use of jogging to develop and maintain cardiorespiratory fitness. Involves instruction and practice in the techniques of jogging as well as instruction dealing with the physiological and health benefits of vigorous aerobic activity. 2 hours activity.

### KIN 120A Beginning Aikido (1)

Instruction and skill development in the basic 21 Aikido exercises. 2 hours activity.

### KIN 121A Intermediate Aikido (1)

Intermediate level of instruction and skill development in Aikido. 2 hours activity.

**KIN 123A Karate (1)**

Instruction and skill development in the basic karate movements. Physical and mental aspects of karate, including basic strategies for personal defense. 2 hours activity.

**KIN 124A Ski Conditioning (1)**

Off-season conditioning activities emphasizing leg and cardiovascular fitness necessary for cross-country and downhill skiing. 2 hours activity.

**KIN 126A Soccer (1)**

Instruction in the skills, techniques, and rules of soccer including offensive and defensive strategies, and team play. 2 hours activity.

**KIN 128A Softball (1)**

Instruction in the skills, techniques, and rules of softball including offensive and defensive strategies, and team play. 2 hours activity.

**KIN 129A Springboard Diving (1)**

Techniques, skills, knowledge, safety, and competitive rules of springboard diving. 2 hours activity.

**KIN 131A Tumbling and Trampoline (1)**

Instruction on the fitness value of the activities of tumbling and trampoline. Application of basic principles of biomechanics. Participants will acquire the ability to perform beginning and intermediate stunts and will understand the components of health-related fitness. 2 hours activity.

**KIN 133A Racquetball (1)**

Instruction in fundamental skills, strategies, safety, and court etiquette for racquetball. Cardiovascular and muscular endurance conditioning, hand-eye motor fitness coordination. 2 hours activity.

**KIN 136A Skiing (1)**

Basic techniques of downhill skiing, including skill development, conditioning activities, safety procedures, and selection and care of equipment. Fee is required to cover cost of field-trips to local ski areas. 2 hours activity.

**KIN 145A Beginning Archery (1)**

Instruction in the basic techniques, principles and skills involved in recreational and competitive archery including safety precautions, proper form, scoring, and history of the sport. 2 hours activity.

**KIN 147A Beginning Badminton (1)**

Development of an appreciation for recreational and competitive badminton. Basic strokes, shots, rules, and strategies for beginning singles and doubles play. 2 hours activity.

**KIN 148A Advanced Badminton (1)**

Development of consistency in stroke production, comprehensive understanding of the badminton rules, and knowledge of the basic principles of strategy during game play. 2 hours activity.

**KIN 157A Beginning Golf (1)**

Basic fundamentals of golf including swing, club selection, putting, etiquette, rules, history, equipment, and playing strategies. 2 hours activity.

**KIN 158A Advanced Golf (1)**

Advanced stroke practice, establishing handicaps, and tournament formats. Held at off-campus facility. Fee required. 2 hours activity.

**KIN 159A Beginning Gymnastics (1)**

Instruction on parallel bars, uneven parallel bars, vaulting, balance beam, and horizontal bars stressing beginning level movements. Emphasis on how components of health-related fitness are developed through these activities. History of gymnastics as it evolved from military training into a competitive sport. 2 hours activity.

**KIN 161A Beginning Swimming (1)**

Basic swimming and safety skills for non-swimmers. Orientation to the water, floating, front and back kicking, arm strokes, and rhythmic breathing. Safety skills include treading water, survival float, and general pool safety. 2 hours activity.

**KIN 162A Advanced Swimming (1)**

Emphasis on stroke development and breathing coordination. Strokes include elementary backstroke, breaststroke, butterfly, freestyle (crawl strokes), and selected prelifediving strokes. 2 hours activity.

**KIN 163A Beginning Volleyball (1)**

Basic fundamentals of volleyball including the serve, passing, spiking, offensive and defensive strategies, rules, and team play. 2 hours activity.

**KIN 164A Advanced Volleyball (1)**

Advanced instruction and practice in serving, passing, digging, blocking, spiking, shoulder rolls, and diving. Emphasis placed on advanced offensive and defensive strategies and team play for participation at the tournament competition level. 2 hours activity.

**KIN 165A Beginning Weight Training (1)**

Instruction in basic concepts involving the muscular system and its function in weight training exercise. Includes skill development through use of weight-training exercises to develop muscular strength and muscular endurance. 2 hours activity.

**KIN 166A Advanced Weight Training (1)**

Advanced concepts involving the muscular system and its function in weight training exercise. Includes the use of free weights to develop muscular strength and muscular endurance. 2 hours activity.

**KIN 167A Beginning Tennis (1)**

Instruction and skill development in basic strokes including forehand and backhand drives, volley, and serve. Rules, scoring, and court etiquette. 2 hours activity.

**KIN 168A Intermediate Tennis (1)**

Instruction and stroke development for forehand and backhand drives, a variety of serves, and overhead strokes. Emphasis on topspin, backspin, and strategy at the intermediate level. 2 hours activity.

**KIN 169A Advanced Tennis (1)**

Introduction of advanced skills and stroke development for preparation toward participation at the tournament competition level. 2 hours activity.

**KIN 172 Physical Activity for Healthier Living (1)**

Integrated approach to healthy and active lifestyles, including fitness component assessment methods, goal-setting principles, health



behaviors, and programming appropriate individualized activities which contribute to life-long health and wellness. 1 hour lecture discussion.

#### **KIN 173A Fitness Activities for Healthier Living (1)**

An optional activity to accompany KIN 172. Self-assessment, allowing for the application of knowledge and skills introduced in KIN 172. Participation in a variety of fitness activities designed to carry out lifestyle strategies for optimal fitness and health. 2 hours activity.

#### **KIN 174A Sports Activities for Healthier Living (1)**

An optional activity to accompany KIN 172. Self-assessment, allowing for the application of knowledge and skills introduced in KIN 172. Participation in a variety of sports activities designed to carry out lifestyle strategies for optimal fitness and health. 2 hours activity.

#### **KIN 175A Aquatic Activities for Healthier Living (1)**

An optional activity to accompany KIN 172. Self-assessment, allowing for the application of knowledge and skills introduced in KIN 172. Participation in a variety of aquatic activities designed to carry out lifestyle strategies for optimal fitness and health. 2 hours activity.

#### **KIN 176A Recreational Activities for Healthier Living (1)**

An optional activity to accompany KIN 172. Self-assessment, allowing for the application of knowledge and skills introduced in KIN 172. Participation in a variety of recreational activities designed to carry out lifestyle strategies for optimal fitness and health. 2 hours activity.

#### **KIN 179A General Activity (1)**

Instruction in a variety of activities for the development of skill, knowledge, and health-related fitness. 2 hours activity.

#### **KIN 181-195 Competitive Athletics (2)**

May be taken by those students who compete on an intercollegiate athletic team and may be repeated for additional credit as long as normal academic progress is maintained.

181 Intercollegiate Basketball (Women)

182 Intercollegiate Baseball

183 Intercollegiate Basketball (Men)

184 Intercollegiate Soccer (Women)

185 Intercollegiate Cross Country (Men)

186 Intercollegiate Soccer (Men)

190 Intercollegiate Tennis (Men)





- 191 Intercollegiate Track and Field (Men)
- 192 Intercollegiate Volleyball (Women)
- 193 Intercollegiate Cross Country (Women)
- 194 Intercollegiate Tennis (Women)
- 195 Intercollegiate Track and Field (Women)

#### **KIN 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### **KIN 201 Introduction to Kinesiology (4)**

Introduction and orientation to kinesiology as a profession and discipline. Exploration of subdisciplines and career opportunities in the field. Critical analysis and evaluation of literature, philosophy, and scientific basis. 4 lecture discussions.

#### **KIN 202A Cardiopulmonary Resuscitation (CPR) (1)**

Introduction and orientation to basic life support: artificial ventilation and cardiopulmonary resuscitation. Meets State credential requirements and American Red Cross certification upon successful completion of course. 2 hours technical activity.

#### **KIN/FN 203 Health, Nutrition and the Integrated Being (4)**

Investigation of specific areas of the integrated being dealing with nutrition, stress, drugs, sexuality, major health problems and death and dying. Understanding their effect on "the integrated being" and the development of behaviors and actions that will promote optimum physical and mental health. Meets GE Area 3G requirement. Team-taught. 4 lecture discussions.

#### **KIN 204/204A Field Work for Prospective Physical Education Teachers (1/2)**

Observation and critical case study analysis of elementary and secondary physical education programs in preparation for student teaching experiences. Selected educational programs and teaching methodologies are analytically reviewed. 1 lecture/problem-solving, 4 hours workshop. Corequisites: KIN 204/204A.

#### **KIN 205/205A First Aid (2/1)**

Instruction in providing immediate and temporary care for victims of injuries, sudden illness and other medical emergencies using American Red Cross procedures. Cardiopulmonary resuscitation and removal of airway obstruction. Certification in CPR and first aid. 2 lecture discussions, 2 hours activity. Corequisites: KIN 205/205A.

#### **KIN 206 Introduction to Adapted Physical Education (3)**

Techniques for teaching physical education to persons with handicapping conditions. Handicapping conditions, program adaptations, and mainstreaming plus observation of selected programs. 3 lectures/problem-solving.

#### **KIN 207 Personal Health (4)**

Critical health and wellness issues individuals face daily. Specific health assessments: blood chemistry, blood pressure, body composition and other assessment tools. Projection of risk factors over a lifetime and development of decision-making skills to change health risk behaviors. Meets GE Area 3G requirement. 4 lecture discussions. Lab fee required for blood chemistry panel.

#### **KIN 210 History of Physical Education and Sport (4)**

Discussion of physical education and sport from earliest times to the

present; concentration on political, religious, and social bases of societies and the effect of these beliefs on the physical education/sport of each culture. Emphasis on the United States. 4 lecture discussions.

#### **KIN 217/217A Folk and Square Dance Theory (2/1)**

Theory, analysis, philosophy of folk and square dance as a fine art; their place in our educational system. 2 lecture discussions, 2 hours activity. Corequisites: KIN 217/217A.

#### **KIN 231/231A Basic Scuba (2/2)**

Use of scuba apparatus and its application as an adjunct to marine studies. Includes concepts of diving medicine, physics, oceanography and its scientific application. Leads to basic diver open water certification. Must pass swim test. 2 lectures/problem-solving, 4 hours technical activity. Corequisites: KIN 231/231A.

#### **KIN 232/232A Scuba Environment Specialty (1/1)**

Introduction to diving environments outside Southern California. Includes on-site investigation of marine ecological changes along the Northern California and Mexican coasts. Scientific application of gas laws, principles and effects of underwater pressure on metabolism. 1 lecture/problem-solving. 2 hours technical activity. Corequisites: KIN 232/232A. Prerequisites: KIN 231/231A.

#### **KIN 235/235A Water Safety Instructor, Life Saving, and CPR (2/2)**

Study and practice of water safety instruction, life saving techniques, cardiopulmonary resuscitation, beach and pool lifeguard techniques. Includes skin diving and use of safety floatation devices. Minimum skill and knowledge in these activities required. 2 hours lecture, 4 hours activity. Corequisites: KIN 235/235A. Prerequisite: Must pass a swim test.

#### **KIN 240/240A Introduction to Athletic Training (2/1)**

Responsibilities of athletic trainer. Policies and procedures for training room management and operation. Acquisition of practical skills for treatment, prevention and care of sports-related injuries. 2 lecture discussions, 2 hours activity. Corequisites: KIN 240/240A. Prerequisite: KIN 205/205A.

#### **KIN 250/250A (1/1)**

Basketball skills, knowledge, and team strategies for beginner to intermediate levels. Identification of common errors and necessary corrections. Drills, lead-up and modified activities, and regulation game play. Assessment and evaluation methods. 1 lecture/problem-solving, 2 hours educational workshop. Corequisites: KIN 250/250A.

#### **KIN 252/252A Soccer Theory for Teachers (1/1)**

Theory and procedures for teaching the skills of soccer from beginner to intermediate skill level. Rules and strategies to include tactical knowledge, developmentally appropriate drills and lead up games. Identification of common errors and corrections. Assessment and evaluation protocols. 1 lecture/problem-solving, 2 hours educational workshop. Corequisites: KIN 252/252A.

#### **KIN 254/254A Softball Theory for Teachers (1/1)**

Softball skills, knowledge, strategies and interactions from beginner to intermediate level. Identification of common errors and corrections. Drills, lead-up and modified games, and regulation play. Assessment and evaluation methods. 1 lecture/problem-solving, 2 hours educational workshop. Corequisites: KIN 254/254A.

#### **KIN 256/256A Volleyball Theory for Teachers (1/1)**

Volleyball skills, knowledge, team strategies and team interaction from beginner to intermediate level. Identification of common errors and corrections. Drills, lead-up games and modified games. Assessment and evaluation protocols. 1 lecture/problem-solving, 2 hours educational workshop. Corequisites: KIN 256/256A.

#### **KIN 260/260A Gymnastics and Tumbling Theory for Teachers (1/1)**

Theory and procedures for teaching the skills of gymnastics and tumbling from beginners to intermediate skill level. Instruction on selected apparatus and tumbling mats. Identification of common errors and corrections. Assessment and evaluation protocols. 1 lecture/problem-solving, 2 hours educational workshop. Corequisites: KIN 260/260A.

#### **KIN 262/262A Racket Sports Theory for Teachers (1/1)**

Skills, knowledge, strategies and psycho-social concepts of tennis, paddle tennis, racquetball, and badminton for beginner to intermediate skill levels. Identification of common skill errors and corrections. Drills, lead-up games, modified games, and regulation game play. Assessment and evaluation protocols. 1 lecture/problem-solving, 2 hours educational workshop. Corequisites: KIN 262/262A.

#### **KIN 264/264A Swimming Theory for Teachers (1/1)**

Beginner to advanced swimming skills including analysis and knowledge. Assessment and evaluation methods. Identification of common errors. 1 lecture/problem-solving, 2 hours educational workshop. Corequisites: KIN 264/264A.

#### **KIN 266/266A Track and Field Theory for Teachers (1/1)**

Track and field skills, knowledge, and strategies for beginner to intermediate level. Identification of common errors and corrections. Drills, lead-up games and modified games. Assessment and evaluation protocols. 1 lecture/problem solving, 2 hours educational workshop. Corequisites: KIN 266/266A.

#### **KIN 268/268A Weight Training and Aerobic Exercise Theory for Teachers (1/1)**

Theory and procedures for teaching weight training and activities for aerobic conditioning. Analysis and study of the principles related to physical conditioning. Emphasis on correct and safe movement techniques. 1 lecture/problem-solving, 2 hours educational workshop. Corequisites: KIN 268/268A.

#### **KIN 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Corequisites may be required. Instruction is by lecture, laboratory, or a combination.

#### **KIN 301 Scientific Foundations of Sports Medicine (4)**

Survey of scientific aspects of sports medicine including biological systems associated with human performance; role in public health; kinesiological approaches; applications of technology and ethical implications. Designed for the student with a basic scientific background seeking knowledge and an understanding of sports medicine. 4 hours lecture.

#### **KIN 302 Anatomical Kinesiology (4)**

Interrelationships of the body segments and the action of the joints and muscles involved in human movement; application of the principles of movement for the analysis and evaluation of selected physical education activities. 4 hours lecture. Prerequisite: ZOO 234/234L.

#### **KIN 303/303L Physiology of Exercise (3/1)**

Aerobic and anaerobic metabolism and energy sources for muscular activity. Physiology of muscle contraction; muscular endurance, strength and flexibility. Nervous system control of muscular activity. Pulmonary and circulatory physiology; gas exchange and transport. Body composition and weight control. 3 lecture discussions, 3 hours technical laboratory. Prerequisite: ZOO 235/235L. Corequisites: KIN 303/303L.

#### **KIN 307/307A The School and Sex Education (3/1)**

Development and conduct of sex education in the public schools; factors in human growth and sexuality; decision-making, family health problems, parenthood, and family planning. 3 lecture discussions, 2 hours activity. Corequisites: KIN 307/307A.

#### **KIN 308 Drug Education (4)**

Drugs in contemporary society; drug abuse; controlling factors; federal and state drug laws. 4 lecture discussions.

#### **KIN 310 Philosophy of Physical Education (3)**

The nature, significance, and development of sport and physical education and their place in human society as related to the major philosophical systems. 3 hours lecture.

#### **KIN 312/312A Life Span Motor Development (3/1)**

Growth and physical development from birth through adulthood with emphasis on changing motor abilities. Examination of skill development through case studies, cross-sectional and longitudinal descriptive research. 3 lectures/problem-solving, and 2 hours of activity involving field work. Corequisites: KIN 312/312A

#### **KIN 328/328A Developmental Movement for Children (2/1)**

Analysis of the instructional processes in teaching elementary physical education as well as development of a comprehensive curriculum. Basic skill movements used in developmental games, gymnastics, and rhythms. 2 lecture discussions, 2 hours educational workshop. Corequisites: KIN 328/328A.

#### **KIN 340/340A Management of Athletic Injuries (3/1)**

Immediate observation and examination of common athletic injuries/illnesses including joints, extremities and musculoskeletal tissue. Special emphasis on the etiology, pathology, signs and symptoms, and complications related to common injuries/illnesses sustained by athletes. 3 lecture discussions, 2 hours activity. Prerequisites: KIN 240/240A and ZOO 234/234L. Corequisites: KIN 340/340A.

#### **KIN 341A, 342A, 343A Direction of Physical Education Activity (1)(1)(1)**

Experience in the supervision of physical education classes under the direction of the faculty. 2 hours activity.

#### **KIN 355/355A Adapted Aquatics (2/1)**

Theory and practical aspects of teaching swimming and water related activities to special populations. Movement exploration principles/mechanics, self-adaptations, facility and equipment aids, administrative considerations, and research. Must pass swim test. 2 lectures, 2 hours activity. Corequisites: KIN 355/355A.

#### **KIN 363 Psychological Aspects of Physical Activity and Sport (4)**

Examination of health psychology, social psychology, and intervention and performance enhancement techniques. Topics include personality, attention, arousal, motivation, aggression, activity and psychological

well being, exercise adherence, and various intervention techniques. 4 lectures/problem-solving. Meets GE Area 5 requirement.

### **KIN 370 Stress Management for Healthy Living (4)**

Stress management and its relationship to health, disease, and motor performance. Analysis of everyday stressors and intervention strategies for managing stress effectively. 4 lectures/problem-solving. Meets GE Area 5 requirement.

### **KIN 375/375A Computer Applications in Kinesiology (2/2)**

Hands-on experience with software related to kinesiology that can facilitate professional effectiveness. May be taken a second time for elective credit. 2 lectures/problem-solving, 4 hours technical activity. Corequisites: KIN 375/375A.

### **KIN 379/379A Advanced Scuba Techniques (2/2)**

Advanced knowledge and skills required for use of scuba in studying the marine environment. Continuation of study in diving medicine, physics and oceanography; scientific methods for marine study. 2 lecture discussions, 4 hours technical activity involving field work. Prerequisites: KIN 233/233A. Corequisites: KIN 379/379A.

### **KIN 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### **KIN 401/401A Motor Assessment for Individuals with Disabilities (3/1)**

General motor assessment strategies for disabled populations. Emphasis on descriptive and limiting performance tests. Matching data to program development. 3 lectures, 2 hours activity. Prerequisite: KIN 206, or graduate standing. Corequisites: KIN 401/401A.

### **KIN 402/402L Biomechanical Kinesiology (3/1)**

Introduction to biochemical analysis of human movement in sport, daily living, work and leisure. Analysis of mechanical principals in human performance. Musculoskeletal system and neuromuscular aspects of movement. Forces, kinetics and kinematics. Examination and student presentations of selected movement patterns. 3 hours lecture discussion, 3 hours technical laboratory, Corequisites: KIN 402/402L. Prerequisite: KIN 302.

### **KIN 403/403L Physiology of Exercise II (3/1)**

Methods and physiological effects of training. Exercise and performance and their interrelationships with nutrition, environmental conditions, endocrine system, health, aging and gender. Regulation of acid/base balance. Muscular fatigue and soreness. 3 lecture discussions, 3 hours technical laboratory. Prerequisite: KIN 303/303L. Corequisites: KIN 403/403L.

### **KIN 404/404A Rhythms and Dance for Movement Education (2/1)**

Designing dance and rhythmic programs basic to development of movement patterns for instruction of normal and atypical individuals. Analysis and demonstration of dance curriculum for different levels of motor development. Includes clinical and fieldwork experiences. Meets state requirements for adapted physical education credential. 2 lectures/problem-solving, 2 hours educational workshop. Prerequisite: KIN 328 or graduate standing. Corequisites: KIN 404/404A.

### **KIN 405/405A Adapted Physical Education Fieldwork (2/1)**

Supervised clinical experience in adapted physical education at Cal Poly Pomona's Motor Development Clinic. May be repeated for a total of 9 units. 2 hours clinical processes, 2 hours educational workshop. Prerequisites: KIN 206 or graduate standing. Corequisites: KIN 405/405A.

### **KIN 406/406A Physical Education for Orthopedically and Health Impaired (3/1)**

Techniques for developing and implementing physical activity programs for orthopedically handicapped and other health-impaired individuals, e.g., cardiovascular, cardiorespiratory conditions. 3 lectures, 2 hours activity. Prerequisite: KIN 206 or graduate standing. Corequisites: KIN 406/406A.

### **KIN 410/410A Physical Activity for Individuals with Severe Disabilities (3/1)**

Techniques for developing/implementing physical activity programs for the mentally-handicapped and emotionally-disturbed populations. 3 lectures, 2 hours activity. Prerequisite: KIN 206 or graduate standing. Corequisites: KIN 410/410A.

### **KIN 414/414A Movement Analysis (2/1)**

Applied approach to observation and analysis of sport and motor skills. Practical hands-on experience will also be required with various ages and abilities of students. 2 lecture discussions, 2 hours educational workshop. Prerequisite: KIN 402. Corequisites: KIN 414/414A.

### **KIN 415/415A Developmental Games for Children (2/1)**

Designed for prospective teachers interested in elementary physical education. Focus is upon use of a games medium to promote movement ability of children. 2 lecture discussions, 2 hours educational workshop. Prerequisite: KIN 328. Corequisites: KIN 415/415A.

### **KIN 416/416A Developmental Gymnastics for Children (2/1)**

Designed for prospective teachers interested in elementary physical education. Use of an educational gymnastics and basic movement medium to promote movement ability of children. 2 lecture discussions, 2 hours educational workshop. Prerequisite: KIN 328. Corequisites: KIN 416/416A.

### **KIN 420 Management Principles in Kinesiology and Sport (4)**

Study of the underlying philosophy and principles of administrative theory and practice. Legal aspects and safety policies for physical education and sport programs. 4 lecture presentations. Prerequisites: upper division standing.

### **KIN 425/425A Tests and Measurements in Physical Education (3/1)**

Techniques and principles involved in assessing the outcome of instruction and participation in physical education. 3 lectures/problem-solving, 2 hours technical activity. Corequisites: KIN 425/425A.

### **KIN 428 Sports Psychology (4)**

Contemporary sport as it affects personality, mental fitness, mental health and behavior of the individual. Relationship of biological, neurological, and social factors to the psychology of human performance in a sport setting. 4 lecture discussions.

**KIN 430/430L Motor Learning and Human Performance (3/1)**

Student analysis of the perceptual and sensory systems involved in neuromuscular performance. Laboratory demonstration of the role of kinesthesia, reaction time, and strength in neuro-motor coordination and motor learning; transfer factors affecting motor performance. 3 lectures/problem-solving, 3 hours technical laboratory. Prerequisites: KIN 303/303L, 425/425A. Corequisites: KIN 430/430L.

**KIN 433 Advanced Athletic Training (3)**

Advanced clinical methods for prevention, examination, evaluation and rehabilitation of athletic injuries/illnesses. Diverse, specific, theoretical, and clinical areas of sports medicine. Competencies necessary for NATA certification exam. 3 lecture discussions. Prerequisites: KIN 302, 303/303L, 340/340A.

**KIN 435/435A Athletic Training Therapy and Modalities (2/1)**

Introduction to clinical therapeutic modalities. Physiological effects, indications, contraindications, dosage and maintenance of each modality. Concepts and methods of therapeutic exercise utilized during the course of an athlete's rehabilitation. 2 lecture discussions, 2 hours activity. Prerequisite: KIN 433. Corequisites: KIN 435/435A.

**KIN 437A Athletic Training Practicum (2)**

Practical experience in an athletic training facility under direction of a certified athletic trainer. May be taken a maximum of three quarters. 40 hours per quarter. Prerequisite: KIN 240/240A.

**KIN 440 The Physical Education Curriculum (4)**

Principles and foundations of curriculum design to meet the dimensional and individual needs of learners. Development of competencies for designing curriculum materials in multicultural school communities. 4 lectures/problem-solving.

**KIN 441 Elementary School Health Education (3)**

Methods, processes, and content used in the elementary schools, including middle schools, for teaching health and for dealing with health-related problems. Satisfies the health education requirement for the California Multiple Subject Credential. 3 lectures/problem-solving. Prerequisite: upper division standing.

**KIN 442 Secondary School Health Education (3)**

Methods, processes, and content used in secondary schools, including middle schools, for teaching health and for dealing with health-related problems. Satisfies the health education requirement for the California Single Subject Credential. 3 lectures/problem-solving.

**KIN 448 Modern Olympic Games (4)**

International perspectives of the modern Olympic Games from 1896 to present. 4 lecture discussions.

**KIN 449 Play, Games and Sport in Culture (4)**

Interdisciplinary approaches to the analysis of play, games and sport. Critical analysis of the motives, sources and behavior associated with play and sport. An examination of the variations among and within cultures from sociological, anthropological and neuro-psychological perspectives. 4 lecture discussions. Meets GE Area 5 requirements.

**KIN 450 Role of Sport in Contemporary Society (4)**

Contemporary athletics, sports, and physical activity as they affect the individual's socio-cultural development and value system; inter-

relationship with other aspects of American culture. 4 hours lecture/discussion.

**KIN 453 Principles of Health/Fitness Programs (3)**

Theoretical basis and techniques of developing and implementing adult fitness programs. Components of adult fitness; fitness as a lifestyle; industrial and community-based programs and fitness programs for the cardiac patient. Student presentations required. 3 lecture presentations.

**KIN 455 Sports Medicine (4)**

Current topics in sports medicine as they affect human performance including ergogenic aids; age and sport performance; overtraining; sports anemia; blood doping; and other selected contemporary topics. Student presentations required. 4 lecture presentations.

**KIN 456 Exercise Metabolism and Weight Control (3)**

Overview of weight control and health. Metabolism, energy balance equation, and role of diet and exercise in preventing/treating obesity. Methods for assessing body composition. Eating disorders. Behavior modification, surgical intervention and other methods of dealing with mild to severe obesity. 3 lecture discussions. Prerequisites: KIN 303/303L and FN 205 or FN 235 and FN 236L.

**KIN 458/458A Exercise Physiology Fieldwork (1/2)**

Supervised clinical laboratory experience in Cal Poly Pomona's Exercise Physiology Laboratory or in off-campus clinics or fitness programs. May be repeated for a total of 6 units. 1 hour clinical processes, 4 hours educational workshop. Prerequisites: KIN 303/303L. Corequisites: KIN 458/458A.

**KIN 459 Health/Fitness Instructor (3)**

Knowledge and competencies related to working with apparently healthy populations in a variety of health/fitness settings. Information specifically pertaining to the Health/Fitness Instructor Certification of the American College of Sports Medicine. 3 lectures/problem-solving.

**KIN 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Minimum of 120 hours total time.

**KIN 463 Senior Seminar (4)**

Issues, practices, and trends in the professions. Other material relevant to graduating seniors. 4 seminars. Prerequisite: senior standing.

**KIN 469 History of Women in Sport (4)**

Women's role in sport from ancient Egypt and Greece to present. Includes individual athletes and women's contributions to the growth and development of sport. 4 lectures.

**KIN 498 Professional Organizations in Physical Education Seminar (1)**

Analysis of professional organizations in the physical education field. Includes attendance at state or national level conferences. 1 seminar.

**KIN 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

Graduate courses are listed in the "Graduate Studies" section of this catalog.



**RECREATION****REC 124 The Philosophy of Leisure and the Work Ethic (4)**

An exploration of leisure and the work ethic from a philosophical perspective. Art and aesthetics are examined in the context of leisure. 4 lectures.

**REC 125 Leisure in Society (4)**

An exploration of leisure from a sociological, political, historical and economic perspective. Analysis of social institutions and their effects on the development of leisure and popular culture in post-industrial societies. 4 lectures.

**REC 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**REC 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.



## MUSIC

\_\_\_\_\_, Chair

Donald Ambrosion  
Susan M. Burns  
Phillip C. Clarke  
Stanley Gibb  
David Grasmick  
Iris S. Levine

The department offers a variety of coursework in academic and performance aspects of music which leads to a bachelor of arts degree. Courses are offered for the major and minor as well as for students with majors in other disciplines. The minor is designed for students in other disciplines who desire further experience in and knowledge of music. See department office for required course work in minor.

The major in music provides the foundation for succeeding in performance, business and teaching careers. The student must select an emphasis in one of the following areas: Music Business, Commercial Music, Music Education, Performance, and Music Theater. Performance emphasis may be taken in guitar, keyboard, instruments, voice, and world music.

Prospective music majors will be given placement exams in music theory and performance. Students who do not meet minimum requirements must take such remedial classes as are deemed necessary prior to being allowed to take classes in theory and/or studio instruction.

Each quarter a music major is enrolled in studio lessons, he or she must be enrolled in the appropriate seminar and a performance ensemble as determined by the curriculum emphasis. Music majors and students enrolled in instrument-use courses are required to pay a musical instrument repair fee each quarter.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Music Theory I	MU	120	(4)
Introduction to Music Business	MU	104	(4)
Introduction to Music Technology	MU	108/108	(3/1)
Music Studies Integration I	MU	279	(1)
Music Studies Integration II	MU	394	(1)
Senior Recital/Project/Internship	MU	462	(4)

### AREAS OF EMPHASIS

Each student chooses additional courses from one of the five emphases (Music Business, Commercial Music, Music Education, Performance or Music Theatre)..... (95-102)

Courses to complete General Education Requirements. .... (72)

Unrestricted electives. .... (4-6)

### MUSIC BUSINESS EMPHASIS

#### GENERAL EDUCATION COURSES FOR MUSIC BUSINESS EMPHASIS

##### AREA 1

A. Freshman English I	ENG	104	4
B. Advocacy and Argument	COM	204	4
C. Freshman English II	ENG	105	4

##### AREA 2

A. Select one course			4
B. Physics of Musical Sound	PHY105 and 105L	3/1	
C. Select one course			4
D. Select one course			4

##### AREA 3

A. World of Music	MU	103	4
B. Business and Professional Ethics	PHL	205	4
C. Select one course			4
D. Principles of Economics	EC	201	4
E. Select one course			4
F. Select one course			4
G. General Psychology	PSY	201	4

##### AREA 4

A. Introduction to American Government	PLS	201	4
B. United States History	HST	202	4

##### AREA 5

12 Upper Division units are required, 4 of which fulfill Area 2D.

A. Principles of Management	MHR	301	4
B. Principles of Marketing Management	IBM	301	4

### SUPPORT COURSES FOR THE MUSIC BUSINESS EMPHASIS

Survey/World Pop Music	MU	109	4
Jazz and Beyond	MU	110	4
Music Recording Techniques I	MU	228/228A	3,1

Select 5 units from the following Music Literature courses: ..... 5

Europe Before 1800	MU	240	1
Europe After 1800	MU	241	1
North America	MU	242	1
Middle East	MU	243	1
Africa	MU	244	1
Latin America	MU	245	1
Jazz Traditions	MU	246	1
World Pop Music	MU	247	1
Music Theater	MU	248	1
Music Recording Techniques II	MU	328/328A	1,1
Music in Film	MU	397	4
Artist Representation and Promotion	MU	398	4
Computers and Music	MU	408/408A	3,1
Music Publishing, Copyright and Licensing	MU	490	4
Accounting/Decision-Making I	ACC	204	4
Accounting/Decision-Making II	ACC	205	4
Introduction to Microcomputing	CIS	101	4
Legal Environment of Business Transactions	FRL	201	4
Legal Environment of Business Organization	FRL	302	4
New Venture Creation	MHR	306	4
Multicultural Organizational Behavior	MHR	318	4

Select 6 units from the following: ..... 6

Class Piano	MU	111A	(1)
Class Piano	MU	112A	(1)
Class Piano	MU	113A	(1)

Beginning/Intermediate Classes:

Beginning Piano	MU	114	1
Brass Class	MU	130	1
Guitar Class	MU	131	1
Percussion Class	MU	132	1
Strings Class	MU	133	1
Voice Class	MU	134	1

Woodwind Class . . . . .	MU	135	1
World Music Class . . . . .	MU	136	1

## Studios:

Strings . . . . .	MU	171	1
Brass . . . . .	MU	172	1
Woodwinds . . . . .	MU	173	1
Percussion . . . . .	MU	174	1
Keyboard . . . . .	MU	175	1
Guitar . . . . .	MU	176	1
Voice . . . . .	MU	177	1
World Music . . . . .	MU	180	1

## Performance Ensembles:

Brass Ensemble . . . . .	MU	341A	1
Woodwind Ensemble . . . . .	MU	342A	1
Percussion Ensemble . . . . .	MU	343A	1
String Ensemble . . . . .	MU	344A	1
Piano Accompaniment . . . . .	MU	345A	1
Guitar Ensemble . . . . .	MU	346A	1
World Music Ensemble . . . . .	MU	347A	1
Piano Ensemble . . . . .	MU	348A	1
Orchestra . . . . .	MU	351L	1
Concert Band . . . . .	MU	352L	1
Symphonic Wind Ensemble . . . . .	MU	353L	1
Jazz Band . . . . .	MU	354L	1
Jazz Combo . . . . .	MU	356A	1
Latin American Ensemble . . . . .	MU	358A	1
Concert Choir . . . . .	MU	361L	1
Chamber Singers . . . . .	MU	364L	1
Vocal Jazz Ensemble . . . . .	MU	365L	1
Music Theatre Workshop . . . . .	MU	366L	1

Music Electives: . . . . . 14

Select 14 units Music courses (6 must be upper division)

Business electives: . . . . . 12

Select 12 units Business courses (8 must be upper division)

**COMMERCIAL MUSIC EMPHASIS****GENERAL EDUCATION COURSES FOR COMMERCIAL MUSIC EMPHASIS****AREA 1**

A. Freshman English I . . . . .	ENG	104	4
B. Advocacy and Argument . . . . .	COM	204	4
C. Freshman English II . . . . .	ENG	105	4

**AREA 2**

A. Select one course . . . . .			4
B. Physics of Musical Sound . . . . .	PHY	105/105L	3/1
C. Select one course . . . . .			4
D. Select one course . . . . .			4

**AREA 3**

A. World of Music . . . . .	MU	103	4
B. Select one course . . . . .			4
C. Select one course . . . . .			4
D. Select one course . . . . .			4
E. Select one course . . . . .			4
F. Select one course . . . . .			4
G. Select one course . . . . .			4

**AREA 4**

A. Introduction to American Government . . . . .	PLS	201	4
B. United States History . . . . .	HST	202	4

**AREA 5**

12 Upper Division units are required, 4 of which fulfill Area 2D.  
See Schedule of Classes for approved courses.

**SUPPORT COURSES FOR THE COMMERCIAL MUSIC EMPHASIS**

Survey/World Pop Music . . . . .	MU	109	4
Jazz and Beyond . . . . .	MU	110	4

Select 3 units Keyboard Requirements from the following: . . . . . 3

Class Piano . . . . .	MU	111A-113A	
Class Piano . . . . .	MU	211A-213A	
Studio Keyboard . . . . .	MU	175/375/393	

Beginning Improvisation . . . . .	MU	116	2
Music Theory II . . . . .	MU	121	4
Music Theory III . . . . .	MU	122	4

Lower Division Studio Instruction: . . . . . 6  
(Must complete 6 units in one area)

Strings . . . . .	MU	171	1
Brass . . . . .	MU	172	1
Woodwinds . . . . .	MU	173	1
Percussion . . . . .	MU	174	1
Keyboard . . . . .	MU	175	1
Guitar . . . . .	MU	176	1
Voice . . . . .	MU	177	1
World Music . . . . .	MU	180	1
Musicianship . . . . .	MU	221	1
Musicianship . . . . .	MU	222	1
Musicianship . . . . .	MU	223	1
Music Recording Techniques I . . . . .	MU	228/228A	3,1

Select 6 units from the following Music Literatures: . . . . . 6

Europe Before 1800 . . . . .	MU	240	1
Europe After 1800 . . . . .	MU	241	1
North America . . . . .	MU	242	1
Middle East . . . . .	MU	243	1
Africa . . . . .	MU	244	1
Latin America . . . . .	MU	245	1
Jazz Traditions . . . . .	MU	246	1
World Pop Music . . . . .	MU	247	1
Music Theatre . . . . .	MU	248	1

Performance Seminar . . . . .	MU	270	10
Jazz Improvisation . . . . .	MU	316	2
Music Recording Tech II . . . . .	MU	328/328A	2

Select 12 units from the following Performance Ensembles: . . . . . 12

Brass Ensemble . . . . .	MU	341A	1
Woodwind Ensemble . . . . .	MU	342A	1
Percussion Ensemble . . . . .	MU	343A	1
String Ensemble . . . . .	MU	344A	1
Piano Accompaniment . . . . .	MU	345A	1
Guitar Ensemble . . . . .	MU	346A	1
World Music Ensemble . . . . .	MU	347A	1

Piano Ensemble	MU	348A	1
Orchestra	MU	351L	1
Concert Band	MU	352L	1
Symphonic Wind Ensemble	MU	353L	1
Jazz Band	MU	354L	1
Jazz Combo	MU	356A	1
Latin American Ensemble	MU	358A	1
Concert Choir	MU	361L	1
Chamber Singers	MU	364L	1
Vocal Jazz Ensemble	MU	365L	1
Music Theatre Workshop	MU	366L	1

Upper Division Studio Instruction: . . . . . 4  
(Must complete 4 units in one area)

Brass (Jazz and Pop)	MU	384	1
Guitar (Jazz and Pop)	MU	386	1
Percussion(Jazz and Pop)	MU	388	1
Strings (Jazz and Folk)	MU	390	1
Voice (Jazz and Pop)	MU	391	1
Woodwinds (Jazz and Pop)	MU	392	1
Keyboard (Jazz and Pop)	MU	393	1

Commercial Music Styles	MU	396	4
Music in Record, Radio, Film and T.V.	MU	397	4
Artist Representation and Promotion	MU	398	4
Problems in Music Performance	MU	399	4
Computers and Music	MU	408/408A	3,1
Music Histories of Europe, N. and S. America	MU	418	4
Music Histories of Africa, Asia and Middle East	MU	419	4
Music Publishing, Copyright and Licensing	MU	490	4

## MUSIC EDUCATION EMPHASIS

### GENERAL EDUCATION COURSES FOR MUSIC EDUCATION EMPHASIS

#### AREA 1

A. Freshman English I		104	4
B. Advocacy and Argument	COM	204	4
C. Freshman English II	ENG	105	4

#### AREA 2

A. Select one course			4
B. Physics of Musical Sound	PHY	105/105L	3/1
C. Select one course			4
D. Select one course			4

#### AREA 3

A. World of Music	MU	103	4
B. Select one course			4
C. Select one course			4
D. Principles of Economics	EC	201	4
E. Select one course			4
F. Introduction to Cultural Anthropology	ANT	102	4
G. Select one course			4

#### AREA 4

A. Introduction to American Government	PLS	201	4
B. United States History	HST	202	4

#### AREA 5

12 Upper Division units are required, 4 of which fulfill Area 2D.			
A. Social Anthropology	ANT	358	4
B. Select one course			4

## SUPPORT COURSES FOR THE MUSIC EDUCATION EMPHASIS

Class Piano	MU	111A	1
Class Piano	MU	112A	1
Class Piano	MU	113A	1
Music Theory II	MU	121	4
Music Theory III	MU	122	4

Lower Division Studio Instruction: . . . . . 6  
(Must complete 6 units in one area)

Strings	MU	171	1
Brass	MU	172	1
Woodwinds	MU	173	1
Percussion	MU	174	1
Keyboard	MU	175	1
Guitar	MU	176	1
Voice	MU	177	1
World Music	MU	180	1
Class Piano	MU	211A	1
Class Piano	MU	212A	1
Class Piano	MU	213A	1
Musicianship	MU	221	1
Musicianship	MU	222	1
Musicianship	MU	223	1
Directed Field Experience	MU	230	2

Select 6 units from the following Music Literatures: . . . . . 6

Europe Before 1800	MU	240	1
Europe After 1800	MU	241	1
North America	MU	242	1
Middle East	MU	243	1
Africa	MU	244	1
Latin America	MU	245	1
Jazz Traditions	MU	246	1
World Pop Music	MU	247	1
Music Theatre	MU	248	1
Performance Seminar	MU	270	10
Advanced Music Theory	MU	301	3
Beginning Conducting	MU	304	2
Instrumental Conducting	MU	307	2
Choral Conducting	MU	308	2
Arranging I	MU	309	2
Musicianship	MU	321	1
Musicianship	MU	322	1
Musicianship	MU	323	1
Brass Fundamentals	MU	330	2
Percussion Fundamentals	MU	331	2
String Fundamentals	MU	332	2
Voice Fundamentals	MU	333	2
Woodwind Fundamentals	MU	334	2

### Ensemble Requirements:

Group I Performance Ensemble (1)			3
World Music Ensemble	MU	347A	

Group II Performance Ensembles (select 3 units): . . . . . 3

Brass Ensemble	MU	341A	1
Woodwind Ensemble	MU	342A	1
Percussion Ensemble	MU	343A	1
String Ensemble	MU	344A	1
Piano Accompaniment	MU	345A	1



Guitar Ensemble	MU	346A	1
World Music Ensemble	MU	347A	1
Piano Ensemble	MU	348A	1
Symphonic Wind Ensemble	MU	353L	1
Jazz Band	MU	354L	1
Jazz Combo	MU	356A	1
Latin American Ensemble	MU	358A	1
Chamber Singers	MU	364L	1
Vocal Jazz Ensemble	MU	365L	1
Music Theatre Workshop	MU	366L	1

Group III Performance Ensembles . . . . . 3

Orchestra	MU	351L	1
Concert Band	MU	352L	1
Concert Choir	MU	361L	1

Select 3 additional units from Group I, II, or III above:

Performance Ensemble			3
Instrumental Techniques for Secondary Education	MU	357	2
Vocal Techniques for Secondary Education	MU	367	2

Upper Division Studio Instruction: . . . . . 3  
(Must complete 3 units in one area)

Strings (Classical)	MU	371	1
Brass (Classical)	MU	372	1
Woodwinds (Classical)	MU	373	1
Percussion (Classical)	MU	374	1
Keyboard (Classical)	MU	375	1
Guitar (Classical)	MU	376	1
Voice (Classical)	MU	377	1
Composition	MU	378	1
World Music	MU	380	1
Brass (Jazz and Pop)	MU	384	1
Guitar (Jazz and Pop)	MU	386	1
Percussion (Jazz and Pop)	MU	388	1
Strings (Jazz and Folk)	MU	390	1
Voice (Jazz and Pop)	MU	391	1
Woodwinds (Jazz and Pop)	MU	392	1
Keyboard (Jazz and Pop)	MU	393	1
Conducting Studio	MU	382	2
Problems in Music Performance	MU	399	4

Music Literature for Children	MU	402/402A	1,1
Arranging II	MU	407	2
Music Histories of Europe, N. and S. America	MU	418	4
Music Histories of Africa, Asia, and Middle East	MU	419	4

## PERFORMANCE EMPHASIS

### GENERAL EDUCATION COURSES FOR PERFORMANCE EMPHASIS

#### AREA 1

A. Freshman English I	ENG	104	4
B. Advocacy and Argument	COM	204	4
C. Freshman English II	ENG	105	4

#### AREA 2

A. Select one course			4
B. Select one course			4
C. Select one course			4
D. Select one course			4

#### AREA 3

A. World of Music	MU	103	4
B. Select one course			4
C. Select one course			4
D. Select one course			4
E. Select one course			4
F. Select one course			4
G. Select one course			4

#### AREA 4

A. Introduction to American Government	PLS	201	4
B. United States History	HST	202	4

#### AREA 5

12 Upper Division units are required, 4 of which fulfill Area 2D.  
See Schedule of Classes for approved courses.

### SUPPORT COURSES FOR THE PERFORMANCE EMPHASIS

Class Piano	MU	111A	1
Class Piano	MU	112A	1
Class Piano	MU	113A	1
Music Theory II	MU	121	4
Music Theory III	MU	122	4

Lower Division Studio Instruction: . . . . . 6  
(Must complete 6 units in one area)

Strings	MU	171	1
Brass	MU	172	1
Woodwinds	MU	173	1
Percussion	MU	174	1
Keyboard	MU	175	1
Guitar	MU	176	1
Voice	MU	177	1
World Music	MU	180	1
Class Piano	MU	211A	1
Class Piano	MU	212A	1
Class Piano	MU	213A	1
Musicianship	MU	221	1
Musicianship	MU	222	1
Musicianship	MU	223	1

Select 6 units from the following Music Literatures: . . . . . 6

Europe Before 1800	MU	240	1
Europe After 1800	MU	241	1
North America	MU	242	1
Middle East	MU	243	1
Africa	MU	244	1
Latin America	MU	245	1
Jazz Traditions	MU	246	1
World Pop Music	MU	247	1
Music Theater	MU	248	1
Performance Seminar	MU	270	10
Advanced Music Theory	MU	301	3
Counterpoint	MU	302	3
Form and Analysis	MU	303	3
Beginning Conducting	MU	304	2
Musicianship	MU	321	1
Musicianship	MU	322	1
Musicianship	MU	323	1

Upper Division Studio Instruction: ..... 4  
(Must complete 4 units in one area)

Strings (Classical) .....	MU	371	1
Brass (Classical) .....	MU	372	1
Woodwinds (Classical) .....	MU	373	1
Percussion (Classical) .....	MU	374	1
Keyboard (Classical) .....	MU	375	1
Guitar (Classical) .....	MU	376	1
Voice (Classical) .....	MU	377	1
Composition .....	MU	378	1
World Music .....	MU	380	1
Brass (Jazz and Pop) .....	MU	384	1
Guitar (Jazz and Pop) .....	MU	386	1
Percussion (Jazz and Pop) .....	MU	388	1
Strings (Jazz and Folk) .....	MU	390	1
Voice (Jazz and Pop) .....	MU	391	1
Woodwinds (Jazz and Pop) .....	MU	392	1
Keyboard (Jazz and Pop) .....	MU	393	1
Problems in Music Performance .....	MU	399	4
Music Histories of Europe, No. and So. America .....	MU	418	4
Music Histories of Africa, Asia, and Middle East .....	MU	419	4

Additional courses for Guitar Performance: ..... 26  
(Designed for students who enroll in MU 176)

Instrumental Conducting .....	MU	307	2
Guitar Literature .....	MU	422	2

#### Ensemble Requirements:

Guitar Ensemble .....	MU	346A1	2
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Select 10 units from the following Performance Ensembles: ..... 10

World Music Ensemble .....	MU	347A	1
Jazz Band .....	MU	354L	1
Jazz Combo .....	MU	356A	1
Concert Choir .....	MU	361L	1

Additional courses for Keyboard Performance: ..... 26  
(Designed for students who enroll in MU 175)

Choral Conducting .....	MU	308	2
Piano Literature .....	MU	421	2

Select 8 units from the following: ..... 8

Piano Accompaniment .....	MU	345	1
Piano Ensemble .....	MU	348	1

Select 14 units from the following Performance Ensemble: ..... 14

World Music Ensemble .....	MU	347A	1
Orchestra .....	MU	351L	1
Concert Band .....	MU	352L	1
Symphonic Wind Ensemble .....	MU	353A	1
Jazz Band .....	MU	354L	1
Jazz Combo .....	MU	356A	1
Latin American Ensemble .....	MU	358A	1
Concert Choir .....	MU	361L	1
Chamber Singers .....	MU	364L	1
Vocal Jazz Ensemble .....	MU	365L	1
Music Theatre Workshop .....	MU	366L	1
Music Theatre Production .....	MU	368L	1

Additional courses for Strings, Brass, Woodwinds,  
Percussion, or World Music Performance ..... 26  
(Designed for students who enroll in MU 171, MU 172,  
MU 173, MU 174, or MU 180)

Instrumental Conducting .....	MU	307	2
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Select 2 units from the following Instrumental Literatures: ..... 2

Brass Literature .....	MU	423	1
Woodwind Literature .....	MU	424	1
Percussion Literature .....	MU	425	1
String Literature .....	MU	426	1
World Music Literature .....	MU	427	1
Wind Ensemble Literature .....	MU	429	1
Orchestra Literature .....	MU	430	1

Select 8 units from the following Performance Ensembles: ..... 8

Brass Ensemble .....	MU	341	1
Woodwind Ensemble .....	MU	342	1
Percussion Ensemble .....	MU	343	1
String Ensemble .....	MU	344	1
World Music Ensemble .....	MU	347	1

Select 14 units from the following Performance Ensembles: ..... 14

Orchestra .....	MU	351L	1
Concert Band .....	MU	352L	1
Symphonic Wind Ensemble .....	MU	353A	1
Jazz Band .....	MU	354L	1
Jazz Combo .....	MU	356A	1
Latin American Ensemble .....	MU	358A	1
Concert Choir .....	MU	361A	1

Additional courses for Vocal Performance ..... 26  
(Designed for students who enroll in MU 177)

Diction for Singers .....	MU	261	2
Interpretation for Singers .....	MU	263	2
Choral Conducting .....	MU	308	2
Song Literature .....	MU	420	2

Select 4 units from the following: ..... 4

Elementary French .....	FL	101	4
Elementary German .....	FL	111	4

Select 14 units from the following Performance Ensembles: ..... 14

Concert Choir .....	MU	361L	1
Chamber Singers .....	MU	364L	1
Vocal Jazz Ensemble .....	MU	365L	1
Music Theatre Workshop .....	MU	366L	1
Music Theatre Production .....	MU	368L	1

## MUSIC THEATRE EMPHASIS

### GENERAL EDUCATION COURSES FOR MUSIC THEATRE EMPHASIS

#### AREA 1

A. Freshman English I .....	ENG	104	4
B. Advocacy and Argument .....	COM	204	4
C. Freshman English II .....	ENG	105	4

**AREA 2**

A. Select one course	4
B. Select one course	4
C. Select one course	4
D. Select one course	4

**AREA 3**

A. World of Music	MU	103	4
B. Select one course			4
C. Select one course			4
D. Select one course			4
E. Select one course			4
F. Select one course			4
G. Select one course			4

**AREA 4**

A. Introduction to American Government	PLS	201	4
B. United States History	HST	202	4

**AREA 5**

12 Upper Division units are required, 4 of which fulfill Area 2D.

Choose one in each group:

A. 1) History of Costume	TH	481	(4)
2) Through Artist's Eyes: Visions of World Artists	TH	301	(4)
3) Twentieth Century American Theatre	TH	410	(4)
B. Any Area 5 course on approved list, see Schedule of Classes.			4

**SUPPORT COURSES FOR THE MUSIC THEATRE EMPHASIS**

Class Piano	MU	111A	1
Class Piano	MU	112A	1
Class Piano	MU	113A	1
Music Theory II	MU	121	4
Music Theory III	MU	122	4
Studio Voice	MU	177 (1)	6
Class Piano	MU	211A	1
Class Piano	MU	212A	1
Class Piano	MU	213A	1
Musicianship	MU	221	1
Musicianship	MU	222	1
Musicianship	MU	223	1

Select 6 units from the following Music Literatures: . . . . . 6

Europe Before 1800	MU	240	1
Europe After 1800	MU	241	1
North America	MU	242	1
Middle East	MU	243	1
Africa	MU	244	1
Latin America	MU	245	1
Jazz Traditions	MU	246	1
World Pop Music	MU	247	1
Music Theatre	MU	248	1

Diction for Singers	MU	261	2
Performance Seminar	MU	270	10
Beginning Conducting	MU	304	2
Musicianship	MU	321	1
Musicianship	MU	322	1
Musicianship	MU	323	1

**Ensemble Requirements:**

Music Theater Workshop	MU	366L	3
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Select 9 units from the following Performance Ensembles: . . . . . 9

Concert Choir	MU	361L	1
Chamber Singers	MU	364L	1
Music Theatre Production	MU	368L	1

Studio Voice (Classical)	MU	377 (1)	4
Problems in Music Performance	MU	399	4
History of Opera to 1900	MU	440	4
History of 20th Century Opera and Music Theatre	MU	441	4
History of World Music Theatre	MU	442	4
Acting I	TH	151/151L	2,2
Acting II	TH	152/152L	2,2
Vocal Techniques for the Theatre	TH	252/252L	2,1
Movement for the Stage	TH	254L	2
Improvisation for the Theatre	MU	355L	1,1
Modern Dance I-II	DAN	273A	2
Modern Dance III-IV	DAN	274A	2

**COURSE DESCRIPTIONS****MU 100 Introduction to Music (4)**

Cross-cultural study of basic elements of music and their applications; music in culture, its values, structures, and functions. 4 lectures/problem-solving.

**MU 101 Music Appreciation (4)**

Developing skills in listening to music using music from various cultures. Exposure to different styles of music representing many diverse music cultures. 4 lecture discussions.

**MU 103 World of Music (4)**

Introduction to selected music cultures of the world. At least one music culture from each continent will be covered. 4 lectures/problem-solving.

**MU 104 Introduction to Music Business (4)**

Survey of the music industry, with emphasis on individual career options, roles and responsibilities. Interaction with industry components, and relationships between business personnel and the music artist. 4 lecture presentations.

**MU 105A Concert Attendance (1)**

Attendance at and reporting of concerts, music hours, recitals, and musicals. 2 hours activity. Total credit limited to 12 units.

**MU 107 Western Classical Music (4)**

A presentation of Western classical music cultures found in Europe, Asia, Africa, North and South America. Forms, styles, genres, social context, aesthetics. 4 lecture discussions.

**MU 108/108A Introduction to Music Technology (3/1)**

Theories, concepts and terminology of music technology. Physical/timbral characteristics of acoustic instruments. Technological models that imitate and expand acoustic characteristics. Basics of sound reinforcement systems, storage systems, analog and digital sound systems. Computer applications in sound synthesis, composition and research. 3 lecture presentations/problem-solving, 2 hours activity. Co-requisites: MU 108/108A.

**MU 109 Survey of World Pop Music (4)**

Coverage of pop music in various countries in Asia, Africa, Europe, North and South America. Forms, performers, combinations of local and international traditions. 4 lecture discussions.

**MU 110 Jazz and Beyond (4)**

A broadly multicultural survey of jazz and jazz-related music from America and around the world. CDs, videos. 4 lecture presentations.

**MU 111A, 112A, 113A Class Piano (1)**

Beginning class piano instruction. Development of ability to play chords in all keys and to harmonize melodies using these chords. Transposition of melodies. Technical studies. Prerequisite: MU 100 or equivalent. 2 hours activity.

**MU 114 Beginning Piano (1)**

Beginning class piano instruction. Reading and playing simple compositions. No previous experience required. May be repeated for a total of 3 credits. One lecture.

**MU 116 Beginning Improvisation (1)**

Beginning experience in improvisational techniques. Chords, key, scales, melodic and rhythmic application, stylistic devices and procedures necessary to the development of spontaneous and creative soloistic invention. Total credit limited to 6 credits. 2 hours activity. Prerequisite: permission of instructor.

**MU 120 Music Theory I (4)**

Reading, playing, singing, listening to and analyzing rhythms, simple double and triple meters, dotted notes, the pitches of the treble and bass clefs, major scales and key signatures, major and minor triads, principal triads in major keys and their inversions. 4 lectures/problem-solving. Prerequisite: none.

**MU 121 Music Theory II (4)**

Compound meters, second level subdivision of the beat, syncopation; natural, harmonic and melodic minor scales, minor key signatures, principal triads in minor keys, major and minor key relationships, all chords in major keys including secondary dominant functioning chords and inversions. 4 lectures/problem-solving. Prerequisite: MU 120

**MU 122 Music Theory III (4)**

All diatonic minor key chords and their inversions, secondary dominant functioning chords and their inversions, 7th and 9th chords, harmonic flow in major and minor keys, modulation to closely related keys, introduction to chromatic harmony. 4 lectures/problem-solving. Prerequisites: MU 120, 121

**MU 130 Brass Class (1)**

Beginning and intermediate instruction in the fundamentals of playing brass instruments. One lecture. May be repeated for a total of 3 credits. No previous experience required.

**MU 131 Guitar Class (1)**

Beginning and intermediate instruction in the fundamentals of playing guitar. Development of right and left hand finger coordination, strumming and finger-picking techniques; note and chord reading skills. One lecture. May be repeated for a total of 3 credits. No previous experience required.

**MU 132 Percussion Class (1)**

Beginning and intermediate instruction on percussion instruments. Stick and mallet technique including membrane, metal, non-pitched and pitched instruments. One lecture. No previous experience required. May be repeated for a total of 3 credits.

**MU 133 Strings Class (1)**

Beginning and intermediate instruction on the violin, viola, cello, or bass. Development of bow and finger coordination, tone and note reading skills. One lecture. May be repeated for a total of 3 credits. No previous experience required.

**MU 134 Voice Class (1)**

Beginning and intermediate instruction in singing. Basic techniques with emphasis on breath techniques, tone production, diction, and song performances. One lecture. May be repeated for a total of 3 credits. No previous experience required.

**MU 135 Woodwind Class (1)**

Beginning and intermediate instruction on flute, oboe, clarinet, bassoon, or saxophone. One lecture. May be repeated for a total of 3 credits. No previous experience required.

**MU 136 World Music Class (1)**

Beginning and intermediate instruction on instruments from world music traditions not covered in MU 130, 131, 132, 133, or 135. One lecture. May be repeated for a total of 3 credits. No previous experience required.

**MU 171 Studio Strings (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for violin, viola, cello, or double bass. Jury examination at the end of each quarter. Total credit limited to 9 credits. Prerequisite: permission of instructor.

**MU 172 Studio Brass (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for trumpet, horn, trombone, tuba, euphonium. Jury examination at the end of each quarter. Total credit limited to 9 credits. Prerequisite: permission of instructor.

**MU 173 Studio Woodwinds (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for flute, oboe, clarinet, bassoon, saxophone. Jury examination at the end of each quarter. Total credit limited to 9 credits. Prerequisite: permission of instructor.

**MU 174 Studio Percussion (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for timpani, mallet instruments, and other percussion specialties. Jury examination at the end of each quarter. Total credit limited to 9 credits. Prerequisite: permission of instructor.

**MU 175 Studio Keyboard (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for piano, organ, or harpsichord. Jury examination at the end of each quarter. Total credit limited to 9 credits. Prerequisite: permission of instructor.

**MU 176 Studio Guitar (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies. Jury examination at the end of each quarter. Total credit limited to 9 credits. Prerequisite: permission of instructor.



**MU 177 Studio Voice (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies. Jury examination at the end of each quarter. Total credit limited to 9 credits. Prerequisite: permission of instructor.

**MU 180 World Music Studio (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate to the instrument. Jury examination at the end of each quarter. Total credit limited to 9 credits. Prerequisite: permission of instructor.

**MU 199A Special Activity for Lower Division (1-2)**

Small group performance or other musical activity. Title to be specified in advance. Total credit limited to 8 units, with a maximum of 2 units per quarter. Prerequisite: permission of instructor.

**MU 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**MU 211A, 212A, 213A Class Piano (1)**

Second year of class piano. Continued development of music reading skills and transposing, music for recreation. 2 hours activity. Prerequisite: MU 113A.

**MU 214 Intermediate Piano (1)**

Intermediate class piano instruction. Continued development of reading and playing skills at the keyboard. One lecture. May be repeated for a total of 3 credits. Prerequisite: MU 114.

**MU 221 Musicianship (1)**

Development of sight reading skills and rhythmic, melodic and harmonic dictation in a laboratory setting including computer-assisted tutoring. Prerequisite: MU 122 or equivalent. One lecture.

**MU 222 Musicianship (1)**

Development of sight reading skills and rhythmic, melodic and harmonic dictation in a laboratory setting including computer-assisted tutoring. Prerequisite MU 221 or equivalent. One lecture.

**MU 223 Musicianship (1)**

Drill and practice of sight reading skills and rhythmic, melodic and harmonic dictation in a laboratory setting including computer-assisted tutoring. Prerequisite MU 222 or equivalent. One lecture.

**MU 228/228A Music Recording Techniques I (3/1)**

Recording techniques, microphone placement, recorders, mixing, overdubbing, multi-track recording, "live" recording, digital and analog signal storage mediums, signal processing. Creative solving of recording problems as related to the musical product. 3 lectures/problem-solving. 2 hours activity. Corequisites: MU 228/228A.

**MU 230 Directed Field Experience (2)**

Observation and analysis of the public school music classroom. Analyze current trends in contemporary music education. Observation and clinical experiences in public school classrooms will be required. 2 seminars.

**MU 240 Music Literatures of Europe before 1800 (1)**

Developing an awareness of European music literatures created before

1800 by means of directed listening. One lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 241 Music Literatures of Europe after 1800 (1)**

Developing an awareness of the variety of European music literatures created after 1800 by means of directed listening. One lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 242 Music Literatures of North America (1)**

Developing an awareness of North American music literatures by means of directed listening. One lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 243 Music Literatures of the Middle East (1)**

Developing an awareness of Middle Eastern music literatures by means of directed listening. One lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 244 Music Literatures of Africa (1)**

Developing an awareness of African music literatures by means of directed listening. 1 lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 245 Music Literatures of Latin America (1)**

Developing an awareness of Latin American music literatures by means of directed listening. 1 lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 246 Music Literatures of Jazz Traditions (1)**

Developing an awareness of jazz music literatures by means of directed listening. 1 lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 247 Music Literatures of World Pop Music (1)**

Developing an awareness of world pop music literatures by means of directed listening. 1 lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 248 Music Literature for Music Theatre (1)**

Developing an awareness of music literatures for music theatre by means of directed listening. 1 lecture/problem-solving. Prerequisites: MU 103, MU 120

**MU 251 Marching Band Techniques (1)**

Techniques involved in the successful operation of a marching band; charting, drill, music selection, instrumentation, and budget. 1 lecture discussion/presentation.

**MU 261 Diction for Singers (2)**

Study of International Phonetic Alphabet, pronunciation of languages most often needed to perform great song and operatic literature. Exercises in Italian, French, German, and English diction. Performance of songs or arias in these languages. 2 lectures/presentation/problem-solving.

**MU 263 Interpretation for Singers (2)**

A performance workshop based on individual student participation in which communication through the singing voice and the special problems of the singer/actor are explored in depth. 2 lectures/presentation/problem-solving. Prerequisites: MU 134 or 1 unit of MU 177

**MU 270 Performance Seminar (1)**

Weekly seminar/workshop to give students an opportunity to perform for each other and encourage discussion of technique, interpretation, and style. May be repeated up to 12 units. 1 seminar.

**MU 279 Music Studies Integration I (1)**

Integration of the creativity, performance, technological and business aspects of music. Quarter long group projects resulting in a finished performance and/or product. One lecture/problem-solving. Prerequisite: MU 104, 108/108A, and 120.

**MU 299/299A/299L Special Topics for Lower Division (1-4)**

Lower division group study of a selected topic within the lecture/presentation/problem-solving format. Topics to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

**MU 301 Advanced Music Theory (3)**

Study of chromatic harmony including augmented 6th chords and chromatic modulation; evolution and re-ordering of musical elements in the 20th Century including expanded use of rhythm and meters, free tonality, atonality, bi-tonality, symmetry, multi-layered techniques, ultra-rationalism, minimalist techniques. 3 lectures/problem-solving. Prerequisite: MU 122 or equivalent.

**MU 302 Structure of Music: Tonal Counterpoint (3)**

Study and experience in analyzing and writing modal and tonal counterpoint. Including ecclesiastic almodos, rhythmic modes, species counterpoint, contrapuntal techniques. Vocal polyphony and instrumental inventions and fugues. 3 lectures/problem-solving. Prerequisite: MU 301 or equivalent.

**MU 303 Form and Analysis (3)**

Study and experience in solving problems related to analyzing musical forms. Includes small song and dance forms, sonata, rondo, concerto, theme and variation. 3 lectures/problem-solving. Prerequisite: MU 302 or equivalent.

**MU 304 Beginning Conducting (2)**

Study of and experience in basic conducting techniques. Problem solving and decision making with regard to tempo, dynamics, performers ability, difficulty of music, instrumentation, balance, blend, pitch and rhythmic accuracy, and score reading. 2 lectures/problem-solving. Prerequisite: MU 122.

**MU 307 Instrumental Conducting (2)**

Study of and experience in instrumental conducting techniques. Problem-solving and decision-making as it pertains to conducting instrumental ensembles. Practical experience in implementing those decisions. 2 lectures/problem-solving. Prerequisite: MU 304 or equivalent.

**MU 308 Choral Conducting (2)**

Study of and experience in choral conducting techniques. Problem-solving and decision-making as it pertains to conducting vocal ensembles. Practical experience in implementing those decisions. 2 lectures/problem-solving. Prerequisite: MU 304 or equivalent.

**MU 309 Arranging I (2)**

Techniques of arranging; modifying existing compositions for concert band, jazz band, orchestra, small and large instrumental and vocal ensembles. 2 lectures. Prerequisite: MU 120 or consent of instructor.

**MU 311 Music of Mexico (4)**

Survey of music and dance of Mexico focusing on folk instruments and music patterns, cultural crossover between Hispanic and Indian music heritages. 4 lecture discussions.

**MU 315 Music of Asia (4)**

The music of South, East, and West Asia; forms, genres, functions of music in societies. Musical studies related to aesthetics and other values. 4 lecture discussions.

**MU 316 Advanced Jazz Improvisation (1)**

Traditional and contemporary techniques of improvisation. Basic and advanced chords, keys, and scales are emphasized through melodic, rhythmic, and harmonic applications. Total credit limited to 6 units. 2 hours activity. Prerequisite: MU 116 or consent of instructor.

**MU 317 Women in Music (4)**

Study of contributions women have made as composers and performers. Student presentation of a culminating study. 4 lecture discussions.

**MU 319 Music of Africa (4)**

Survey of sub-Saharan traditional music exploring stylistic diversity and unity expressing values of African peoples. Consideration of pre-European and Western-influenced styles as they depict Africa's musical responses to contemporary life. 4 lecture discussions.

**MU 321L Musicianship (1)**

Development of sight-reading skills and rhythmic, melodic and harmonic dictation in a laboratory setting including computer-assisted tutoring. Prerequisite: MU 223 or equivalent. One lecture.

**MU 322L Musicianship (1)**

Development of sight-reading skills and rhythmic, melodic and harmonic dictation in a lab setting including computer-assisted tutoring. Prerequisite: MU 321 or equivalent. One lecture.

**MU 323L Musicianship (1)**

Development of sight-reading skills and rhythmic, melodic and harmonic dictation in a lab setting including computer-assisted tutoring. Prerequisite: MU 322 or equivalent. One lecture.

**MU 328/328A Music Recording Techniques II (1/1)**

Creative application of techniques acquired in MU 228. Supervision of student projects involving multi-track and/or "live" recording leading to production of demonstration and master tapes. 1 seminar, 2 hours activity. Prerequisites: MU 228/228A or permission of instructor. Corequisites: MU 328/328A.

**MU 329 Music Technology Through the Ages (4)**

Exploration of the influences that technology developments have had on music composition and performance in a variety of cultures, beginning with the development of the first percussion, string, and wind instruments to the present use of digital technology. 4 lecture discussions.

**MU 330 Brass Fundamentals (2)**

Fundamentals of playing and teaching the trumpet, trombone, horn, tuba for music majors and minors who plan to teach music in the public schools K-12. Development of embouchure, tone, note reading skills; basic brass pedagogy. 2 lecture presentations/problem-solving. Prerequisite: MU 120-122.

**MU 331 Percussion Fundamentals (2)**

Fundamentals of playing and teaching percussion instruments for music majors and minors who plan to teach music in the public schools K-12; stick and mallet technique for membrane, metal, non-pitched and pitched instruments. Basic percussion pedagogy. 2 lecture presentations/problem-solving. Prerequisite: MU 120 - 122.

**MU 332 String Fundamentals (2)**

Fundamentals of playing and teaching the violin, viola, cello, and string bass for music majors and minors who plan to teach music in the public schools K-12. Development of bow and finger coordination, tone, note reading skills; basic string pedagogy. 2 lecture presentations/problem-solving. Prerequisite: MU 120 - 122.

**MU 333 Voice Fundamentals (2)**

Fundamental techniques of singing for music majors and minors who plan to teach music in the public schools K-12. Methods of tone production, breathing, diction, selection of repertoire, and song interpretations. 2 lecture presentations/problem-solving. Prerequisite: MU 120 - 122.

**MU 334 Woodwind Fundamentals (2)**

Fundamentals of playing and teaching woodwinds: flute, oboe, clarinet, bassoon, saxophone, for music majors and minors who plan to teach music in the public schools K- 12. Development of finger coordination, tone, note reading skills; basic woodwind pedagogy. 2 lecture presentations/problem-solving. Prerequisite: MU 120 - 122.

**MU 341 Brass Ensemble (1)**

Study and performance of small instrumental ensemble literature. May be repeated for a total of 6 credits. Enrollment by audition. 1 lecture.

**MU 342 Woodwind Ensemble (1)**

Study and performance of small instrumental ensemble literature. May be repeated for a total of 6 credits. Enrollment by audition. 1 lecture.

**MU 343 Percussion Ensemble (1)**

Study and performance of small instrumental ensemble literature. May be repeated for a total of 6 credits. Enrollment by audition. 1 lecture.

**MU 344 String Ensemble (1)**

Study and performance of small instrumental ensemble literature. May be repeated for a total of 6 credits. Enrollment by audition. 1 lecture.

**MU 345 Piano Accompaniment (1)**

Study of accompaniments for rehearsals and performances of soloists and ensembles in vocal and instrumental classes. May be repeated for a total of 6 credits. Enrollment by audition. 1 lecture.

**MU 346 Guitar Ensemble (1)**

Study and performance of small instrumental ensemble literature. May be repeated for a total of 6 credits. Enrollment by audition. 1 lecture.

**MU 347 World Music Ensemble (1)**

Study and performance of small instrumental ensemble literature. May be repeated for a total of 6 credits. Enrollment by audition. 1 lecture.

**MU 348 Piano Ensemble (1)**

Sight-reading, rehearsal, and performance of ensemble piano repertoire. Ensembles to include piano 4-hands, duo-piano, and groups

of 3-4 keyboard players on multiple instruments. May be repeated for a total of 6 credits. 1 lecture. Enrollment by audition.

**MU 351L Orchestra (1)**

Rehearsal and performance of orchestral literature from all musical periods by composers from around the world. 3 hours laboratory. May be repeated for 12 credits. Enrollment by audition.

**MU 352L Concert Band (1)**

Rehearsal and performance of wind band literature by composers from around the world. 3 hours laboratory. May be repeated for a total of 12 credits. Enrollment by audition.

**MU 353A Symphonic Wind Ensemble (1)**

Rehearsal and performance of symphonic wind literature by composers from around the world. 2 hours activity. May be repeated for a total of 12 credits. Enrollment by audition.

**MU 354L Jazz Band (1)**

Rehearsal and performance of jazz and jazz related music . 3 hours laboratory. May be repeated for a total of 12 credits. Enrollment by audition.

**MU 356A Jazz Combo (1)**

Rehearsal of performance of small group jazz and jazz related music . 2 hours activity. May be repeated for a total of 12 credits. Enrollment by audition.

**MU 357 Instrumental Techniques for Secondary Education (2)**

Study and student discussion of problems and solutions involved in developing and operating an instrumental music program in secondary schools. 2 lectures/problem-solving. Prerequisite: permission of instructor.

**MU 358A Latin American Ensemble (1)**

Study and performance of music from Latin American countries. 2 hours activity. May be repeated for 6 credits. Enrollment by audition.

**MU 361L Concert Choir (1)**

Rehearsal and performance of choral literature for mixed voices, from all musical periods by composers from around the world. Enrollment by audition. 3 hours laboratory. May be repeated for a total of 12 credits.

**MU 364L Chamber Singers (1)**

Rehearsal and performance literature for small choral ensembles, from all musical periods by composers from around the world. Enrollment by audition. 3 hours laboratory. May be repeated for a total of 12 credits.

**MU 365L Vocal Jazz Ensemble (1)**

Rehearsal and performance of jazz and jazz-related vocal music . 3 hours laboratory. May be repeated for a total of 12 credits. Enrollment by audition.

**MU 366L Music Theatre Workshop (1)**

Rehearsal and performance of operatic and musical theatre literature. May be repeated for a total of 6 credits. 3 hours laboratory. Enrollment by audition.

**MU 367 Vocal Techniques for Secondary Education (2)**

Study and student discussion of problems and solutions involved in

developing the adolescent voice, as well as developing and operating a vocal music program in secondary schools. 2 lectures/problem-solving. Prerequisite: permission of instructor.

### **MU 368L Music Theatre Production (1)**

Rehearsal and performance of an opera or musical comedy. Technical crews, singing, and acting. May be repeated for a total of 6 credits. 3 hours laboratory. Enrollment by audition.

### **MU 371 Studio Strings (Classical) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies for violin, viola, cello, or double bass with a higher level of skill and more repertoire mastered than for MU 171. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: successful completion of MU 171 requirements and passing entrance requirements for upper division studio.

### **MU 372 Studio Brass (Classical) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for trumpet, horn, trombone, tuba, or euphonium with a higher level of skill and more repertoire mastered than for MU 172. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: successful completion of MU 172 requirements and passing entrance requirements for upper division studio.

### **MU 373 Studio Woodwinds (Classical) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for flute, oboe, clarinet, bassoon, or saxophone with a higher level of skill and more repertoire mastered than for MU 173. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: successful completion of MU 173 requirements and passing entrance requirements for upper division studio.

### **MU 374 Studio Percussion (Classical) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for timpani, mallet instruments, or other percussion specialties with a higher level of skill and more repertoire mastered than for MU 174. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: successful completion of MU 174 requirements and passing entrance requirements for upper division studio.

### **MU 375 Studio Keyboard (Classical) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for piano, organ, or harpsichord with a higher level of skill and more repertoire mastered than for MU 175. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: successful completion of MU 175 requirements and passing entrance requirements for upper division studio.

### **MU 376 Studio Guitar (Classical) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies with a higher level of skill and more repertoire mastered than for MU 176. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: successful completion of MU 176 requirements and passing entrance requirements for upper division studio.

### **MU 377 Studio Voice (Classical) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies with a higher level of skill and more repertoire mastered than for MU 177. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: successful completion of MU 177 requirements and passing entrance requirements for upper division studio.

### **MU 378 Studio Composition (1)**

A series of 10 specialized individual instruction lessons. Jury examination at the end of each quarter. Total credit limited to 6 units. Prerequisite: MU 120 - 122, MU 221 - 223

### **MU 380 World Music Studio (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate to the instrument with a higher level of skill and more repertoire mastered than for MU 180. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: successful completion of MU 180 requirements and passing entrance requirements for upper division studio.

### **MU 382 Studio Conducting (1)**

A series of 10 specialized individual instruction lessons per quarter. Jury examination at the end of each quarter. Total credit limited to 6 credits. Prerequisite: MU 304, MU 307 or 308, and permission of instructor.

### **MU 384 Studio Brass (Jazz and Pop Music Styles) (1)**

A series of 10 specialized individual instruction lesson. Repertoire and technical studies as appropriate for brass. Jury examination at the end of each quarter. Total credit limited to 6 credits. One hour supervision. Prerequisite: successful completion of MU 172 requirements and passing entrance requirements for upper division studio.

### **MU 386 Studio Guitar (Jazz and Pop Music Styles) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for guitar. Jury examination at the end of each quarter. Total credit limited to 6 credits. One hour supervision. Prerequisite: successful completion of MU 176 requirements and passing entrance requirements for upper division studio.

### **MU 388 Studio Percussion (Jazz and Pop Music Styles) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for percussion. Jury examination at the end of each quarter. Total credit limited to 6 credits. One hour supervision. Prerequisite: successful completion of MU 174 requirements and passing entrance requirements for upper division studio.

### **MU 390 Studio Strings (Jazz and Folk Styles) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for strings. Jury examination at the end of each quarter. Total credit limited to 6 credits. One hour supervision. Prerequisite: successful completion of MU 171 requirements and passing entrance requirements for upper division studio.

### **MU 391 Studio Voice (Jazz and Pop Music Styles) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for voice. Jury examination at the end of each quarter. Total credit limited to 6 credits. One hour supervision. Prerequisite: successful completion of MU 177 requirements and passing entrance requirements for upper division studio.



**MU 392 Studio Woodwinds (Jazz and Pop Music Styles) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for woodwinds. Jury examination at the end of each quarter. Total credit limited to 6 credits. One hour supervision. Prerequisite: successful completion of MU 173 requirements and passing entrance requirements for upper division studio.

**MU 393 Studio Keyboard (Jazz and Pop Music Styles) (1)**

A series of 10 specialized individual instruction lessons. Repertoire and technical studies as appropriate for keyboard. Jury examination at the end of each quarter. Total credit limited to 6 credits. One hour supervision. Prerequisite: successful completion of MU 175 requirements and passing entrance requirements for upper division studio.

**MU 394 Music Studies Integration II (1)**

Integration of the creativity, performance, technological and business aspects of music. Quarter-long group projects resulting in a finished performance and/or product. 1 lecture/problem-solving. Prerequisites: MU 120, MU 108/108A, MU 279.

**MU 396 Commercial Music Styles (4)**

Survey of popular music performed in concert and the recorded media from the early 1900's to the present. Styles include rock, jazz, new age, and other popular styles performed within and outside of the United States. Research and presentation of findings. 4 lecture presentations/problem-solving. Prerequisite: MU 104, MU 109, MU 110, MU 120-122.

**MU 397 Music in Record, Radio, Film, and Television Industries (4)**

Study of record companies, radio stations, music in film and television. Administrative and creative functions, their roles and influence within the music industry and impact on society. Advertising, music videos and multimedia. Administrative and creative functions of music synchronization. 4 lecture discussions. Prerequisites: none.

**MU 398 Artist Representation and Promotion, Non-Profit Music (4)**

Roles and responsibilities of individuals who represent performing artists. Credibility and image-building. Techniques for self-promotion. Orchestras, symphonies, and opera companies as business operations. Responsibilities of personnel. Financial concerns, grants and fundraising. Promotion and marketing. 4 lecture discussions. Prerequisite: MU 104.

**MU 399 Problems in Music Performance (4)**

Examination of issues from overuse syndrome to stage fright which performers of all ages must resolve. 4 lectures/problem-solving. Prerequisite: enrollment in music studio or ensemble course.

**MU 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**MU 401/401A Music Skills for Teachers (1/1)**

Music skills applied to elementary classroom instruments. Music notation, reading and playing children's literature. 1 hour lecture/presentation/problem-solving. 2 hours activity. Corequisites: MU 401/401A. Prerequisite: upper division standing.

**MU 402/402A Music Literature for Children (1/1)**

Music methods, texts, songs, recordings, and instruments used in the elementary classroom. Further development of skills acquired in MU 401, their application to problem-solving. Presentation of music activities for all elementary grade levels. Application of music to teach non-music concepts. 1 hour lecture discussion/problem-solving. 2 hour activity. Prerequisite: MU 401 or passing a MU 401 equivalency examination. Corequisites: MU 402/402A.

**MU 404 History of Music to 1750 (4)**

Development of Western musical cultures from the Middle Ages through 1750. Research, listening, analysis. 4 hours lecture/presentation/problem-solving. Prerequisite: MU 103, required MU 240 - 248 courses appropriate to emphasis, MU 120-122, MU 301, MU 221-223, MU 321-323.

**MU 405 History of Music 1750 to 1900 (4)**

Development of Western musical cultures from 1750 to 1900. Research, listening, analysis. 4 lecture presentations/problem-solving. Prerequisite: MU 103, required MU 240 - 248 courses appropriate to emphasis, MU 120 -122, MU 301, MU 221 - 223, MU 321 - 323.

**MU 406 History of Twentieth Century Music (4)**

Development of Western musical cultures in the 20th Century. Research, listening, analysis. 4 lecture presentations/problem-solving. Prerequisite: MU 103, required MU 240 - 248 courses appropriate to emphasis, MU 120-122, MU 301, MU 221-223, MU 321-323.

**MU 407 Arranging II (2)**

Arranging for ensembles of mixed colors: string, woodwind, brass, percussion and electronic instruments. Including techniques of instrumentation and orchestration for "serious," popular, jazz and multicultural genres. 2 lectures/problem-solving. Prerequisite: MU 309.

**MU 408/408A Computers and Music (3/1)**

Computer music software and hardware: software based sound generation, computer assisted composition, music notation, computer as event controller. MIDI in music performance, composition and recording. Problems in the use of technology to express the human quality in music. 3 lecture presentations/problem-solving, 2 hours activity. Prerequisite: MU 108/108A or permission of instructor. Corequisites: MU 408/408A.

**MU 410 Music in Society (4)**

Exploring the complex relationship between society, music, and musicians. Observing music and music making as activities with meaning beyond the sounds of music itself. 4 lecture discussions.

**MU 411 Music of China (4)**

An examination of the richly diverse past and present music cultures of China. The values and thought which are the foundation for the creation of this vast music literature. 4 lecture discussions.

**MU 412 Music of Turkey (4)**

An examination of music's in the Turkish history, folk and art traditions, recent developments. 4 lecture discussions.

**MU 413 Music of Ghana (4)**

Ghana's many musical traditions from indigenous to imports. 4 lecture discussions.

**MU 414 Music of Afro America (4)**

African-derived music forms and expression in the Americas. An examination of cultural values which generate the various music of diverse Black communities throughout the Americas and the Caribbean. 4 lecture discussions.

**MU 415 Music of England (4)**

An examination of music in English history, folk and art music traditions, and recent developments. 4 lecture discussions.

**MU 416 Music of Native America (4)**

A study of selected music traditions of Native American peoples. Forms, histories. 4 lecture discussions.

**MU 417 Music of India (4)**

Study of the principal systems of music in India, Karnatic and Hindustani, as well as the music of film, folk and popular music. Forms and genres. 4 lecture discussions.

**MU 418 Music Histories of Europe, North and South America (4)**

Examination of the histories of various selected music cultures in Europe, North and South America. Research, listening. 4 hours lecture/problem-solving. Prerequisite: MU 103, required MU 240 - 248 courses appropriate to emphasis, MU 120 - 122, MU 301, MU 221 - 223, MU 321 - 323.

**MU 419 Music Histories of Africa, Asia, and the Middle East (4)**

Examination of the histories of selected music cultures in Africa, Asia, and the Middle East. Research, listening. 4 hours lecture/problem-solving. Prerequisite: MU 103, required MU 240 - 248 courses appropriate to emphasis, MU 120 - 122, MU 301, MU 221 - 223, MU 321 - 323.

**MU 420 Song Literature (2)**

Survey of song literature available to the concert singer from the time of the troubadours to the present, with emphasis on the major Italian, German, French, English, and American repertoire. Presentation of research and categorization of various styles, periods and composers. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 177 (6 units), MU 221 - 223.

**MU 421 Piano Literature (2)**

Survey of piano music by 18th, 19th, 20th century composers. Research and presentation of systematic and graded repertoire for works by assigned composers. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 175 (6 units), MU 221 - 223.

**MU 422 Guitar Literature (2)**

Survey of available solo and ensemble literature composed or transcribed for the guitar, classical forms to contemporary. Research and presentation of findings. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 176 (6 units), MU 221 - 223.

**MU 423 Brass Literature (2)**

Survey of solo and ensemble brass music by 18th, 19th, and 20th century composers. Research and presentation of historic and graded repertoire. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 172 (6 units), MU 221 - 223.

**MU 424 Woodwind Literature (2)**

Survey of solo and ensemble woodwind music by 17th, 18th, 19th, and 20th century composers. Research and presentation of historic and graded repertoire. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 173 (6 units), MU 221 - 223.

**MU 425 Percussion Literature (2)**

Survey of available solo and ensemble literature composed or transcribed for pitched and non-pitched percussion, classical forms to contemporary. Research and presentation of findings. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 174 (6 units), MU 221 - 223.

**MU 426 String Literature (2)**

Survey of solo and ensemble literature composed for violin, viola, cello, and double bass. Research and presentation of findings. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 171 (6 units), MU 221 - 223.

**MU 427 World Music Literature (2)**

Survey of literature composed for various instruments in world music performance. Research and presentation of findings. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 180 (6 units), MU 221 - 223.

**MU 428 Choral Literature (2)**

A survey of choral literature from medieval times to present day. Emphasis will be given to music appropriate for school choir, church/synagogue choir, and community choir. Survey to include music of various styles and genres. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 361 or 364 (6 units), MU 221 - 223.

**MU 429 Wind Ensemble Literature (2)**

Survey of original wind ensemble music and transcriptions by 18th, 19th, and 20th century composers. Research and presentation of historic and graded repertoire. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 221 - 223, MU 352L or 353A (6 units).

**MU 430 Orchestra Literature (2)**

Survey of orchestral compositions by 17th, 18th, 19th, and 20th century composers. Research and presentation of repertoire. 2 lecture presentations. Prerequisite: MU 120 - 122, MU 221 - 223.

**MU 440 History of Opera to 1900 (4)**

Growth of opera from its beginnings in the Baroque period through 1900. Research, listening, analysis. 4 lecture presentations/problem-solving. Prerequisite: required number of courses specified by the emphasis area in the sequence MU 240 - 248, MU 120 - 122, MU 221 - 223.

**MU 441 History of Twentieth Century Opera and Musical Theater (4)**

Development of opera and musical theater during the twentieth century. Research, listening, analysis. 4 lecture presentations/problem-solving. Prerequisite: MU 440.

**MU 442 History of World Music Theaters (4)**

Styles of music theater found throughout the world with special emphasis on non-Western traditions. Research, listening, analysis. 4 lecture presentations/problem-solving. Prerequisite: MU 441.

**MU 462 Senior Project (4)**

Completion of a recital or research, writing and presentation of a project, or work experience in music business. Category to be determined by, and work to be accomplished under the supervision of appropriate faculty member. Prerequisite: completion of 100 level, 200 level, 300 level (except ensemble) courses required by the emphasis of choice.

**MU 490 Music Publishing, Copyright, and Licensing (4)**

Music publishing administration, copyright law, songwriter-publisher contracts, music licensing and clearances. Legal rights and obligations. Discussion of concepts: personal service, exclusivity and conflict of interest, issues of publicity versus privacy, anti-trust, trademark and labor law. 4 lectures/problem-solving. Prerequisite: MU 104

**MU 499/499A/499L Special Topics for Upper Division Students (1-4)**

Upper division group study of a selected topic within the lecture/presentation/problem-solving format. Subject to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Corequisites may be required. Prerequisite: permission of instructor.



## PHILOSOPHY

Laurie Shrage, Chair

David M. Adams,  
George E. Derfer  
Zijiang Ding  
James C. Manley  
Judy Miles  
Richard C. Richards  
Rafael F. Rondon

The Philosophy Department has organized its programs to connect the traditional concerns of philosophy with the directions and needs of contemporary society. Philosophy instruction enhances students' knowledge of significant intellectual movements and figures, strengthens students' critical thinking skills, and provides students with a strong background in the humanities and traditional liberal arts. The Department offers both major and minor programs. Emphases within the major are designed to promote interdisciplinary inquiry and to integrate philosophical study with practical endeavors.

The Law and Society Emphasis allows students to concentrate on courses exploring current social and ethical issues. The study of moral and political philosophy, especially, equips students with the tools needed to analyze legal or moral concepts and arguments, and to work toward reasonable solutions to societal problems. This emphasis offers excellent preparation for those planning careers in law, business, education, urban planning, and human services, or those planning graduate work in philosophy.

The Science and Society Emphasis is designed for those who seek to understand the methodological, historical, and philosophical background of contemporary science and technology. This emphasis is especially useful for those planning further study in the physical, cognitive, behavioral, or biological sciences, environmental studies, medicine, biotechnology, computer science, veterinary science, or philosophy.

The Educational and Society Emphasis is designed for students who are planning careers in education, especially at the elementary level. The emphasis includes coursework in critical thinking and ethics, and covers major intellectual debates in the humanities and social and natural sciences. The emphasis constitutes a baccalaureate waiver program that prepares students for entry into a multiple subjects teaching credential program. Admission to such programs is by separate application. Students who plan to seek a multiple subjects teaching credential must have their area competency assessed by the Philosophy Department. Please check with the department office to find out how to complete the assessment process.

The Philosophy Department also offers minors in Philosophy and Religious Studies. The Philosophy minor enables students majoring in other disciplines to gain critical depth into the differing perspectives, assumptions, and values behind their primary discipline. The flexibility of the minor makes it adaptable to a variety of specific vocational and professional interests.

The Religious Studies minor serves students interested in deepening their awareness of the historical and multicultural dimensions of religious traditions as these affect the contemporary world.

### LAW AND SOCIETY EMPHASIS

**CORE COURSES (48 units)** A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Introduction to Philosophy . . . . .	PHL	201	4
Ethical Problems of Contemporary Life . . . . .	PHL	204	4

Religions of the World . . . . .	PHL	220	4
Philosophical Issues in the Law . . . . .	PHL	420	4
Undergraduate Seminar . . . . .	PHL	463	4

Two of the following: . . . . . 8

History of Ancient Philosophy . . . . .	PHL	312	(4)
History of Medieval Philosophy . . . . .	PHL	313	(4)
History of Modern Philosophy . . . . .	PHL	314	(4)
Contemporary Philosophy . . . . .	PHL	315	(4)

Four of the following: . . . . . 16

Philosophy of the Arts . . . . .	PHL	301	(4)
Moral Philosophy . . . . .	PHL	309	(4)
Nineteenth Century Philosophy . . . . .	PHL	319	(4)
American Philosophy . . . . .	PHL	320	(4)
Ethics, Environment and Society . . . . .	PHL	330	(4)
Bioethics . . . . .	PHL	433	(4)
Epistemology . . . . .	PHL	459	(4)
Philosophy of Love and Sex . . . . .	PHL	465	(4)
Film Aesthetics . . . . .	PHL	468/468A	(4)
Existentialism . . . . .	PHL	469	(4)
Social Philosophy . . . . .	PHL	480	(4)
Comparative Philosophy: East and West . . . . .	PHL	485	(4)

### SUPPORT COURSES (20 units)

Total curriculum for B.A. must include 60 units of upper division courses. Students should consult with their advisors to select additional Philosophy and other upper division courses. Students will need to petition any non-philosophy upper division course they wish to use to satisfy the support courses requirement.

### UNRESTRICTED ELECTIVES (50 UNITS)

#### SCIENCE AND SOCIETY EMPHASIS

**CORE COURSES (48 units)** A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Introduction to Philosophy . . . . .	PHL	201	4
Ethical Problems of Contemporary Life . . . . .	PHL	204	4
Symbolic Logic I . . . . .	PHL	218	4
Symbolic Logic II . . . . .	PHL	219	4
Philosophy of Religion . . . . .	PHL	303	4
Bioethics . . . . .	PHL	433	4
Epistemology . . . . .	PHL	459	4
Metaphysics . . . . .	PHL	460	4
Undergraduate Seminar . . . . .	PHL	463	4
Philosophy of Science . . . . .	PHL	483	4

Two of the following: . . . . . 8

History of Ancient Philosophy . . . . .	PHL	312	(4)
History of Medieval Philosophy . . . . .	PHL	313	(4)
History of Modern Philosophy . . . . .	PHL	314	(4)
Contemporary Philosophy . . . . .	PHL	315	(4)

### SUPPORT COURSES (20 units)

Total curriculum for the B.A. must include 60 units of upper division courses. Students should consult with their advisors to select additional Philosophy and other upper division courses. Students will need to petition any non-philosophy upper division course they wish to use to satisfy the support courses requirement.



**UNRESTRICTED ELECTIVES (46 UNITS)****EDUCATION AND SOCIETY EMPHASIS**

This emphasis fulfills the subject matter requirements for the California Multiple Subjects Teaching Credential.

**CORE COURSES (36 units)** A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Philosophy Through Children's Literature	PHL	206	4
History of Ancient Philosophy	PHL	312	4
History of Modern Philosophy	PHL	314	4
Philosophy of Education	PHL	412	4
Senior Seminar on Knowledge, Education, and Society	PHL	464	2,2

One of the following: . . . . . 4

Symbolic Logic I	PHL	218	(4)
Symbolic Logic II	PHL	219	(4)

One of the following: . . . . . 4

Religions of the World	PHL	220	(4)
Moral Philosophy	PHL	309	(4)
Ethics, Environment, and Society	PHL	330	(4)

One of the following: . . . . . 4

Philosophy of the Arts	PHL	301	(4)
Film Aesthetics	PHL	468/468A	(4)
Social Philosophy	PHL	480	(4)
Comparative Philosophy	PHL	485	(4)

One of the following: . . . . . 4

American Philosophy	PHL	320	(4)
Epistemology	PHL	459	(4)
Philosophy of Science	PHL	483	(4)

**SUPPORT COURSES (71 units)**

Students in the Education and Society Emphasis must complete the following units in order to meet the multiple subject area standards set by the California Commission on Teacher Credentialing. Students who take any of the following courses (or equivalent courses) to satisfy their General Education requirements may have them waived from their major requirements. Students should consult with their advisors to select and substitute one or more elective courses:

Language Acquisition	ENG	323	4
Survey of Mathematics	MAT	191	4
Elementary Mathematics from an Advanced Viewpoint	MAT	391	4
Elementary Geometry from an Advanced Viewpoint	MAT	392	4
History of California	HST	370	4
(Students who have not had a U.S. History course as part of their General Education should substitute HST 201 or HST 202 for HST 370)			
Art and the Child	ART	405	4
Child Psychology: The Middle Years	PSY	311	4
Field Experience: Introduction to Schooling	TED	301	4
Physics Concepts and Activities	SCI	210/210L	4
Chemical Sciences	SCI	211/211L	4
Geological Sciences	SCI	212/212L	4

One of the following: . . . . . 4

Survey of American Literature I	ENG	211	(4)
Survey of American Literature II	ENG	212	(4)
Ethnic Literatures of the U.S.	ENG	213	(4)

One of the following: . . . . . 4

Social Anthropology	ANT	358	(4)
Sociology of Minority Communities	SOC	323	(4)

One of the following: . . . . . 4

Children's Literature	ENG	324	(4)
Introduction to Folklore	ENG	231	(4)
Ethnicity, Folklore, and The Arts	EWS	410	(4)

One of the following: . . . . . 4

Cultural Geography	GEO	102	(4)
Economic Geography	GEO	312	(4)
Legal and Political Geography	GEO	313	(4)
Urban Geography	GEO	315	(4)

One of the following: . . . . . 4

Native Peoples of California	ANT	320	(4)
Native Peoples of North America	ANT	321	(4)
Native American Experience	EWS	203	(4)
Native American Contemporary Issues	EWS	403	(4)

One of the following: . . . . . 4

World of Music	MU	103	(4)
Pop Music of Today	MU	106	(4)
Introduction to Jazz Styles	MU	110	(4)
Music Skills for Teachers	MU	401/401A	(2)
and Music Literature for Children	MU	402/402A	(2)

One of the following: . . . . . 3

Developmental Movement for Children	KIN	328/328A	(3)
Developmental Games for Children	KIN	415/415A	(3)

**UNRESTRICTED ELECTIVES (7 UNITS)****GENERAL EDUCATION COURSES (72 UNITS)**

Students may fulfill GE requirements for any of the Philosophy emphases with Track A or Track B of the GE program or with the Interdisciplinary General Education Program.

**PHILOSOPHY MINOR**

Select seven courses from the following list:

Introduction to Philosophy	PHL	201	(4)
Critical Thinking	PHL	202	(4)
Ethical Problems of Contemporary Life	PHL	204	(4)
Philosophy of the Arts	PHL	301	(4)
Moral Philosophy	PHL	309	(4)
History of Ancient Philosophy	PHL	312	(4)
History of Medieval Philosophy	PHL	313	(4)
History of Modern Philosophy	PHL	314	(4)
Contemporary Philosophy	PHL	315	(4)
Great Philosophers	PHL	318	(4)
Nineteenth Century Philosophy	PHL	319	(4)

American Philosophy	PHL	320	(4)
Ethics, Environment, and Society	PHL	330	(4)
Philosophy and Religion of Japan	PHL	401	(4)
Philosophy and Religion of China	PHL	402	(4)
Philosophy and Religion of India	PHL	403	(4)
Philosophy of Education	PHL	406	(4)
Philosophical Issues in the Law	PHL	420	(4)
Bioethics	PHL	433	(4)
Epistemology	PHL	459	(4)
Metaphysics	PHL	460	(4)
Myth, Symbol, and Ritual	PHL	466	(4)
Film Aesthetics	PHL	468/468A	(3,1)
Existentialism	PHL	469	(4)
Social Philosophy	PHL	480	(4)
Philosophy of Science	PHL	483	(4)
Comparative Philosophy	PHL	485	(4)

Total units required for Minor . . . . . 28

### RELIGIOUS STUDIES MINOR

Choose six of the following courses: . . . . . 24

Religions of the World	PHL	220	4
Introduction to Religious Studies	PHL	221	4
Philosophy of Religion	PHL	303	4
Myth, Symbol, and Ritual	PHL	466	4
Philosophy and Religion of Japan	PHL	401	(4)
Philosophy and Religion of China	PHL	402	(4)
Philosophy and Religion of India	PHL	403	(4)

Choose one of the following courses: . . . . . 4

Anthropology of Religion	ANT	360	(4)
Ethnic Thought and Value	EWS	430	(4)
Religion in American History	HST	415	(4)
Religion in American Life	SOC	323	(4)

Total units required for Minor . . . . . 28

### COURSE DESCRIPTIONS

#### PHL 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

#### PHL 201 Introduction to Philosophy (4)

Investigation of basic concepts and methods of philosophy; selected metaphysical, epistemological, ethical, aesthetic, and logical problems and issues traditional to philosophy, with emphasis on their relevance for intelligent living. 4 lectures/problem-solving.

#### PHL 202 Critical Thinking (4)

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

#### PHL 204 Ethical Problems of Contemporary Life (4)

The implications of ethics and ethical systems. The meaning of right and wrong, good and bad, obligation. Sanctions and sources of morality. Inquiry into the principles of the morality of human actions. Ethical foundations of personal and social relations. 4 lectures/problem-solving.

#### PHL 205 Business and Professional Ethics (4)

An analysis of major ethical traditions with a focus on the nature of obligations, right action, responsibility and altruism. Applications to issues concerning business and society. 4 lectures/problem-solving.

#### PHL 206 Philosophy Through Children's Literature (4)

Introduction to philosophical ideas and issues using children's stories and classic philosophical texts. Topics include the mind/body problem, the structure of a just society, the problem of evil, and the criteria of rationality. Stories from different ethnic, national, and religious traditions will be introduced.

#### PHL 218 Symbolic Logic I (4)

An introduction to symbolic languages. Translating from natural languages into symbolic languages. A study of clause logic and sentential calculus. An introduction to predicate logic. 4 lectures/problem-solving.

#### PHL 219 Symbolic Logic II (4)

An intermediate to advanced level investigation of predicate logic. A study of one or more advanced systems of logic or a study of the theorem of completeness. 4 lectures/problem-solving. Prerequisite PHL 218.

#### PHL 220 Religions of the World (4)

Thematic analysis of religious life: practice, belief, history; relationships between religion, society, and culture. Religions include Islam, Judaism, Christianity, Hinduism, Buddhism, Shinto, Taoism, Confucianism, Archaic and Non-missionary traditions, among others. 4 lectures/problem-solving.

#### PHL 221 Introduction to Religious Studies (4)

Basic structural categories of religions: myth, ritual, space, time, gods, ethics, prayer, scripture, iconography, communities, religious leaders. Basic beliefs: sin, pollution, purity, salvation, harmony, transformation, enlightenment. Basic world-views: sacred, profane, good, evil, heaven, hell. 4 lecture/ problem-solving.

#### PHL 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Corequisites may be required. Instruction is by lecture, laboratory or a combination. Prerequisite: permission of instructor.

#### PHL 301 Philosophy of the Arts (4)

Investigation of the nature of art, aesthetic experience, beauty, and the standards upon which aesthetic judgments are based. Concepts common to the various artistic disciplines; problems in specific areas in architecture, the graphic arts, music, and literature. 4 lectures/problem-solving.

#### PHL 303 Philosophy of Religion (4)

Nature and grounds of religious experience, such problems as our concept of ourselves, our gods, our anxiety, evil; the relation of religious faith to science and human behavior. 4 lectures/problem-solving.

#### PHL 309 Moral Philosophy (4)

Investigation of moral theories, drawing from American, Asian, African, European, and Latin American philosophical and religious traditions. Inquiry into the justification and implications of ethical principles and claims. Application of moral theories to particular political issues and personal conflicts. 4 lecture discussions.

**PHL 312 History of Ancient Philosophy (4)**

Examination of the philosophical ideas of the Greek, Roman, and early medieval worlds, from the pre-Socratic philosophers to St. Augustine. 4 lectures/problem-solving.

**PHL 313 History of Medieval Philosophy (4)**

Examination of the philosophical ideas of the medieval and Renaissance worlds, from St. Augustine to Descartes. 4 lectures/problem-solving.

**PHL 314 History of Modern Philosophy (4)**

Great philosophical ideas and thinkers from Descartes to the 20th century; Continental and British schools. 4 lectures/problem-solving.

**PHL 315 Contemporary Philosophy (4)**

Philosophical movements of the 20th century, including modern idealism, positivism, pragmatism, existentialism, dialectical materialism, phenomenology, and ordinary language analysis. May be repeated for credit by permission of instructor and student's major department. 4 lectures/problem-solving.

**PHL 318 Great Philosophers (4)**

Study in depth of a great philosopher, with attention devoted to primary source materials. May be repeated for credit by permission of instructor and student's major department. 4 lectures/problem-solving.

**PHL 319 Nineteenth-Century Philosophy (4)**

Philosophical trends during the 19th century, including the Kantian heritage, the idealism of Fichte, Schelling, and Hegel; utilitarianism as introduced by Bentham and revised by Mill; and the positivism of Comte. 4 lectures/problem-solving.

**PHL 320 American Philosophy (4)**

The lively and varied growth of American thought, from the Puritans through the personalists to the pragmatists: Edwards, Peirce, James, Royce, Santayana, Dewey, Whitehead. 4 lectures/problem-solving.

**PHL 330 Ethics, Environment, and Society (4)**

An examination of the moral and social philosophical aspects of the environmental crisis and the ecological movement. 4 lecture discussions/problem-solving.

**PHL 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**PHL 401 Philosophy and Religion of Japan (4)**

Traditional ways of thought in Japan. Modifications in Shinto from its beginnings through the impacts of Buddhism and Confucianism; its re-emergence in the 19th century. Twentieth-century developments and the emergence of the "new religions." 4 lectures/problem-solving.

**PHL 403 Philosophy and Religion of India (4)**

The diversity of the philosophy and religion of India from Rig Vedic times to the 20th century. Development of the Upanishads, Yoga systems, the great epics, the bhakti movements; emergence of Jainism, Buddhism, Sikhism, Indian Islam. 4 lectures/problem-solving.

**PHL 404 African Philosophy: Nature, Humans, and the Universe (4)**

Explores the meaning and implications of the basic assumptions about

human beings, nature, and the universe in African philosophy. 4 lectures/problem-solving.

**PHL 412 Philosophy of Education**

A critical investigation of the moral, political, and philosophic underpinnings of education in a democratic society. Application of theoretical knowledge to particular contemporary problems facing educators today.

**PHL 420 Philosophical Issues in the Law (4)**

Seminar on a variety of specific issues of philosophical importance which arise in the law. Emphasis upon philosophical problems raised by constitutional law, criminal law, and the law of tort. 4 lectures/problem-solving.

**PHL 433 Bioethics (4)**

Seminar in current issues occasioned by new medical technology. Includes defining death, informed consent, autonomy, allocating scarce medical resources, and ethical theory. Primarily designed for philosophy, pre-med, and health sciences students. 4 seminars. Prerequisite: PHL 201 or equivalent.

**PHL 459 Epistemology (4)**

Seminar in the scope and limits of human knowledge and its relationship to metaphysics: the relationship between knowledge and certainty, the conduct of inquiry in the sciences and humanities, rationalism, empiricism, the relationship of the knower to the known. 4 seminars. Prerequisite: PHL201 or equivalent.

**PHL 460 Metaphysics (4)**

Speculative issues that have been central to philosophy throughout its history: the mind-body problem, the nature of the self, the reality of permanence and change, freedom versus determinism. 4 lectures/problem-solving.

**PHL 461, 462 Senior Project (2)(2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Formal report required. Minimum 120 hours total time.

**PHL 463 Undergraduate Seminar (4)**

An open forum of senior students in which the latest developments, practices, and procedures are discussed. Development and presentation by students of topics in their chosen fields. 4 seminars.

**PHL 464 Senior Seminar in Knowledge, Education, and Society (2-4)**

A capstone seminar for seniors enrolled in the Philosophy Department elementary subject matter pre-credential program. May be taken twice for a total of 4 units.

**PHL 465 Philosophy of Love and Sex (4)**

Definitions of love, connections between love and sexuality. Selected problems related to sex and sex roles. Ethical dimensions of love and sexuality. 4 lecture discussions.

**PHL 466 Myth, Symbol, and Ritual (4)**

Major mythic themes in both Eastern and Western cultures. Ritual practices and symbolic transformation as part of humanity's search for orientation. Contemporary relevance of mythic and symbolic factors. Offered in odd-numbered years. 4 lectures/problem-solving.

**PHL 468/468A Film Aesthetics (3/1)**

Topical approach to film aesthetics; role of myth, psychology, literature, politics, science-fiction, and the popular arts in the aesthetic value of film. Films will be primarily from local sources. 3 lectures/problem-solving. 2 hours activity. Corequisites: PHL 468/468A.

**PHL 469 Existentialism (4)**

Basic ideas of existentialist philosophers of the 19th and 20th centuries; a comparison of theistic and atheistic existentialism; existentialist ideas of anxiety, freedom, and responsibility. 4 lectures/problem-solving.

**PHL 480 Social Philosophy (4)**

A philosophical examination of the methods for studying human societies and human beings. The writings of major social theorists will be covered, including Plato, Marx, Freud, Weber, Durkheim, DuBois, Beauvoir, Marcuse, Foucault, Sapir, and Geertz. Topics include how social theories incorporate values and cultural biases, quantitative vs. qualitative approaches, psychoanalytic and interpretative approaches, and the study of the socially marginal. 4 lecture/problem-solving.

**PHL 483 Philosophy of Science (4)**

A comprehensive introduction to the main theories, arguments and problems in contemporary philosophy of science. 4 lecture-discussions. Prerequisite: PHL 201 or equivalent.

**PHL 485 Comparative Philosophy: The East and the West (4)**

A general comparative study of Eastern and Western philosophy. Topics studied may include metaphysics, epistemology, methodology, theories of human nature, the nature of religious belief, and socio-political values and ideals. 4 lectures/problem-solving.

**PHL 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Corequisites may be required. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.





## POLITICAL SCIENCE

David M. Speak, Chair

Mohammed A. Al-Saadi      Renford R. Reese  
Sandra M. Emerson        Sidney Silliman  
Maria E. Harris            Jose M. Vadi  
John L. Korey              Barbara J. Way  
Ronald M. Peterson

The political science program is designed to provide students with the opportunity to acquire the kind of broad and rigorous education needed for life now and in the 21st century. The best career and life preparation is one which produces individuals who are both educated in the finest traditions of learning and equipped to adapt to constant and rapid change.

The department offers courses leading to the degree of Bachelor of Arts in Political Science. Within this major, two options are offered. The first, a general option in political science, offers a selection of coursework spanning the subfields of the discipline. The second, in public administration, also provides broad coverage of the discipline of political science, but devotes special attention to developing the competencies needed by managers in the public sector. Both options provide a large number of units of free electives in order to ensure flexibility and permit students to tailor their curricula to individual interests, needs, and career goals. For students in majors other than political science, the department offers minors in political science and in public administration.

A special feature of the public administration option and the public administration minor is that these programs are available to both day and evening students.

Students majoring in political science who have at GPA of at least 3.0 overall and 3.3 in the major have the opportunity to join Pi Sigma Alpha, the national honorary society in political science. Additional information can be obtained from the Department of Political Science.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Introduction to Comparative Government and Politics	PLS	202	(4)
Introduction to International Relations	PLS	203	(4)
Introduction Political Thought	PLS	204	(4)
Introduction Research Methods	PLS	205/205A	(3,1)

All students must complete the above core courses by the end of their sophomore year, or by the end of their first year of residency, whichever comes later. Core and option courses may not be used for support and elective courses.

### OPTION COURSES FOR MAJOR

(Required in specific options)  
Political Science\*\*

3 Three-course elective subfields	(36)
2 One-course elective subfields	(8)
Additional courses in political science from any subfields	(8)

\*\*POLITICAL SCIENCE SUBFIELDS

American Politics: PLS 321, 323, 325, 326, 327, 328, 425, 427;  
Comparative Politics: PLS 342, 441, 442, 444, 446, 447, 448, 449;  
International Relations: PLS 451, 453, 454, 455, 456, 457; 458  
Political Theory: PLS 330A, 431, 432, 433, 435, 436, 438;  
Public Administration: PLS 314, 315, 318, 414, 415, 416, 417/417A, 471, 472;  
Public Law: PLS 304, 401, 405, 407, 409.

### PUBLIC ADMINISTRATION

Public Administration	PLS	314	(4)
Politics of Public Policy	PLS	315	(4)
Government Budget Administration	PLS	414	(4)
Government Human Resources Management	PLS	415	(4)
Public Organizations	PLS	416	(4)
Policy Analysis and Program Evaluation	PLS	417/417A	(3,1)
Additional courses in Political Science			(24)

### SUPPORT AND ELECTIVE COURSES

(Required in specific options)

#### Political Science

Principles of Economics	EC	202	4
Free Electives			(42)
(The total curriculum must include 60 units of upper division courses.)			

#### Public Administration

Select ONE track from A, B, or C.

A) Public Budget and Finance (select 4 courses)

Principles of Economics I	EC	201	(4)
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Select three of the following courses:

Accounting for Decision-Making I	ACC	204	(4)
Accounting for Decision-Making II	ACC	205	(4)
Public Finance	EC	410	(4)
Seminar in Land Economics	EC	419	(4)
State and Local Finance	EC	430	(4)
Regional Economic Analysis	EC	431	(4)
Seminar in Urban Economics	EC	432	(4)
Seminar in Environmental Economics	EC	435	(4)

B) Organizational Behavior and Human Resource Administration (select 4 courses)

Industrial and Personnel Psychology	PSY	332	(4)
Psychological Testing	PSY	416	(4)
Multicultural Organizational Behavior	MHR	318	(4)
Advanced Organizational Behavior	MHR	438	(4)
Emerging Issues in Management	MHR	452	(4)

C) Urban Social Problems (select 4 courses)

Principles of Urban Planning	URP	301	(4)
Contemporary Social Problems	SOC	301	(4)
Criminology	SOC	302	(4)
Social Organizations	SOC	310	(4)
Ethnic Relations in America	SOC	320	(4)
Sociology of Minority Communities	SOC	323	(4)
Juvenile Delinquency	SOC	360	(4)
Urban Sociology	SOC	401	(4)

Free Electives. . . . . (34)  
(The total curriculum must include 60 units of upper division courses.)

**GENERAL EDUCATION COURSES****Area 1:**

- A. Select one course ..... (4)  
 B. Select one course ..... (4)  
 C. Select one course ..... (4)

**Area 2:**

- A. Elementary Statistics ..... STA 120 (4)  
 B. Select one course ..... (4)  
 C. Select one course ..... (4)  
 D. Select one course ..... (4)

**Area 3:**

- Select one course from each (A, B, C, D, E, and F) ..... (24)  
 G. Political Science Option, select one course. .... (4)  
     Public Administration Option,  
     General Psychology ..... PSY 201 (4)

**Area 4:**

- Introduction to American Government ..... PLS 201 (4)  
 United States History ..... HST 202 (4)

**Area 5:**

- Select two courses outside own major. .... (8)

**POLITICAL SCIENCE MINOR**

Any two courses from:

- Comparative Political Systems ..... PLS 202 (4)  
 Introduction to International Relations ..... PLS 203 (4)  
 Introduction to Political Thought ..... PLS 204 (4)  
 Introduction to Research Methods ..... PLS 205/205A (3/1)

Additional courses from at least two subfields (\*) of  
 political science. .... (20)  
 Total units required for minor. .... (28)

**\*POLITICAL SCIENCE SUBFIELDS**

American Politics: PLS 321, 323, 325, 326, 327, 328, 425, 427;  
 Comparative Politics: PLS 342, 441, 442, 444, 446, 447, 448, 449;  
 International Relations: PLS 451, 453, 454, 455, 456, 457  
 Political Theory: PLS 330A, 431, 432, 433, 435, 436, 438;  
 Public Administration: PLS 314, 315, 318, 414, 415, 416, 417/417A,  
 471, 472;  
 Public Law: PLS 304, 401, 405, 407, 409.

**PUBLIC ADMINISTRATION MINOR**

Required of all students:

- Public Policy Administration ..... PLS 315 (4)  
 Government Budget Administration ..... PLS 414 (4)  
 Government Human Resources Management ..... PLS 415 (4)  
 Policy Analysis and Program Evaluation ..... PLS 417 (4)

Select one course from the following:

- Principles of Management ..... MHR 301 (4)  
 Public Administration ..... PLS 314 (4)

Select one course from the following:

- Multicultural Organizational Behavior ..... MHR 318 (4)  
 Public Organizations ..... PLS 416 (4)  
 Social Organization ..... SOC 310 (4)

Select 12 units from the following:

- Principles of Economics ..... EC 202 (4)  
 or General Psychology ..... PSY 201 (4)

Accounting for Decision-Making I	ACC	204	(4)
Accounting for Decision-Making II	ACC	205	(4)
Computer Applications In Political Science	PLS	330A	(4)
or Computer Methods in Behavioral Sciences	BHS	340	(4)
or Introduction to Microcomputing	CIS	101	(4)
Public Finance	EC	410	(4)
State and Local Government Finance	EC	430	(4)
Urban Economics	EC	432	(4)
Business and Public Policy	PLS	318	(4)
American State and Local Politics	PLS	328	(4)
Field Work in Government	PLS	471	(1-4)
Field Work in Government and Politics	PLS	472	(1-4)
Industrial and Personnel Psychology	PSY	332	(4)
Psychological Testing	PSY	416	(4)
Criminology	SOC	302	(4)
Urban Sociology	SOC	401	(4)
Principles of Urban Planning	URP	301	(4)
Total units required for minor.			(36)

**QUANTITATIVE RESEARCH MINOR**

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Political Science. A full description of this minor is included in the "University Programs" section of this catalog.

**COURSE DESCRIPTIONS****PLS101A Research Resources in Political Science (4)**

Introduction to the tool of inquiry, both electronic and traditional, needed by students studying politics in the contemporary university. On-Line and hard-copy reference works, electronic mail and other uses of the internet, software applications commonly used in political science for gathering, analyzing, and communicating information.

**PLS 201 Introduction to American Government (4)**

U.S. and California Constitutions and political philosophies of their framers; intergovernmental relations; political institutions and processes; rights and obligations of citizens. Meets state graduation requirement in U.S. Constitution and Government and U.S. Ideals and Institutions. 4 lecture discussions.

**PLS 202 Introduction to Comparative Political Systems (4)**

Introductory comparative analysis of both Western and non-Western politics and government. Relevance of such concepts as political culture, political socialization, and political ideologies to the understanding of political systems. 4 lecture discussions.

**PLS 203 Introduction to International Relations (4)**

Introduction to contemporary international affairs, with emphasis on politics among states. Examination of national foreign policies, the organizational, legal and economic dimensions of the state system, the causes of war, and the future of the global order. 4 lecture discussions.

**PLS 204 Introduction to Political Thought (4)**

Writings of selected philosophers on central questions of political life such as: What is the best political order? Who should rule? What is the nature of freedom and liberty? Equality? Justice? Rights? The public

interest? Power? Basic conceptions and principles of normative political theory. 4 lecture discussions.

### **PLS 205/205A Introduction to Research Methods (3/1)**

The methods of the social sciences as applied to the study of politics. How social scientists ask and attempt to answer empirical questions about politics. 3 lectures, 1 two-hour activity. Corequisites: PLS 205/205A. Prerequisites: PLS 201; STA 120.

### **PLS 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Corequisites may be required. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

### **PLS 304 The Criminal Justice System (4)**

The structure, operation, and goals of the criminal justice system. Review of the process; behavior of the major players and institutions in the system—police, prosecutors, attorneys, courts, corrections; judicial interpretations of due process and constitutional criminal procedure. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 314 Public Administration (4)**

Structures, functions, principles, and processes of American governmental administration. Attention to importance and growth of government administration and to the principles and processes of establishing, directing, and evaluating governmental programs. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 315 Politics of Public Policy (4)**

Substantive policies of government in relation to economic, social, and political programs; the examination of public policy in relation to democratic institutions and the general problem of making public policy responsive to democratic control. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 320 Political Science in America (4)**

The individual and the American political system. Social and psychological factors involved in the formation of political attitudes and behavior, including public opinion, belief systems, participation, party identification and voting. 4 lecture/discussions. Prerequisite: PLS 201

### **PLS 321 Elections in America (4)**

Campaigns and elections in American politics. Role of political party organizations, candidates, issues, campaign strategies, media coverage, long and short term social and economic trends. 4 lecture/discussions. Prerequisite: PLS 201

### **PLS 323 American Ethnic Politics (4)**

The ethnic factor in politics; theoretical literature relating ethnicity to politics; ethnicity, class, and politics; political organization and mobilization. Emphasis on the California experience. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 325 The American Congress (4)**

Congress as a political subsystem; relations between Congress and other branches of American government; comparisons and contrasts between Congress and other legislative bodies. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 326 The American Federal Executive (4)**

Executives as subsystems within the federal political system: behavior, processes, and functions. Emphasis on constitutional underpinnings and institutionalization of the American presidency, on other executive components, and on the frictions created by competing values in the administrative process. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 327 The American Judiciary (4)**

Courts as political subsystems; the structure of the federal judiciary; the nature and scope of judicial power; the Supreme Court and American political development; the politics of judicial appointment; influences on judicial decision-making. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 328 American State and Local Politics (4)**

Comparative analysis of the structures and functions of state and local governments, with emphasis on California. Examination of the relationships among the several levels of government in American federalism. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 342 Politics of Developing Areas (4)**

Examination of the socio-economic and political problems of the developing and new nations in their quest for modernization and development. Relevance of Western and Soviet-Marxist models to the political experience of the new nations. 4 lecture discussions. Prerequisite: PLS 201, or PLS 202.

### **PLS 390/SOC 390 Political Sociology (4)**

Social bases of the political process. Socialization, participation, elite-mass relationships. Influence of factors such as class, race, religion, and sex on political attitudes and behavior. Course listed as both, PLS 390 and SOC 390. Meets General Education requirements in Track B, Area 3 E. Not open to Political Science or Behavioral Sciences majors. 4 lecture discussions. Prerequisite: PLS 201.

### **PLS 400 Special Problems for Upper Division Students (1-4)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### **PLS 401 Constitutional Law: Governmental Powers (4)**

Constitutional questions concerning the distribution of powers and responsibilities among the institutions of the federal government and between the federal and state governments. Special attention to interbranch conflicts, constitutional crises such as the Civil War and Watergate. Seminar, 4 hours. Prerequisite: PLS 201.

### **PLS 405 Jurisprudence (4)**

The nature and sources of law; the process of legal interpretation; the meaning of legal concepts like justice, liberty, responsibility, negligence, punishment. 4 seminars. Prerequisite: PLS 201 or AMC 201 or PLS 204.

### **PLS 407 Constitutional Law: Rights and Liberties (4)**

Constitutional questions arising out of the 1st and 14th amendments. Supreme Court decisions regarding personal liberty; freedom of speech, press, and assembly; freedom of and from religion; and equal protection of the laws. 4 seminars. Prerequisite: PLS 201.

**PLS 409 Contemporary Issues in American Law (4)**

Current debates and controversies in or about American law and legal studies; topics will be specified in advance. May be repeated as topics vary; total credit is limited to 8 units. 4 seminars. Prerequisite: permission of instructor.

**PLS 414 Government Budget Administration (4)**

Development of concepts of government budgeting. Role of the budget in determination of public policy and control of governmental operations. Public revenues, expenditures, and debt. 4 lectures/problem-solving. Prerequisite: (PLS 201) and (PLS 314 or MHR 301).

**PLS 415 Government Human Resources Management (4)**

History of American public personnel and civil service administration, including the role of the civil servant in society. Objectives, principles, and processes of administering the personnel function of government; recruiting, training, promotion, control of government personnel and organization development. 4 lectures/problem-solving. Prerequisite: PLS 201 and PLS 314 or MHR 318.

**PLS 416 Public Organizations (4)**

Development of literature of organization theory and behavior generally. Emphasis on unique perspective, problems, ethical dilemmas and contributions of the public sector. 4 seminars. Prerequisite: PLS 201 and PLS 314 or MHR 301.

**PLS 417/417A Policy Analysis and Program Evaluation (3/1)**

Application of quantitative techniques to the study of public programs; research design, computer data analysis, and report writing are emphasized. 3 lectures/problem-solving, 1 two-hour activity. Prerequisites: Statistics 120; PLS 205; PLS 314 or PLS 315. Corequisites: PLS 417/417A.

**PLS 425 Women and Politics in America (4)**

Examination of the role of women in the political system of the United States. Emphasis on political participation, involvement in political institutions, and policies that affect women. 4 lecture presentations. Prerequisite: PLS 201.

**PLS 427 American Political Economy (4)**

Examination of the relationship between politics and macroeconomic policymaking in the United States, special attention to the impact of economic policymaking on the political behavior of mass publics. Theories of political economy, the structure of the political economy, and the relationships between political and economic systems. 4 seminars. Prerequisites: PLS 201.

**PLS 431 Ancient and Medieval Political Thought (4)**

Major contributions of Plato and Aristotle to Western political philosophy; survey of the Middle Ages. Emphasis on the timeliness of classical and medieval political conceptions. Seminar, 4 hours. Prerequisite: PLS 201 or PLS 204.

**PLS 432 Modern Political Thought (4)**

From Machiavelli to the 19th Century. Analysis of the break with the classical tradition. Seminar, 4 hours. Prerequisite: PLS 201 or PLS 204.

**PLS 433 American Political Thought (4)**

Major ideas and thinkers who have influenced American political life. 4 seminars. Prerequisite: PLS 201 or PLS 204.

**PLS 436 Twentieth-Century Political Thought (4)**

Selected theories of the 20th century, with emphasis on existentialism, Christian humanism, contemporary socialism, revolutionary theory, and representative conceptions of individualism. 4 seminars. Prerequisite: PLS 201 or PLS 204.

**PLS 441 Comparative European Governments and Politics (4)**

Comparative analysis of the political institutions, governmental organizations, and social structures of some selected countries of Western Europe, with special reference to contemporary problems of post-industrialism. Regional economic and political organizations and their global impact. 4 lecture discussions. Prerequisite: PLS 201 or PLS 202.

**PLS 442 Comparative Sub-Saharan African Governments and Politics (4)**

Political behavior and processes of governments in Sub-Saharan Africa, emphasis on governmental policies, distribution of goods, services, and power; effects of colonialism, neo-colonialism, political conflict and integration; the international system as it impinges on these countries. 4 lecture discussions. Prerequisite: PLS 201 or PLS 202.

**PLS 444 Comparative Latin American Governments and Politics (4)**

Analysis of models of Latin American political systems, their development and culture, key actors, and formal and informal processes; focus on socio-economic change and trends in Cuba, Brazil, Mexico, Chile, and Argentina. 4 seminars. Prerequisite: PLS 201 or PLS 202.

**PLS 446 Comparative Middle Eastern Governments and Politics (4)**

Contemporary government and politics of the Middle East. Emphasis on the historical, cultural, and economic dynamics of the region. An extensive analysis of the dominant states in the area and their interaction regionally and internationally. 4 lecture presentations. Prerequisite: PLS 201 or PLS 202.

**PLS 447 Government and Politics of the Russian Republic (4)**

The emergence and current political circumstances of the Russian Republic and its transformation. Backgrounds of the new Republic, including examination of the causes for the rise and fall of the Soviet system. Prerequisite: PLS 201 or PLS 202.

**PLS 448 Comparative East Asian Governments and Politics (4)**

Comparative analysis of the political systems of China, Japan, and Korea with emphasis on the state, the social and cultural context of contemporary politics, political elites, public policy, and political opposition. 4 lecture presentations. Prerequisite: PLS 201 or PLS 202.

**PLS 449 Comparative Southeast Asian Governments and Politics (4)**

Comparative analysis of the origins, cultural context, political dynamics, and public policies of selected southeast Asian states: Burma, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand and Vietnam. 4 lecture presentations. Prerequisite: PLS 201 or PLS 202.

**PLS 451 International Conflict, War and Peace (4)**

The phenomenon of international conflict with primary emphasis on theories concerning the causes of war; conflict resolution, strategies for peace keeping, and options for a peaceful world order. 4 lecture presentations. Prerequisite: PLS 203 or permission of instructor.

**PLS 452 International Political Economy**

The relationship between power and wealth in international affairs, with



emphasis on both the political basis of economic action and the economic basis of political action; analysis of the structure of the global economy and current issues will reveal the interplay of politics and markets. 4 lecture presentations. Prerequisite: PLS 203 or permission of instructor.

#### **PLS 454 U.S.-Latin American Relations (4)**

Introduction to the problems and policies of the nations of Latin America with particular reference to their relations to the superpowers and their participation in international organizations. Seminar, 4 hours. Prerequisite: PLS 201 or PLS 202 or PLS 203.

#### **PLS 455 Foreign Relations of the United States (4)**

Survey of the United States foreign policy system with emphasis upon structural characteristics which influence decision-making. Examination of political, strategic and economic aspects of contemporary policy. 4 lecture discussions. Prerequisite: PLS 201 or PLS 203, or permission of instructor.

#### **PLS 456 International Law (4)**

Nature, sources, function, and evolution of international law; principal law-making and adjudicatory agencies; diplomatic and consular intercourse; treaties and executive agreements; pacific settlement of disputes; war and neutrality; international law and its function in international relations. 4 seminars. Prerequisite: PLS 203 or permission of instructor.

#### **PLS 457 International Relations of the Middle East (4)**

Examines the interaction of the Middle Eastern system of states within that region and with the outside world system. Emphasis on regional conflicts and cooperation, regional organizations, the influence of outside powers. 4 lecture discussions. Prerequisite: PLS 201 or PLS 202 or PLS 203.

#### **PLS 461, 462 Senior Project (2) (2)**

Selection and completion of a thesis under faculty supervision. Thesis to be of substantial academic quality on a significant problem in the student's major area of interest within political science. Formal report required. Prerequisite: senior standing. Required minimum of 120 hours.

#### **PLS 463 Undergraduate Seminar (2)**

In-depth inquiry into selected topics in one of the sub-areas of the discipline. May be repeated twice for credit. Prerequisite: upper division standing or permission of instructor.

#### **PLS 471, 472 Field Work in Government and Politics (1-4)**

Placement in government agencies or political organizations for practical applications of academic training. Written report and evaluation required. 10 hours a week on agency assignment for each unit of credit. Total credit limited to 8 units. Prerequisite: permission of instructor.

#### **PLS 497 Honors Research Seminar I (2)**

Research designs, strategies, and tools. Application to research project chosen by the student with the approval of the instructor. May be repeated once for credit. 2 seminars. Prerequisites: upper division standing; minimum 2.5 overall GPA.

#### **PLS 498 Honors Research Seminar II (2)**

Completion of research project initiated in PLS 497. Report presentation. May be repeated once for credit. 4 seminars. Prerequisite: PLS 497.

#### **PLS 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Corequisites may be required. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.



## PSYCHOLOGY

One of the three majors offered in the Behavioral Sciences Department is Psychology. For other programs in this department, see Sociology and Behavioral Science. For information on the graduate program in psychology see the "Graduate Studies" section in this catalog.

Gary A. Cretser, Chair

Sonia L. Blackman	Frederick B. Meeker
Meg Clark	Jeffery S. Mio
Larry Goldman	Laurie A. Roades
Lori Barker Hackett	Donald V. Shupe
Nancy J. Harkey	Susan N. Siaw
Louis J. King	James W. Sturges
Marcia E. Lasswell	Felicia F. Thomas

Psychology is an academic discipline which attempts to enable its students to better understand human behavior. The Psychology degree program, which is housed in the Department of Behavioral Sciences, is designed to provide a comprehensive undergraduate education in this field, leading to the Bachelor of Arts degree. The student will receive a broad exposure to developmental, social, cognitive, clinical and physiological areas of Psychology, as well as specific training in research methodology and statistics. Original student research is also fostered and encouraged during the undergraduate experience. The program is intended primarily as an excellent foundation for entrance to graduate school in any area of psychology, but also provides a good background in the science of human behavior for students seeking careers in management in public and private sectors, or seeking an undergraduate major in this area for a variety of other reasons.

For this major, the high school student should have a broad background in the natural and social sciences, English and mathematics.

The department offers a Master of Science degree in psychology designed to prepare students for licensure in the field of Marriage, Family and Child Counseling (MFCC). Requirements for this program are found in the "Graduate Studies" section of this catalog.

Since Behavioral Science is an interdisciplinary major drawn from Psychology and Sociology, students may not double major in Psychology and Behavioral Science.

Students majoring in psychology or behavioral sciences who have a GPA of at least 3.0 overall have the opportunity to join Psi Chi, the National Honor Society in Psychology. For additional information contact the department office.

### PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Psychology.

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

### CORE COURSES FOR MAJOR

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

Principles of Psychology I	PSY	202	(4)
Principles of Psychology II	PSY	203	(4)
Principles of Sociology II	SOC	202	(4)

(SOC 201 under GE)			
Methods of Behavioral Sciences I	BHS	204	(4)
Methods of Behavioral Sciences II	BHS	205	(4)
Statistics for Behavioral Science	BHS	307/307A	(4)
Social Psychology	PSY	401	(4)
History and Systems	PSY	410	(4)
Experimental Psychology	PSY	433/433L	(5)
Senior Project	BHS	461/462	(4)
or Senior Seminar	BHS	498	

Choose one from each group below:

- A. Applications:  
PSY 321, PSY 314/A, PSY 450, PSY 455. . . . . (4-5)
  - B. Clinical Topics:  
PSY 412, PSY 415, PSY 416/L, SOC 430 . . . . . (4)
  - C. Developmental Topics:  
PSY 305, PSY 310, PSY 311, PSY 312 . . . . . (4-5)
  - D. Personality/Cognition:  
PSY 334, PSY 402, PSY 403. . . . . (4)
  - E. Quantitative/Experimental:  
PSY 303/L, PSY 460/A, BHS 426/A, SOC 433/A. . . . . (4-5)
- Approved electives in PSY, SOC, BHS, SW, (300-400 level,  
not to include 400 or 402) chosen in consultation with advisor . . . (12)

### SUPPORT AND ELECTIVE COURSES

Writing for the Professions	ENG	301	(4)
Upper division electives (300-400 level)			(12)
Courses to complete General Education requirements.			(72)
Unrestricted electives.			(23-25)

### PSYCHOLOGY MINOR

(May not be taken by majors in Psychology, Sociology, or Behavioral Sciences)

Required of all students in the minor:

PSY 202 Principles of Psychology I	4
PSY 203 Principles of Psychology II	4
	8

Choose four courses from one of the following tracks:

#### I. Counseling

Human Relations	PSY	314/314A	4
Psychology of Personality	PSY	403	4
Theories of Counseling	PSY	412	4
Abnormal Psychology	PSY	415	4
Psychological Testing	PSY	416/416L	4
Basic Counseling	#PSY417/417A		4
Introduction to Group Counseling	#PSY	418	2
Principles of Behavioral Management	PSY	450	4

#### II. Industrial/Organizational

Human Relations	PSY	314/314A	4
Industrial and Personnel Psychology	PSY	332	4
Psychological Testing	PSY	416/416L	5
Basic Counseling	#PSY417/417A		4
Introduction to Group Counseling	#PSY	418	2
Environmental Psychology	PSY	420	4
Applied Social Psychology/Sociology	BHS	426	4
Survey Research	SOC	433	4

## III. General

Basic Developmental Psychology . . . . .	PSY	305	4
Psychology of Identity . . . . .	PSY	321	4
Cognitive Processes . . . . .	PSY	334	4
Social Psychology . . . . .	PSY	401	4
Theories of Learning . . . . .	PSY	402	4
History and Systems . . . . .	PSY	410	4

Total units in track . . . . . 14-17

Two additional upper division courses chosen from Behavioral Sciences, or Psychology. The current list of available courses is:

Statistics for Behavioral Sciences . . . . .	BHS	307/307A	4
Women and Men: Changing Sex Roles . . . . .	BHS	328	4
Computer Methods in Behavioral Science . . . . .	BHS	340/340A	4
Special Topics for Upper Division Students . . . . .	BHS	499	4
Physiological Psychology . . . . .	PSY	303/303L	5
Child Psychology: Early Childhood . . . . .	PSY	310	4
Child Psychology: The Middle Years . . . . .	PSY	311	4
Adolescent Psychology . . . . .	PSY	312	4
Educational Psychology . . . . .	PSY	340	4
Human Sexual Behavior: Relationships . . . . .	PSY	455	4
Sensations and Perception . . . . .	PSY	460/460A	4

Total units required for minor: . . . . . 30-36  
# note specific prerequisites

## COURSE DESCRIPTIONS

**PSY 201 General Psychology (4)**

Exploration and application of basic psychological principles in understanding self, relationships with others, and interactions with social groups. Stages of psychological development and personality. Psychological approaches to interpersonal relations. Effective and ineffective living. 4 lecture discussions. May be taken for Credit/No Credit by non-majors.

**PSY 202 Principles of Psychology I (4)**

Survey of scope, methods, content of the more quantitative areas of psychology including: perceptions, conditioning, learning, physiological, sensory processes, statistical methods, and psychometrics; additional areas of contemporary interest selected by instructor. 4 lecture discussions.

**PSY 203 Principles of Psychology II (4)**

Survey of scope, methods, content of the more qualitative areas of psychology including personality, personality assessment abnormal, clinical, social, developmental, language, thinking, memory, motivation and emotion. 4 lecture discussions.

**PSY 210 Mind, Brain and Behavior: An Integrated View (4)**

Philosophical/biological exploration of the relationship of human behavior/mind/consciousness and the brain. Includes environmental effects on development; human sexuality and sex differences; learning and memory; pain, psychoactive drugs; normal and abnormal aging; and the brain and mental disorders. 4 lecture discussions.

**PSY 303/303L Physiological Psychology (4/1)**

Relationship of genetic, anatomical and physiological factors to the behavior of organisms; intensive student exploration of the relevance of biological mechanisms to an understanding of human behavior. Introduction to research techniques in physiological laboratory. 4 lectures/problem-solving, one 3-hour laboratory. Prerequisites: BIO 110

or BIO 115 or PSY 210 and one from PSY 201, PSY 202, or PSY 203. Corequisites: PSY 303 and 303L.

**PSY 305 Basic Developmental Psychology (4)**

Theoretical and chronological examination of human development. Influences of heredity, prenatal environment, and psychosocial determinants on personality and social development, sex typing, cognitive and moral development throughout the life span. 4 lecture discussions.

**PSY 310 Child Psychology: Early Childhood (4)**

Developmental aspects of the physical, social, emotional, and intellectual growth of the child. Emphasis on factors that facilitate/impede development; early learning and the development of language; growing awareness of self; cross-cultural comparisons of development. 4 lecture discussions. Prerequisite: PSY 201 or 203.

**PSY 311 Child Psychology: The Middle Years (4)**

Developmental aspects of the physical, cognitive, social, emotional growth of the child from kindergarten years through preadolescence. Emphasis on development of social abilities, and social awareness; thought processes; awareness of self in relation to environment. Cross-cultural aspects of development and socialization. 4 lecture discussions. Prerequisites: PSY 201 or 203.

**PSY 312 Adolescent Psychology (4)**

Physical, social, emotional, and intellectual growth of adolescents. Emphasis on personality formation, social adjustments, and problems of self-identity. Cross-cultural aspects of adolescent development. 4 lecture discussions. Prerequisite: PSY 201 or 203.

**PSY 314/314A Human Relations (3/1)**

Human relation problems in contemporary American organizations. Lectures and counseling involvements related to increasing the student's ability to both lead and participate in small group relationships. 3 lectures/problem-solving, 1 two-hour activity. Corequisites: PSY 314 and 314A. Prerequisite: PSY 201 or 203, junior standing.

**PSY 321 The Psychology of Identity (4)**

An intensive examination of self in terms of theory, locus, development outcomes, sex identity, group identity, and the self in relation to others, extensive in-class practice in techniques for self-awareness, self-evaluation, self-disclosure, self-assertion. 4 lectures/problem-solving. Prerequisites: PSY 201 or 203 and upper division standing or permission of instructor.

**PSY 332 Industrial and Personnel Psychology (4)**

Survey of the applications of psychology to the selection and motivation of employees, leadership, person-machine systems, work, efficiency, and morale; additional areas of concentration are gender, ethnicity, and culture. 4 lecture discussions. Prerequisite: PSY 201 or PSY 202 or PSY 203 or equivalent course.

**PSY 334 Cognitive Processes (4)**

Processes by which humans acquire and maintain knowledge. Focus on the relationships of perception, language, and concept attainment. Major theories of cognition. Gender and culture differences in cognition. Classroom experience with various perceptual and cognitive tasks. 4 lectures/problem-solving. Prerequisite: PSY 201 or 202.

**PSY 340 Educational Psychology (4)**

Psychological principles of the learning process. An analysis of the teaching-learning situation with emphasis on the cognitive basis of learning and instruction. 4 lecture discussions. Prerequisite: PSY 201 or 202.

**PSY 401 Social Psychology (4)**

Advanced study of human behavior as a product of interaction and social process: nature of group life in relation to social groupings, social conflict, public opinion, group morale, social control, leadership. Small groups, team composition, and nature of prejudice. 4 lectures. Prerequisite: PSY 202, 203, BHS 204.

**PSY 402 Theories of Learning (4)**

Examination of classical learning theories in conjunction with critical examination of current theories and research. Status and form of contemporary theory. 4 lecture discussions. Prerequisites: PSY 201 or 202 and junior standing.

**PSY 403 Psychology of Personality (4)**

Advanced study of major contemporary approaches to personality. Emphasis on development and structure of personality. Biological, psychological, and socio-cultural determinants. Dynamics and changes of personality. 4 lectures. Prerequisite: PSY 201 or 203.

**PSY 410 History and Systems (4)**

Seminar in theories and systems of contemporary psychology. Examination of historical origins of modern theories. Student participation in evaluation of competing theories and generation of new models. 4 seminars. Prerequisites: PSY 202, 203, BHS 204.

**PSY 412 Theories of Counseling (4)**

Systematic and comparative analysis of current psychotherapies; their philosophies, purposes, and procedures. 4 lectures. Prerequisite: PSY 202, 203.

**PSY 415 Abnormal Psychology (4)**

The causes, description, and treatment of the extremes of human behavior. Emphasis is on an integrated analysis from a psycho-social viewpoint. 4 lecture discussions. Prerequisite: PSY 201 or 202.

**PSY 416/416L Psychological Testing (4/1)**

Introduction to construction, standardization and statistics involved in both objective and projective testing, in such areas as aptitude, achievement, vocational preference, motivation, and personality. Clinical practice in administering, scoring and interpreting selected tests and measures. 4 lectures/problem-solving, 1 three-hour lab. Prerequisites: PSY 202, 203, BHS 204, and junior standing. Co-requisites: PSY 416 and 416L.

**PSY 417/417A Basic Counseling (3/1)**

An introductory investigation of the dynamics involved in the one-to-one relationship. Emphasis on social communication, basic counseling, and interviewing techniques. To be implemented by small group involvement and individual student supervision. 3 lectures/problem-solving, 1 two-hour activity. Prerequisite: PSY 314. Corequisite: PSY 417 and 417A.

**PSY 418 Introduction to Group Counseling (2)**

Experience with techniques aimed at facilitating introspection and self-analysis through group processes. 2 one-hour clinics. Prerequisites: PSY 314/314A, 417/417A.

Because of the interdisciplinary nature of the Department of Geography and Anthropology, minors which are offered may be taken by students majoring in the curricula offered by the department. Specific details on the conditions under which these minors may be taken, and by which majors, are available from the department office.

**TEACHER PREPARATION—SINGLE SUBJECT CREDENTIAL**

A student whose goal is a single-subject (secondary) credential must consult with his/her advisor.

**CORE COURSES FOR MAJOR**

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Introduction to Biological Anthropology . . . . .	ANT	101	(4)
Psychological Anthropology . . . . .	ANT	355	(4)
or Social Anthropology . . . . .	ANT	358	
Cultural Geography . . . . .	GEO	102	(4)
Economic Geography . . . . .	GEO	312	(4)
United States and Canada Geography . . . . .	GEO	350	(4)
History of Civilization . . . . .	HST	102	(4)
United States History . . . . .	HST	201	(4)
American State and Local Politics . . . . .	PLS	328	(4)
Introduction to Social Sciences . . . . .	SSC	101	(4)
Each student will complete at least 5 upper division courses in 2 or more of the social sciences: American Studies, Anthropology, Economics, Ethnic and Women's Studies, Geography, History, Political Science, Psychology, Sociology, Social Science . . . . .			
(20)			

**SUPPORT AND ELECTIVE COURSES**

(Required of all students)

Freshman English II . . . . .	ENG	105	(4)
Introduction to Ethnic Studies . . . . .	EWS	140	(4)
Political Systems . . . . .	PLS	202	(4)
Computer Geographics . . . . .	GEO	104	(4)
Principles of Economics . . . . .	EC	201	(4)
Varieties of American Culture . . . . .	ANT	333	(4)
Unrestricted Electives . . . . .			(46)

**GENERAL EDUCATION COURSES****Area 1:**

Freshman English I . . . . .	ENG	104	(4)
Public Speaking . . . . .	COM	100	(4)
Logic and Semantics . . . . .	PHL	202	(4)

**Area 2:**

A. Select one course . . . . .			(4)
B. Physical Geography . . . . .	GEO	101	(4)
C. Select one course . . . . .			(4)
D. Select one course . . . . .			(4)

**Area 3:**

A. Select one course . . . . .			(4)
B. Introduction to Philosophy . . . . .	PHL	201	(4)
C. Select one course . . . . .			(4)
D. Principles of Economics . . . . .	EC	202	(4)
E. Introduction to Cultural Anthropology . . . . .	ANT	102	(4)
F. History of Civilization: The Modern World . . . . .	HST	103	(4)
G. Human Nature/Human Affairs . . . . .	ANT	201	(4)

**Area 4:**

Introduction to American Government . . . . .	PLS	201	(4)
United States History . . . . .	HST	202	(4)

**Area 5:**

12 upper division units are required, 4 of which fulfill Area 2D.

See Advisor. . . . .			(8)
Total Units Required for Degree. . . . .			(198)



**COURSE DESCRIPTIONS****Social Sciences****SSC 101 Introduction to Social Sciences (4)**

An analysis of each of the many disciplines comprising the social sciences with particular emphasis on their interrelationships. A study of source materials and library techniques as well as methods employed by social scientists. 4 lecture discussions.

**SSC 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**SSC 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture and activity or laboratory. Prerequisite: permission of instructor. Corequisites may be required.

**SSC 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**SSC 401 Contemporary American Scene (4)**

Domestic problems and issues confronting the American people today. Alternative proposals pointing toward solutions of these problems. 4 lecture discussions.

**SSC 410 The Study of Peace: NMUN Preparation (4)**

Seminar for National Model United Nations (NMUN). Interdisciplinary analysis of peace; inter-group conflict and resolution; and peace institutions, particularly United Nations and related agencies. Simulations of conflict resolution. Uses concepts and methodologies of several social sciences. 4 seminars. Prerequisites: Selection for NMUN and approval of instructor. May be repeated for credit.

**SSC 441 Internship in Social Sciences (1-4)**

Field training which relates academic and practical experience in the student's area of interest. Partial evaluation from work supervisor required upon completion. May be repeated for a maximum of 8 units. Prerequisite: department approval of student's application.

**SSC 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Minimum of 120 hours total time.

**SSC 463 Undergraduate Seminar (2)**

Intensive study of selected social problems with application of various techniques for analysis. 2 meetings. Prerequisite: completion of senior project.

**SSC 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture and activity or laboratory. Prerequisite: permission of instructor. Corequisites may be required.



## SOCIOLOGY

One of the three majors offered in the Behavioral Sciences Department is Sociology. For other programs in this Department, see Behavioral Science and Psychology.

Gary A. Cretser, Chair

Wayne C. Brown  
Mary K.Y. Danico  
Dennis D. Loo

Fernando Parra  
Brett C. Stockdill  
Wayne S. Wooden

The Sociology major, which is housed in the Department of Behavioral Sciences, is designed to provide a substantial foundation in theoretical, methodological, and content areas of sociology, leading to the Bachelor of Arts degree. In addition to a solid introduction to these content areas, students receive specific training in survey research and statistical analysis, and in the many practical applications of sociological theory. The Sociology major has three options: Criminology, Social Work, and General Sociology. The major is an excellent preparation for graduate study in Sociology, or Public Administration, and for professional studies in law, social work, or criminology. It also provides a very good background for entry level positions in management, in both public and private sectors.

For this major, the high school student should have a broad background in college preparation courses in natural and social sciences, English, and mathematics.

The department also offers minors in Psychology, Sociology, and Criminal Justice and Corrections. The Psychology and Sociology minors are not open to students with a major in Behavioral Science, but the Criminal Justice and Corrections minor may be taken by students in any of our majors, except students in the Criminology option. This program is a multidisciplinary grouping of courses which have been specifically selected to fulfill the needs of students presently working in or planning for careers in law enforcement or corrections. Courses required in the minor and certificate program are listed under the Behavioral Science major. Special advisement for students in any major who are interested in Criminal Justice or Corrections may be obtained from the department's Criminal Justice coordinator. Detailed information is available from the department office.

Since Behavioral Science is an interdisciplinary major drawn from Psychology and Sociology, students may not double major in Sociology and Behavioral Sciences.

Sociology majors are invited to participate in a chapter of Alpha Kappa Delta, the National Honor Society in Sociology.

### CORE COURSES FOR MAJOR

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

Principles of Sociology I	SOC	201	(4)
Principles of Sociology II	SOC	202	(4)
Principles of Psychology I	PSY	202	(4)
Methods in Behavioral Sciences I	BHS	204	(4)
Methods in Behavioral Sciences II	BHS	205	(4)
Socialization: Self and Society	SOC	402	(4)
Sociological Theory	SOC	405	(4)
Class, Status and Power	SOC	410	(4)
Senior Seminar	BHS	498	(4)

### OPTION COURSES FOR MAJOR

(Required in specific options)

### CRIMINOLOGY OPTION

Criminology	SOC	302	(4)
Juvenile Delinquency	SOC	360	(4)

Select 3 courses from the following:

SOC 301, SOC 320 or SOC 323, SOC 321, SOC 322, SOC 401, SOC 403, SOC 430			(12)
Approved elective in BHS, PSY, SOC, SW 300-400 level (except for 400 and 402), chosen in consultation with advisor.			(20)

### GENERAL SOCIOLOGY OPTION

Select 2 courses from the following:

BHS 307/307A, BHS 340/340A, SOC 433/433A, SOC 434.			(8)
Approved electives in SOC 300-400 level.			(20)
Approved electives in BHS, PSY, SOC, SW, 300-400 level (except for 400 and 402), chosen in consultation with advisor.			(12)

### SOCIAL WORK OPTION

Survey of Social Welfare	SW	300	(4)
Social Work Practice	SW	301	(4)
Social Welfare Policies and Issues	SW	431	(4)
Field Work	BHS	402	(2,2)

Select 2 courses from the following:

PSY 305, PSY 310, PSY 311, PSY 312, SOC 321, SOC 425			(8)
Approved electives in SOC 300-400 level chosen in consultation with advisor.			(12)

### SUPPORT AND ELECTIVE COURSES

(Required in specified options)

### CRIMINOLOGY OPTION

Freshman English I	ENG	104	(4)
Public Speaking	COM	100	(4)
Logic and Semantics	PHL	202	(4)
General Psychology	PSY	201	(4)
or Mind, Brain and Behavior	PSY	210	
Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)
Writing in the Professions	ENG	301	(4)

Select 3 courses from the following: (12)

Contemporary Treatment of Law Violators	SW	318	
Probation and Parole	SW	320	
Family Violence	SW	322	
Principles of Management	MHR	301	
Public Administration	PLS	314	
The Criminal Justice System	PLS	304	
American Judiciary	PLS	327	

### GENERAL SOCIOLOGY OPTION

Freshman English I	ENG	104	(4)
Public Speaking	COM	100	(4)
Logic and Semantics	PHL	202	(4)
Statistics with Applications	STA	120	(4)
General Psychology	PSY	201	(4)
or Mind, Brain and Behavior	PSY	210	
Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)
Writing in the Professions	ENG	301	(4)
Upper division electives (300-400 level)			(8)

**SOCIAL WORK OPTION**

Freshman English I	ENG	104	(4)
Public Speaking	COM	100	(4)
Logic and Semantics	PHL	202	(4)
General Psychology	PSY	201	(4)
or Mind, Brain and Behavior	PSY	210	
Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)
Writing in the Professions	ENG	301	(4)

Select 3 courses from the following: (12)

Human Services in Health	SW	303	4
Contemporary Treatment of Law Violators	SW	318	4
Probation and Parole	SW	320	4
Family Violence	SW	322	4
Death and Dying	SW	470	4

**SOCIOLOGY MINOR**

(May not be taken by majors in Psychology, Sociology, or Behavioral Sciences)

Required of all students in the minor:

Principles of Sociology I	SOC	201	4
Principles of Sociology II	SOC	202	4
Contemporary Social Problems	SOC	301	4
Class, Status and Power	SOC	410	4
Survey Research	SOC	433	4

Select 3 courses from the following: 12

Criminology	SOC	302	4
Social Organization	SOC	310	4
Collective Behavior	SOC	350	4
Juvenile Delinquency	SOC	360	4
Urban Sociology	SOC	401	4
Socialization: Self and Society	SOC	402	4
Industrial and Personnel Psychology	PSY	332	4
Applied Social Psychology/Sociology	BHS	426	4

Total units required for minor: 32

**COURSE DESCRIPTIONS****SOC 201 Principles of Sociology I (4)**

Sources of materials and methods of sociological study. Concepts and principles, including contemporary social theory, elementary forms of social organization, culture and socialization. 4 lecture discussions. May be taken for Credit/No Credit by non-majors.

**SOC 202 Principles of Sociology II (4)**

Continuation of the sources of materials and methods of sociological study, including social inequality, population, collective behavior and selected social institutions. 4 lecture discussions. Prerequisite: SOC 201.

**SOC 206 Family Relations (4)**

Analysis of dating, courtship, engagement; religious, social, legal and economic factors relating to marriage and early adjustment. Cross-cultural comparisons of marriage and family life. Preparation for marriage. 4 lecture discussions.

**SOC 301 Contemporary Social Problems (4)**

Analysis of leading social problems facing America today, including consideration of variations between cultures in the United States and other nations and regions, and variations across historical time in such areas as drugs, crime, family issues, others. 4 lecture discussions. Prerequisite: junior standing.

**SOC 302 Criminology (4)**

Causal theories, nature, extent, control, and prevention of crimes. Differences across cultures with emphasis on prevention and rehabilitation, both inside and outside penal institutions. 4 lecture discussions. Prerequisites: SOC 201.

**SOC 310 Social Organization (4)**

Structure and function of selected social organizations, with emphasis on social processes, social evolution, and social planning. 4 lectures. Prerequisites: SOC 201, 202, BHS 205 (or concurrent enrollment in BHS 205).

**SOC 320 Ethnic Relations in America (4)**

Social and social-psychological theory in relation to prejudice and discrimination. Emphasis on current ethnic contacts and conflicts in the United States. Comparison with such conflicts in other parts of the world. 4 lecture discussions. Prerequisites: SOC 201.

**SOC 321 Family as a Social Institution (4)**

Social and cultural development of the family as a social institution, focusing upon the structures, functions, cultural cross-cultural and historical variation forms of disorganization and analysis of current trends. 4 lecture discussions. Prerequisites: SOC 201.

**SOC 322 Politics as a Social Institution (4)**

Relates social structure to the political process and how individuals and groups maneuver for relative advantage in the context of local and regional politics. 4 lecture discussions. Prerequisites: SOC 201 or 202.

**SOC 323 Sociology of Minority Communities (4)**

Materials and methods of the sociological study of minority communities; comparisons of minority communities across cultures; concepts and principles; differential structure and process of minority group life; social institutions in the context of value system conflict; indigenous efforts to alleviate community problems. 4 lecture discussions. Prerequisite: junior standing.

**SOC 324 Religion in American Life (4)**

Class focus is upon the various religious orientations in the United States and other countries. Inter-relationship among ethnicity, social class, and religious affiliation is discussed. 4 lecture discussions. Prerequisites: SOC 201 and 202.

**SOC 330 Population and Society (4)**

Population trends and problems in modern society. Focus on demographic characteristics of world population, with special reference to urban concentrations and underdeveloped nations. 4 lecture discussions. Prerequisites: SOC 201 and junior standing.

**SOC 350 Collective Behavior and Social Movements (4)**

Analysis of mass behavior: crowds, riots, fads, fashions, public opinion, and world-wide social movements. 4 lecture discussions. Prerequisites: SOC 201.

**SOC 360 Juvenile Delinquency (4)**

Juvenile delinquency in California and elsewhere; types and extent; theories of causation; laws, courts, correctional institutions, probation; delinquent subcultures, middle-class delinquency; new programs. 4 lecture discussions. Prerequisites: SOC 201.

**SOC 390/PLS 390 Political Sociology (4)**

Social bases of the political process. Socialization, participation, elite-mass relationships. Influence of factors such as class, race, religion, and sex on political attitudes and behavior. Course listed as both, SOC 390 and PLS 390. Meets General Education requirements in Categories IV B and C for majors in the College of Engineering only. Not open to Political Science or Behavioral Sciences majors. 4 lecture discussions.

**SOC 401 Urban Sociology (4)**

The organization of the modern city; emphasis on the social problems of the modern industrial urban center. Analysis of trends in urban and suburban communities; ecological patterns and change. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**SOC 402 Socialization: Self and Society (4)**

Analysis of social interaction relating to development of self; reciprocal influences between individual and society. Development of social roles and the symbolic nature of interaction. 4 lectures. Prerequisites: SOC 201, 202.

**SOC 405 Sociological Theory (4)**

Course emphasizes classroom discussion of ideas raised by sociological theorists and requires students to discover and to question theoretical assumptions. The patterns of thought necessary for critical analysis of sociological theories are systematically outlined and utilized by students. 4 lectures/problem-solving. Prerequisites: SOC 201, 202.

**SOC 410 Class, Status, and Power (4)**

Theories and research concerning social stratification; mobility and inequality in the United States and other societies; measurement and analysis of social status models; the meaning of social class and the distribution of power. 4 lecture discussions. Prerequisites: SOC 201, 202, BHS 205 (or concurrent enrollment in BHS 205).

**SOC 425 Social Gerontology (4)**

Aging as an important part of the human life cycle. Aging as a social, family and personal problem; demographic issues, the aged as a minority. Students select, analyze, and present topics of special interest in this area. 4 seminars. Prerequisites: SOC 201, 202 and upper division standing.

**SOC 430 Sociology of Mental Disorders (4)**

An interdisciplinary examination of sociological factors related to the occurrence and prevalence of mental disorders. Wide range of topics, including effects of ethnicity, social class, sex and marital status. 4 seminars. Prerequisites: SOC 201.

**SOC 433/433A Survey Research (3/1)**

Through development and execution of an original research project, students become experienced with the methodology, strengths, and problems in survey research: unobtrusive measures, sampling, questionnaire construction, interviewing techniques, data analysis. 3 lectures/problem-solving, 1 two-hour activity. Corequisites: SOC 433/433A. Prerequisites: BHS 204, 205 or equivalent course work in quantitative methods.

**SOC 434 Field Research Methods (4)**

Study of field research methods in social settings. Development of skills for collection and analyzing intensive interview and observation data. Development of the social construction of reality perspective. 1 lecture/problem-solving and 120 hours of supervised field work. Prerequisites: SOC 201, SOC 202, BHS 205.

**Social Work****SW 300 Survey of Social Welfare (4)**

Historical overview of social welfare as an institutional response to social needs. Major focus is on analysis of social problems and society's responses within the context of current economic and political policy. Evaluation of current trends and future possibilities. 4 lecture discussions.

**SW 301 Social Work Practice (4)**

Introduction to generalist model of social work practice. Theoretical foundations for and value base of professional practice. Problem-solving process, the nature of assessment and helping skills, client and worker roles and human diversity. 4 lectures/problem-solving. Prerequisites: SW 300.

**SW 303 Human Services in Health Settings (4)**

A multidisciplinary examination of the rapid development of specialized health care and human services for children and adults. Problem-solving and analysis of case studies, focus on psycho-social, cultural, religious, government influences in the delivery of health care. 4 lectures/problem-solving.

**SW 318 Contemporary Treatment of Law Violators (4)**

Introduction and review of the complex problems posed by the criminal justice corrections field. Historical and present public and private efforts to modify the behavior of the law violator will be reviewed and evaluated through the analysis of case histories. 4 lectures/problem-solving.

**SW 320 Probation and Parole (4)**

The theoretical and philosophical basis of probation and parole. Historical background; development and practice of investigation; supervision and treatment role of probation and parole officers. Past and present treatment models related to officer, offender, and community. 4 lecture discussions.

**SW 322 Family Violence (4)**

An introduction to the study of domestic violence and its manifestations in the family. Focus on problem-solving needs of practitioners and educators in identification, referral, case management and treatment of victims and perpetrators. 4 lectures/problem-solving.

**SW 431 Social Policy and Issues (4)**

Seminar to examine the cultural and structural elements that shape social policy in the United States. Emphasis on social welfare policy. Topics include: social security, poverty, child welfare, immigration, physical and mental health. 4 seminars. Prerequisites: SOC 201, 202 and SW 300 and upper division standing.

**SW 470 Death and Dying (4)**

Death and dying in American society. Attitudes towards dying expressed in contemporary institutional policies and practices; cultural variations; selected case histories. Social work practice with the dying and their families. 4 lecture discussions.



For courses in Behavioral Science and in Psychology, please refer to the appropriate sections of this catalog.



## THEATRE

William H. Morse II, Chair

Robert L. Gilbert  
Christine Menzies  
Leslie Rivers  
Kathleen H. Wain

The Cal Poly Pomona Department of Theatre awards an undergraduate degree in theatre which emphasizes production and experience in the "doing" of theatre. At the same time, the Department offers courses in all aspects of the theatre, both artistic and academic. The program stresses concern for students as artists and individuals. Faculty, staff and students work closely together to build a solid foundation of knowledge of both the practical and artistic aspects of theatre for the student.

Four options are offered. The first, the general option enables students to develop a broad theatre curriculum with primary interests in: directing, playwriting, management, or theory and criticism in order to create a course of study that best suits their goals. The second, the acting option, is for the student whose primary interest is in acting for the stage. The third, the design and technical theatre option, is for students with an interest in the theatrical design areas of: scenery, lighting, costumes, makeup or sound; or in the technical areas such as scenic or costume construction, production management, or technical direction. The fourth option is dance for those students that are interested in a general background in theatre with a specific performance interest in dance.

The Department presents a wide variety of productions to give the student a spectrum of experiences. Main stage productions range from dramas to musicals, from realism to varied theatrical styles, from premieres of new plays to presentations of classics by Shakespeare, Shaw, Moliere and Tennessee Williams. Students participate on main stage not only as actors and dancers, but also as designers and in all of the many technical aspects.

In addition to the main stage season, the Department of Theatre also offers an opportunity for experimentation in a program of workshops and projects presented in the smaller "black box" theater, where student involvement is strongly encouraged and supported. All productions draw audiences from the university and the community, and contribute greatly to their cultural climates.

In the classroom, students receive intensive training in acting (a series of at least nine acting courses are offered), directing, stagecraft, makeup, stage lighting, costume and scenic design, playwriting, and theater management.

Coursework also includes theatre history and criticism, dramatic structure and dramatic literature, to provide intellectual and academic skills which work hand-in-hand with artistic skills.

After completing the theatre major at Cal Poly Pomona, students are prepared for advanced training in graduate schools; to go into teaching in high schools; or to begin their careers or specialized training in professional theatre, television or film.

The theatre minor is designed to acquaint a person interested in pursuing theatre on a limited scale with the basic tools for mounting a production, whether in a school or community theatre situation. It also accommodates those who wish to begin a specialization in the acting-directing or the technical track. The program is one of both classroom participation and practical experience in the production program. Special advisement for students who are interested in theatre may be obtained from the department chair. Detailed information is available from the departmental office.

## THEATRE MAJOR CORE COURSES

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

(48 units, required for all options):

Technical Production I	TH	131/131A	(4)
Technical Production II	TH	132/132A	(4)
Acting I	TH	151/151L	(4)
Acting II	TH	152/152L	(4)
Principles and Practices of Theatrical Design	TH	231/231A	(4)
Movement for the Stage	TH	254L	(2)
History of the Theatre I	TH	311	(4)
History of the Theatre II	TH	312	(4)
History of the Theatre III	TH	313	(4)
Directing	TH	356/356L	(4)
Twentieth Century American Theatre	TH	410	(4)
Undergraduate Seminar	TH	461	(2)
Senior Project	TH	462	(2)
Senior Project	TH	463	(2)

## GENERAL OPTION CORE

(11 units)

Acting III	TH	153/153L	(4)
Stage Lighting	TH	332/332L	(2/1)
Playwriting	TH	401	(4)

## GENERAL THEATRE OPTION ELECTIVES

(9 units, with approval of advisor, from the following):

Applied Theatre * (TH 170 series)			(2)
Live Theatre Appreciation	TH	204	(4)
Drafting for the Theatre	TH	233/233A	(3)
Vocal Techniques for the Theatre	TH	252/252A	(3)
Intermediate Acting	TH	253/253L	(4)
Through Artist's Eyes: Visions of World Artists	TH	301	(4)
Improvisation for the Theatre	TH	355L	(2)
Scene Design	TH	337/337A	(4)
Styles of Acting	TH	358/358L	(4)
Theatre Management	TH	361/361L	(4)
Applied Theatre * (TH 370 series)			(2)
Stage Costume Design	TH	381/381A	(4)
Advanced Acting	TH	458/458L	(4)
Creative Theatre	TH	471/471A	(4)
History of Costume	TH	481	(4)
Special Topics	TH	499	(2)

\*No more than 8 units may be selected from these courses for the major. May be repeated for a total of 6 units.

## SUPPORT COURSES

Introduction to Shakespeare	ENG	203	(4)
or Shakespeare	ENG	403	(4)
Play Production Activity **	TH	244L	(6)
Advanced Projects in Theatre **	TH	441L	(6)
Art Course			(4)
Music Course			(4)

\*\* Theatre majors are required to take 1 unit of either TH 244 or 441 per quarter.

## ACTING OPTION CORE (28 units)

Acting III	TH	153/153L	(2/2)
Vocal Techniques	TH	252/252A	(3)
Intermediate Acting	TH	253/253L	(4)

Improvisation for the Theatre	TH	355L	(2)
Styles of Acting	TH	358/358L	(4)
Playwriting	TH	401	(4)
Advanced Acting	TH	458/458L	(4)
Applied Acting	TH	171	(2)
and/or Applied Acting	TH	371	
or Special Problems	TH	400	
Voice Fundamentals I	MU	237A	(1)
or Voice Fundamentals II	MU	238A	(1)

**ACTING OPTION ELECTIVES**

(14 units, from the list below chosen with approval of advisor):

Applied Acting	TH	171	(2)
and/or Applied Acting	TH	371	
Live Theatre Appreciation	TH	204	(4)
Through Artist's Eyes: Vision of World Artists	TH	301	(4)
Stage Lighting	TH	332/332L	(3)
Scene Design	TH	337/337A	(4)
Theatre Management	TH	361/361L	(4)
Stage Costume Design and Construction	TH	381/381A	(4)
History of Costume	TH	481	(4)
Special Topics	TH	499	(2)
Jazz Dance I-II	DAN	270A	(2)
Jazz Dance III-IV	DAN	271A	(2)
Modern Dance I-II	DAN	273A	(2)
Modern Dance III-IV	DAN	274A	(2)
Ballet I-II	DAN	276A	(2)
Ballet III-IV	DAN	277A	(2)
Advanced Dance Technique and Repertory	DAN	279A	(2)
Dance Improvisation and Basic Choreography	DAN	320/320A	(2)

**SUPPORT COURSES**

Introduction to Shakespeare	ENG	203	(4)
or Shakespeare	ENG	403	(4)
Play Production Activity **	TH	244L	(6)
Advanced Projects in Theatre **	TH	441L	(6)
Art Course			(4)
Music Course			(4)

\*\* Theatre majors are required to take 1 unit of either TH 244 or 441 per quarter.

**TECHNICAL THEATRE AND DESIGN OPTION CORE (26 units)**

Applied Theatre (TH 170 series)			(2)
or Special Topics	TH	499	(2)
Drafting	TH	233/233A	(3)
Lighting Design	TH	332/332L	(3)
Scene Design	TH	337/337A	(4)
Applied Drama (TH 370 series)			(2)
Theatre Management	TH	361/361L	(4)
Costume Design	TH	381/381A	(4)
History of Costume	TH	481	(4)

**TECHNICAL THEATRE AND DESIGN OPTION ELECTIVES (7-12 units)**

(The following courses and patterns are recommended but not required, with consent of advisor)

Select one of the following:

Fundamentals of Watercolor **	ART	225A	(3)
Beginning Life Drawing **	ART	224A	(3)
2-D Design **	ART	253A	(3)
Graphics: Introduction to the Computer as a Medium **	ART	255A	(3)
Through Artist's Eyes: Visions of World Artists	TH	301	(4)

Pattern For Theatrical Design Students—Select 2 of the following courses, with approval of advisor:

Special Problems for Upper Division Students	TH	400	(1-2)
Special Topics	TH	499	(2)
Age of Renaissance, Reformation, and Wars of Religion	HST	322	(4)
Ancient and Medieval Architecture	ARC	361	(4)
Renaissance and Baroque Architecture +	ARC	362	(4)
European Architecture ++	ARC	363	(4)
Foundations of Modern Art	ART	312	(4)
Art of the Classical World	ART	316	(4)
Art of the Middle Ages	ART	317	(4)
Art of the Italian Renaissance	ART	318	(4)
History of Music to 1750	MU	404	(4)
History of Music 1750 to 1900	MU	405	(4)
Computers and Music *	MU	408	(4)
Foundations of Modern Art	ART	312	(4)
Historical Interiors I	HE	423/423L	(4)
Historical Interiors II	HE	424/424L	(4)

+Prerequisite: ARC 361

++ Prerequisite: ARC 362

\*Prerequisite: MU 108

\*\* Prerequisite: must receive consent of instructor

Pattern for Technical Theatre Students—Select 2 of the following courses, with consent of advisor:

Engineering Design Graphics	MFE	121L	(2)
Advanced Engineering Design Graphics +	MFE	122L	(2)
Computer-Aided Drafting +	MFE	210L	(2)
Welding	AE	123/123L	(2)
Industrial Safety	ETP	302	(3)

+Prerequisite: MFE 121

**SUPPORT COURSES**

Intro to Shakespeare	ENG	203	(4)
or Shakespeare	ENG	403	(4)
Play Production Activity **	TH	244L	(6)
Advanced Projects in Theatre **	TH	441L	(6)

Art Course (select 1 of the following):

Introduction to Drawing	ART	140A	(3)
or Introduction to Design	ART	150A	(3)

Music Course (select one of the following):

Music Appreciation	MU	101	(4)
or Introduction to Electronic Music	MU	108	(4)

\*\*Theatre majors are required to take 1 unit of either DR 244 or 441 per quarter.

**DANCE OPTION CORE (25 units)**

Jazz Dance	DAN	270A	(4)
or Jazz Dance	DAN	271A	
Modern Dance	DAN	274A	(4)
Ballet Dance	DAN	276A	(4)
or Ballet Dance	DAN	277A	
Advanced Dance Technique and Repertory	DAN	279A	(2)
Improvisation and Basic Choreography	DAN	320/320A	(3)
Choreography	DAN	430/430A	(4)
Dance History	DAN	446	(4)

**DANCE OPTION ELECTIVES**

(16-18 units, with approval of advisor, from the following):

Stage Lighting	TH	332/332L	(3)
Stage Costume Design and Construction	TH	381/381L	(4)
or Scene Design	TH	337/337L	(4)
Percussion Fundamentals	MU	234A	(1-3)
The Visual Arts	ART	110	(4)
History of Tribal Arts	ART	211	(4)
Introduction to Design	ART	150A	(3)

**SUPPORT COURSES**

Introduction to Shakespeare	ENG	203	(4)
or Shakespeare	ENG	403	(4)
Play Production Activity**	TH	244L	(4)
Advanced Projects in Theatre**	TH	441L	(4)
Dance Production**	DAN	294L	(4)

Art Course (4 units from the following):

Foundations of Modern Art	ART	312	(4)
Art of the 20th Century	ART	313	(4)
Art of Ancient Civilization	ART	315	(4)
Special Issues in Contemporary Art	ART	413	(4)+
Motion Graphics: CAD	ART	456A	(3)++

Music Course (4 units from the following):

World of Music	MU	103	(4)
Voice Fundamentals I	MU	237	(1)x
Voice Fundamentals II	MU	238	(1)x

x may be repeated for up to 3 units

+prerequisites: ART 312 and 313

++prerequisite: ART 355

\*\*Theatre majors are required to take 1 unit of either TH 244 or 441 per quarter. Dance option may substitute 1 to 2 units per year of DAN 294.

**GENERAL EDUCATION COURSES****Area 1: (Pattern 2)**

Freshman English 1	ENG	104	(4)
Advocacy and Argument	COM	204	(4)
Freshman English II	ENG	105	(4)
or Writing About Literature	ENG	108	(4)

**Area 2:**

A. Select one course.	(4)
B. Select one course.	(4)
C. Select one course.	(4)
D. Select one course.	(4)

**Area 3:**

A. Introduction to Theatre . . . . .	.TH	203	(4)
B. History of Civilization . . . . .	.HST	101	(4)
or History of Civilization . . . . .	.HST	102	(4)
C. World Literature I . . . . .	.ENG	217	(4)
or World Literature II . . . . .	.ENG	218	(4)
D. Select one course . . . . .			(4)
E. Select one course . . . . .			(4)
F. Select one course . . . . .			(4)
G. Select one course . . . . .			(4)

**Area 4:**

United States History	HST	202
Introduction to American Government	PLS	201

**Area 5:**

12 upper division units, four of these units may fulfill Area 2D. See G.E. section in this catalog for approved courses.

Free Electives ..... +(24)

+ The total curriculum must include 60 units of upper division courses.

**THEATRE MINOR**

Required lower-division courses: 16 units

Technical Production I	TH	131/131A	(4)
and Technical Production II	TH	132/132A	(4)
or Acting I	TH	151/151L	(4)
and Acting II	TH	152/152L	(4)
Introduction to Theatre	TH	203	(4)

Required upper-division courses: 8 units

Advanced Projects in Theatre (4 separate quarters)	TH	441L	(4)
History of the Theatre I	TH	311	(4)
or History of the Theatre II	TH	312	(4)
or History of the Theatre III	TH	313	(4)
or Twentieth Century American Theatre	TH	410	(4)

Choose 8 units from one of the following two groups:

1. Directing—Acting			
Acting III	TH	153/153L	(4)
Directing	TH	356/356L	(4)
or Styles of Acting	TH	358/358L	(4)
2. Technical Theatre			
Stage Lighting	TH	332/332L	(3)
or Scene Design	TH	337/337A	(4)
or Principles and Practices of Theatrical Design	TH	231/231A	(4)
or Costume Design	TH	381	(4)
or Costume History	TH	481	(4)

Total units required in the minor ..... (32)

**COURSE DESCRIPTIONS****TH 125/125A Introduction to Acting (2/2)**

Introduction to theories and approaches to acting through participation. Intensive exercises in improvisation, characterization, concentration, and interpretation. This class focuses on the individual as an instrument for creative expression and encourages research that investigates the human condition from diverse cultures. 2 lectures/problem-solving, 2 two-hour activities. May be repeated once for credit. Corequisites: TH 152/125A.

**TH 131/131A Technical Production I (2/2)**

Principles of backstage organization, scenery construction, and scenic painting. 2 lectures/problem-solving, 2 two-hour activities. Corequisites: TH 131/131A.

**TH 132/132A Technical Production II (2/2)**

Principles and techniques of theatrical make-up, and costume construction. Two lectures. Two three-hour laboratories. Corequisites: TH 132/132A.



**TH 151/151L Acting I (2/2)**

Theory and practice of acting with special attention to basic approaches, including improvisation, motivation, concentration, and character development using the individual as an instrument for creative expression and encouraging research of theatre literature from diverse cultures. 2 lectures, 2 three-hour laboratories. May be repeated once for credit by permission of instructor. Corequisites: TH 151/151L.

**TH 152/152L Acting II (2/2)**

Theory and practice of acting, to refine and expand upon basic acting skills through improvisation and scene study using the individual as an instrument for creative expression and encouraging research of theatre literature from diverse cultures. Includes working with a student director. 2 lectures/problem-solving; 2 three-hour laboratories. May be repeated once for credit by permission of instructor. Prerequisite: TH 151/151L or consent of instructor. Corequisites: TH 152/152L.

**TH 153/153L Acting III (2/2)**

Theory and practice of acting, to explore techniques of performing monologues, scenes and one-act plays using the individual as an instrument for creative expression and encouraging research of theatre literature from diverse cultures. Includes vocal and physical aspects of characterization, and a range of roles which stretch the actor's instrument. 2 lectures/problem-solving, 2 three-hour labs. May be repeated once for credit by permission of instructor. Prerequisite: TH 151/151L, 152/152L and consent of instructor. Corequisites: TH 153/153L.

**TH 170, 370 Applied Theatre (2) (2)**

A series of specialized individual instruction for theatre majors in primary performance disciplines as listed below. A minimum of 10 hours of tutorial guidance for 2 units of credit. Prerequisite: permission of instructor. May be repeated for up to 6 units each, by permission of instructor.

**TH 171, 371 Applied Acting****TH 172, 372 Applied Directing****TH 173, 373 Applied Movement****TH 174, 374 Applied Voice****TH 175, 375 Applied Lighting****TH 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**TH 203 Introduction to the Theatre (4)**

Theatre as a performing art. Consideration of production process; transformation of dramatic text into live performance. Exploration of non-western theatre including Kabuki, Sanskrit Drama, Chinese Opera and non-traditional theatre styles. Representative plays to illustrate dramatic forms, styles, and meaningful cultural connections. 4 lecture discussions. Prerequisite: ENG 104 or permission of instructor.

**TH 204/204A Live Theatre Appreciation (3/1)**

Student discusses and attends six to eight culturally diverse performances at various theatres throughout Los Angeles area and meets for post-performance critical evaluations. Student pays for own theatre tickets. May be repeated once for credit. 3 lectures, 1 three-hour activity. Corequisites: TH 204/204A.

**TH 231/231A Principles and Practice of Theatrical Design (2/2)**

Beginning theatrical design involving the collaborative design process in theatre including: scenic, lighting and costume design. Experience in basic theatrical drafting techniques, model building and theatrical rendering techniques using culturally diverse theatre literature as a basis for design exploration. 2 lectures/problem-solving plus 2 two-hour activities. Corequisites: TH 231/231A. Prerequisites: sophomore standing, TH 131/131A and TH 132/132A or permission of instructor.

**TH 233/233A Drafting for the Theatre (2/1)**

Theatrical drafting techniques, including ground plans, elevations, working drawings, isometrics, cabinet views, light plots, lighting schedules, as well as theatrical pattern drafting including computer drafting. 2 lectures, 1 two-hour activity. Prerequisite: TH 131/131A or permission of instructor. Corequisites: TH 233/233A.

**TH 244/244L Play Production Activity (1-2)**

Theatre literature from diverse cultures used to explore acting style, theatrical design and production practices. Practical experience by participation in theatrical production. Technical crews, theatre management and acting. 4 hours laboratory. May be repeated for not more than 12 units.

**TH 252/252A Vocal Techniques for the Theatre (2/1)**

Principles of effective vocal use in performance; articulatory clarity and expressiveness; analysis of speech sounds through application of phonetic principles; application of vocal technique to performance of prose and verse texts from culturally diverse literary sources. May be repeated once for credit. 2 lecture discussions, 1 two-hour activity. Corequisites: TH 252/252A.

**TH 253/253L Intermediate Acting (2-2)**

Techniques of play and scene analysis through class exercises in improvisation, formal analytical methods, and rehearsal techniques. Practical application of acting techniques to theatrical literature from diverse cultural sources. Creation of roles for class and/or public performance. 2 lecture discussions, 2 three-hour laboratories. Corequisites: TH 253/253L. Prerequisites: TH 151/151L, TH 152/152L and TH 153/153L and permission of instructor. May be repeated once for credit by permission of instructor.

**TH 254L Movement for the Stage (2)**

Exercises in sensory-motor awareness that lead to flexibility and coordination of the body in relation to the stage space that an actor must adapt to and occupy. 2 three-hour laboratories. May be repeated once for credit, by permission of instructor.

**TH 299/299L/299A Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

**TH 301 Through Artist's Eyes: Visions of World Artists (4)**

Exploration of the artist's creative process, life, ethics and survival. Use of actual works of art to explore the artist's role, and to prepare artists, especially those in theatre, for the artist's life, including drama, film, literature, dancing and music from a variety of cultures and periods. 4 lecture discussions.

**TH 311 History of the Theatre I (4)**

Survey of dramatic art and production from the inception of theatre to 1640. Western Europe, French, Spanish and English theatre practices discussed. Also, the theatre art and production of ancient Greek, Roman, Indian, Chinese and Japanese cultures are studied. Application of historic principles and styles to contemporary play production and criticism. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**TH 312 History of the Theatre II (4)**

Survey of world dramatic art and theatre production from 1640 to 1870. Application of theories, principles, and styles to contemporary play production and criticism. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**TH 313 History of the Theatre III (4)**

Survey of world dramatic art and production from 1870 to the present. Application of historic principles and styles to contemporary play production and criticism. 4 lecture discussions. Prerequisite: junior standing or permission of instructor.

**TH 332/332L Stage Lighting (2/1)**

Theory and practice in stage lighting. Composition, design, manual and computer control boards, instrument selection, production planning. Participation as crew members for departmental productions. 2 lectures, 1 three-hour laboratory. Corequisites: TH 332/332L. Prerequisite: TH 133/133A and TH 231/231A or permission of instructor.

**TH 337/337A Scene Design (2/2)**

Theory and technique for scene design, including perspective drawings, renderings, models, scenic shifting methods, painting elevations, and ground plans. 2 lectures, 2 two-hour activities. Prerequisites: TH 131/131A, 132/132A and 231/231A, 233/233A, or permission of instructor. Corequisites: TH 337/337A. May be repeated once for credit by permission of instructor.

**TH 355L Improvisation for the Theatre (1/1)**

An approach to acting, utilizing improvisational techniques to explore temporal, spatial, and sonic relationships as well as scene-building methods. 2 three-hour laboratories. Concurrent enrollment required. Prerequisites: TH 151/151L. Offered in alternate years. May be repeated once for credit by permission of instructor.

**TH 356/356L Directing (2/2)**

Theory and practice of play selection, casting, application of cultural considerations, analysis and direction, composition, movement, coaching, and ground plans. May be repeated once for credit. 2 lecture discussions, 2 three-hour laboratories. Prerequisites: TH 151/151L, 152/152L, or permission of instructor. Corequisites: TH 356/356L.

**TH 358/358L Styles of Acting I (2/2)**

Theory and practice of various periods and styles of acting, including modern. 2 lectures, 2 three-hour laboratories. May be repeated once for credit. Prerequisites: TH 151/151L and TH 152/152L and TH 153/153L and permission of instructor. Corequisites: TH 358/358L.

**TH 361/361L Theatre Management (3/1)**

Principles of organization and management of the performing arts production program, including choice of season, audience analysis, promotion and publicity, box office procedures, budgeting and finance

and crew organization and supervision. 3 lecture discussions, 1 three-hour laboratory. Co-requisites: TH 361/361L. Prerequisites: TH 131/131A, 132/132A, 231/231A or permission of instructor.

**TH 381/381A Stage Costume Design and Construction (2/2)**

Costume design is explored using culturally diverse theatre literature as a basis. Including the creative process, sketches, material selection, budgeting, pattern drafting, and cutting. 2 lectures, 2 two-hour activities. Prerequisites: TH 131/131A, 132/132A, 231/231A. Corequisites: TH 381/381A.

**TH 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**TH 401 Playwriting and Dramatic Structure (4)**

Intensive study of dramatic structure as applied to theatre practice. Theory and practice in playwriting and criticism. 4 lecture discussions. May be repeated once for credit by permission of instructor.

**TH 410 Twentieth Century American Theatre (4)**

Readings chiefly in the 20th century with emphasis upon such representative playwrights as O'Neill, Wilder, Williams, Miller, Hellman, Hansberry, Albee, Baraka, Van Itallie, Wilson, Valdez and Shepherd. Examination of production style and cultural patterns. 4 lecture discussions. Prerequisite: ENG 104 or permission of instructor.

**TH 420/420A Summer Theatre Production (6-12)**

Preparation, rehearsal, and public performance of university-sponsored productions in an organized summer theatre similar to a professional stock company. Full-time work in all phases of production. By contract, 40 hours per week, earning 12 units; by contract, 20 hours per week, earning 6 units. May be repeated for up to 36 units.

**TH 441/441L Advanced Projects in Theatre (1-2)**

Advanced problems and independent projects in acting, directing, stage design, stage lighting, costuming and staging, including participation in major productions and independent production of experimental student plays. Minimum of 4 hours laboratory. May be repeated for not more than 12 units.

**TH 458/458L (2/2)**

Intensive study in styles and forms of acting, with special attention to mastery of technique and comparative study of theories of acting. 2 lectures, 2 three-hour laboratories. Prerequisites: TH 151/151L, TH 152/152L, TH 153/153L, TH253/253L and permission of instructor. Corequisites: TH 458/458L. May be repeated once for credit by permission of instructor.

**TH 461 Undergraduate Seminar (2)**

Writing research papers for theatrical subjects, reports of senior projects and discussions of professional options after college and graduate schools. 2 lecture discussions.

**TH 462, 463 Senior Project (2)(2)**

Selection and completion of a project under faculty supervision. Projects typical of problems the graduate will meet in his/her chosen field of employment. Results presented in a formal written report. Minimum of 120 hours of total time.

**TH 471/471A (2/2)**

Theory and practice of improvisational drama, dramatization of children's stories, and techniques of story-telling, with emphasis on participation, leadership, and development of original materials for classroom and recreational use. 2 lectures/problem-solving, 2 two-hour activities. Corequisites: TH 471/471A.

**TH 481 History of Costume (4)**

The dress of civilized persons as applied to theatre costuming from early recorded history to the present, as seen through contemporary art and written description, with emphasis on art history and social institutions. 4 lectures.

**TH 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: permission of instructor. Corequisites may be required.



## INSTITUTE OF NEW DANCE AND CULTURES

Gayle Fekete, Director

Ann Stabolepszy

The Institute's vision is to reflect a culturally diverse and artistically inclusive student-centered approach to the dance experience at Cal Poly Pomona. "New Dance and Cultures" refers to a humanistic, cross-cultural, interdisciplinary approach to the study of the way art functions in society on a personal, local, national, and global level. "Dance" is defined to include human movement and aesthetic expression, movement based interdisciplinary work, and western and non-western cultural forms.

The Institute supports a variety of campus/community projects, invites innovative collaborations across groups and disciplines, and promotes the development of community engagement projects that reflect the diverse and dynamic cultural climate.

The mission of the Institute is to continue to provide quality dance courses and experiences for the general student population, with an emphasis on common humanistic threads of art and expression found across cultures. By addressing the complexity of contemporary multicultural society through the examination of cultural issues, global perspectives, and personal histories, the institute is committed to developing student-centered study. The Institute of New Dance and Cultures validates the cultural experience and world view of a broad cross-section of perspectives.

Student choreography and performance are showcased in the student/faculty dance concert. Other opportunities for informal works occur year-round in the Institute's studio and campus wide. Internships, independent study, cross-listed course proposals, community based projects, and outreach, are some of the ways in which students can explore a variety of learning experiences not traditionally available.

### NEW DANCE AND CULTURES MINOR

World Dance and Cultures . . . . .	DAN 202	(4)
Modern Dance I-II . . . . .	DAN 273A	(2)
and Modern Dance III-IV . . . . .	DAN 274A	(2)
or Modern Dance III-IV . . . . .	DAN 274A	(4)
Ballet I-II . . . . .	DAN 276A	(2)
and Ballet III-IV . . . . .	DAN 277A	(2)
or Ballet III-IV . . . . .	DAN 277A	(4)
Dance Repertory . . . . .	DAN 279A	(2)
Dance Production . . . . .	DAN 294L	(1)
Festival Production . . . . .	DAN 295L	(1)
or New Dance and Cultures Creative Projects . .	DAN 296L	(1)
or Community Outreach . . . . .	DAN 297L	(1)
Dance improvisation and the creative process . .	DAN 320/320A	(4)
Creative problem solving through movement . . .	DAN 430/430A	(4)
Special Topics for upper division students . . . .	DAN 499	(1-4)
Electives (choose 4 units from the following) . . .		(4)
Jazz/Urban Dance . . . . .	DAN 270-272	
Cultural Performance Series . . . . .	DAN 290	
Total units for the minor (20 Lower division, 13 Upper division)		(33)

### COURSE DESCRIPTIONS

#### DAN 155/155A Beginning Tap Dance (1)

Basic tap techniques. 1 two-hour fine arts activity. May be repeated for a total of 4 units.

#### DAN 202 World Dance and Cultures (4)

Introduction to dance cultures of the world through movement experiences, lectures, videos of performances and cultures, reading and creative projects. 4 Lecture/Discussion.

#### DAN 270-279/270A-279A

May be repeated for additional credit as long as normal academic progress is maintained. May be taken for Credit/No Credit by non-majors.

#### DAN 270A Jazz/Urban Dance I-II (2)

Basic jazz dance and urban dance techniques and the cultural issues that influence the art form. Two 2-hour fine arts activity.

#### DAN 271A Jazz Dance III-IV (2)

Intermediate jazz dance and urban dance techniques and the cultural issues that influence the art form. Two 2-hour fine arts activity. Prerequisites: DAN 270A or permission of the instructor.

#### DAN 272A Jazz Dance V (2)

Advanced jazz dance and urban dance techniques and the cultural issues that influence the art form. Two 2-hour fine arts activity. Prerequisites: DAN 271A or permission of the instructor.

#### DAN 273A Modern Dance I-II (2)

Basic modern dance and contemporary concert dance techniques and the cultural issues that influence the dance form. Two 2-hour fine arts activity.

#### DAN 274A Modern Dance III-IV (2)

Intermediate modern dance and contemporary concert dance techniques and the cultural issues that influence the dance form. Two 2-hour fine arts activity. Prerequisites: DAN 273A or permission of the instructor.

#### DAN 276A Ballet I-II (2)

Basic ballet dance techniques and the cultural issues that created the art form. Two 2-hour fine arts activity.

#### DAN 277A Ballet III-IV (2)

Intermediate ballet dance techniques and the cultural issues that influenced the art form. Two 2-hour fine arts activity. Prerequisites: DAN 276A or permission of the instructor.

#### DAN 279A Dance Repertory (2)

Dance studies through the learning and performing of dances and choreographic works. Two 2-hour fine arts activity. Prerequisites: DAN 276A or permission of the instructor.

#### DAN 290A Cultural Performance Series (1-2)

Special topics in learning the dances of selected cultures (i.e., Asia, Africa, Latin America, North America, India, Polynesia, Western or Eastern Europe, Middle East, etc.) One or two 2-hour fine arts activity. May be repeated for credit.

#### DAN 294L Dance Production (1)

Dance Production activities in preparation for a dance performance. Minimum thirty hours. May be repeated for credit.

#### DAN 295L Festival Production

Festival production activities in preparation for a community performance. Minimum thirty hours. May be repeated for credit.



**DAN 296L New Dance and Cultures Creative Projects (1)**

Dance production activities in preparation for a cultural or experimental/non-traditional dance performance. Minimum thirty hours. May be repeated for credit.

**DAN 297L Community Outreach (1)**

Dance and movement based projects that focus on community outreach, student/mentor relationships, internships and performing opportunities that engage local community groups. Minimum thirty hours. May be repeated for credit.

**DAN 299/299A/299L Special Topics for Lower Division Students (1-4)**

Lower division group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by problem-solving/laboratory/activity/presentation or a combination. Prerequisite: permission of instructor. Corequisite may be required.

**DAN 320/320A Dance Improvisation and the Creative Process (1/2)**

Improvisational techniques used to develop resources for the creative process, dance and performance, movement awareness, creativity and compositional abilities. 2-hour lecture/problem-solving, Two 2-hour fine arts activities.

**DAN 430/430A Creative Problem Solving through Movement (4)**

Creative Problem solving through movement and composing movement phrases and dances. Students critically review dance ideas, dances and other movement based performance forms that have cross disciplinary or cross cultural components. One 2-hour lecture/problem-solving, Two 2-hour fine arts activity. Prerequisites: DAN 320 or permission of the instructor.

**DAN 446 Dance of the 20th Century (4)**

Survey and analysis of choreographers and dance works that represent significant developments in the art form since 1900. Attention paid to the artistic, cultural and social trends the dance forms reflect. 4 lecture discussions.

**DAN 449 Dance in Contemporary Culture (4)**

Examination of how dance functions as social standard political expression, community outreach, educational tool and group identity. Examples from world culture as well as western society and personal experience investigated. 4 lecture/discussions/presentations.

**DAN 499/499A/499L Special Topics for Upper Division Students (1-4)**

Upper division group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by problem-solving/laboratory/activity/presentation or a combination. Prerequisite: permission of instructor. Corequisite may be required.





COLLEGE OF





## COLLEGE OF SCIENCE

Simon J. Bernau, Dean  
Victor P. Abegg, Associate Dean

The curricula offered in the College of Science combine fundamental education in science or mathematics with a broad human outlook, which develops the student's mental horizon beyond the limits of his/her immediate vocational objective.

Each curriculum is designed to prepare graduates for specific professional positions in industry, government and teaching or for graduate and professional work in their disciplines. The four-year sequence covers the basic major courses and has sufficient free electives to allow the students to develop specializations within the major and closely-related fields.

General education courses are offered for all students. The need to understand the concepts of modern science and mathematics and their relationship to life in our present world is important. The College of Science also offers basic supporting courses for students enrolled in the professional and technological degree programs in other colleges of the university.

Majors in nine fields leading to the bachelor of science degree are offered by the College of Science. Information concerning the master's curricula may be found in the graduate listings.

The standard teaching credential program is offered for both the elementary specialization and the secondary specialization in a number of majors and minors.

A pre-professional program is offered for students preparing for medical, dental, or veterinary or other health career schools.

The College of Science actively fosters dialogue and joint research among campus scientists through special institutes and symposia. The Institute for Cellular and Molecular Biology (see catalog section on Special University Centers) and the Institute for Advanced Systems Studies are particularly active in these areas.

An active co-curricular program includes the Science Council; Beta Beta Beta Biological honor society; Biological Sciences Club; Microbiology Club; a chapter of Kappa Mu Epsilon (mathematics); a chapter of student affiliates of the American Chemical Society; Society of Physics Students; Sigma Pi Sigma, national honor society in physics; Upsilon Pi Epsilon, national honor society in Computer Science; the Geology Club and other organizations.

The College of Science supports the concept of international education and encourages students to investigate opportunities for overseas study. Certain courses taken at CSU International Program study centers in foreign countries are equivalent to courses in the College of Science and may be used to fulfill some of the degree requirements offered by the College and/or certain general education requirements. Students should consult the International Programs Bulletin (which is available at the International Center), a department advisor, or the campus International Programs Coordinator for more information.

### Interdisciplinary General Education (IGE)

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

### ENVIRONMENTAL HEALTH SPECIALIST MINOR

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

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

### PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Animal Science, Behavioral Sciences, Biology, Chemistry, Electrical and Computer Engineering (Biomedical Engineering), Foods and Nutrition, Kinesiology, Microbiology and Zoology.

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

### Departments and Majors

#### BIOLOGICAL SCIENCES

Gilbert D. Brum, Chair

Biology major (BS); Biotechnology major (BS); Botany major (BS); Microbiology major (BS); Option in Microbiology, Option in Medical Technology; Zoology major (BS).

Minors in Botany, Plant Biotechnology, Plant Pathology, Microbiology, Zoology, Environmental Health Specialist, Physiology and Comparative Systems Analysis.

Master of Science in Biological Sciences.

#### CHEMISTRY

Keith Howard, Chair

Chemistry major (BS) Option in Chemistry; Option in Chemical Sciences; Option in Industrial Chemistry

Minor in Chemistry

Master of Science in Chemistry

#### COMPUTER SCIENCE

Barry I. Soroka, Chair

Computer Science major (BS)

Minors in Computer Systems Organization, Scientific Computer Programming and Artificial Intelligence

Master of Science in Computer Science

#### GEOLOGICAL SCIENCES

John A. Klasik, Chair

Geology Major (BS); Option in Integrated Earth Studies

Minor in Geology

**MATHEMATICS**

Claudia Pinter-Lucke, Chair

Mathematics Major (BS); Option in Pure Mathematics; Option in Applied Mathematics; Option in Statistics;

Minors in Statistics and Mathematics

Master of Science in Mathematics

**PHYSICS**

Steven W. McCauley, Chair

Physics Major (BS)

Physics Minor

**Center For Education and Equity in Mathematics, Science and Technology**

The Center's purpose is to contribute to the improvement of science and mathematics education in elementary and secondary schools. To this end it coordinates workshops and courses for K-12 teachers and also provides teachers with equipment and other materials for use in their classrooms. For information see Dr. Judith Jacobs (Building 3, Room 243).

**Cooperative Education**

This program combines classroom study with closely related work experience. Its basic purpose is to provide a means whereby a student can combine study at Cal Poly Pomona with work experience. For information see Dr. J. Ernest Simpson (Building 3, Room 233).

**Science Educational Enhancement Services**

The objective of Science Educational Enhancement Services (SEES) is to increase the number of Blacks, Hispanics and American Indians in the sciences and mathematics. The program strives for the retention and graduation of its members by establishing a supportive community among students with these ethnic backgrounds and having technical career goals. SEES services include special faculty advisors in each department of the college, an orientation course for members who are new to the campus, a study center where students can work together, priority consideration to participate in Academic Excellence Workshops (see below) and clubs for preprofessional students from targeted ethnic groups. For information see Dr. Paul Hiemenz (Building 3, Room 222).

**Academic Excellence Workshops**

An Academic Excellence Workshop is a supplement to certain beginning-level chemistry, mathematics, computer science, physics and engineering courses which is open by invitation only. Participants in MEP in the College of Engineering and SEES in the College of Science receive priority consideration as invitees. The Workshop program promotes technical excellence in the subject area while also developing student and communication skills under the guidance of a trained facilitator. An invitation to participate should be regarded as an honor and a unique opportunity.

**Pre-Professional Preparation  
(Pre-Dental, Pre-Medical, Pre-Veterinary, Other)**

A science major is often very suitable for undergraduate preparation for medical, dental, veterinary and other professional schools. The list below summarizes the basic requirements for most professional schools. Requirements for a particular school may vary. Students who are interested in pre-professional preparation should consult with the pre-professional program advisor, Dr. David Steele.

**Recommended Courses**

Freshman English I	ENG	104	(4)
Freshman English II	ENG	105	(4)
Basic Biology	BIO	115/115L	(3/2)
Cell, Molecular and Developmental Biology	BIO	310	(4)
Vertebrate Zoology	ZOO	138/138L	(5)
General Chemistry	CHM	121/121L	(3/1)
General Chemistry	CHM	122/122L	(3/1)
General Chemistry	CHM	123/123L	(3/1)
Organic Chemistry	CHM	314	(3)
Organic Chemistry	CHM	315	(3)
Organic Chemistry	CHM	316	(3)
Organic Chemistry Laboratory	CHM	317L	(1)
Organic Chemistry Laboratory	CHM	318L	(1)
Organic Chemistry Laboratory	CHM	319L	(1)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Physics Laboratory	PHY	141L	(1)
College Physics Laboratory	PHY	142L	(1)
College Physics Laboratory	PHY	143L	(1)

For additional recommended and support courses, see the pre-professional program advisor, Dr. David Steele (medicine, dentistry, veterinary, etc.).

**COLLEGE OF SCIENCE COURSE DESCRIPTIONS****SCI 110/110A Success in Science (1/1) FW**

Orientation to the various majors in the College of Science. Exploration of student and University expectations of science majors. Career opportunities. One-to-one interaction with departmental mentors. Speakers, field trips. Open only to students in Science Educational Enhancement Services (SEES). May be repeated for a maximum of 4 units. 1 lecture, 1 two-hour activity. Concurrent enrollment required.

**SCI 210/210L Physics Concepts and Activities (3/1) FW**

Introduction to physics concepts, covering mechanics, heat, sound, light, electricity, magnetism and properties of matter. Laboratory and demonstration activities appropriate for elementary school teachers are emphasized. 3 lectures, 1 three-hour lab. Concurrent enrollment required. Prerequisite: MAT 191.

**SCI 211/211L Chemical Sciences (3/1) WSP**

The basic concepts of chemistry and an overview of the applications of chemistry from atomic theory through biochemistry. Laboratory activities include fundamental experiments that can be adopted for elementary school teaching. 3 lectures, 1 three-hour lab. Concurrent enrollment required.

**SCI 212/212L Geological Sciences (3/1) Sp**

Foundations in the science of Geology and Earth Science with emphasis on applications important in teaching. Laboratory sessions emphasize experiments useful for elementary school teachers. 3 lectures, 1 three-hour lab. Concurrent enrollment required.

**SCI 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**SCI 450 Philosophic Implications of Science (4) Sp**

Reading and discussion of works of eminent scientists and philosophers concerning those results of science that have a bearing on philosophic problems. Readings may be from authors such as Schrodinger, Russell, Huxley, Chardin, Kuhn. 4 lectures. Prerequisite: senior standing in one of the natural or physical sciences, mathematics or consent of the instructor.

**SCI/EGR 460 Problems in Oceanographic Studies (3-5)**

Course offered in conjunction with the Southern California Ocean Studies Consortium (SCOSC). Topics vary each term. See chair of Biological Sciences Department for further information. Upper division standing and permission of instructor required.

**SCI 470, 471, 472, 473 Cooperative Education (1-4)**

Part-time or full-time work experience that applies scientific principles to practice. To be taken in sequence. Prerequisite: junior standing or approval of co-op coordinator. The work assignment must have prior approval. Maximum 16 units.

**SCIENCE AND MATHEMATICS EDUCATION COURSE DESCRIPTIONS****SME 501 Mathematics and Sciences Learning for Adults (3)**

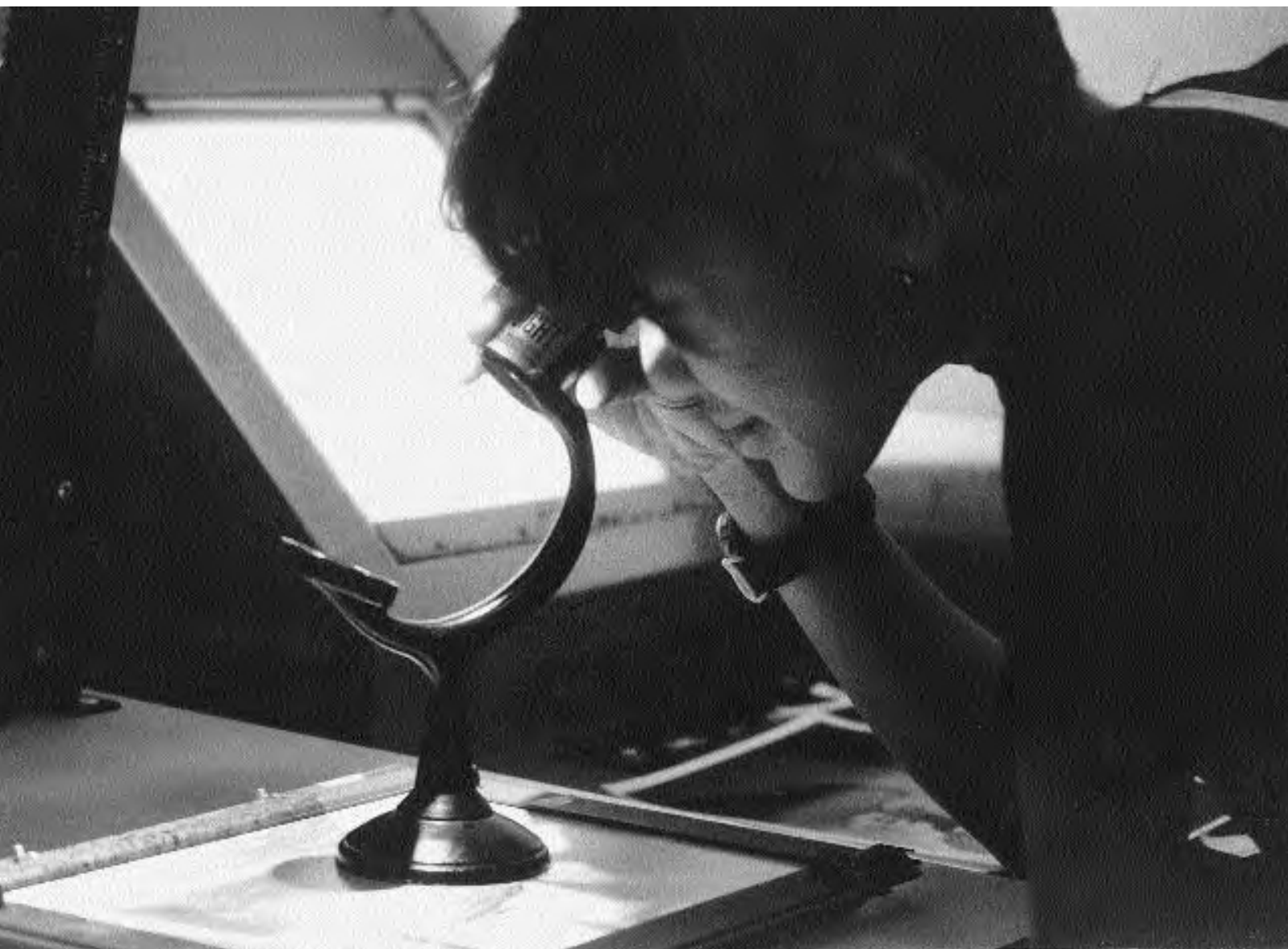
Mathematics and sciences learning theories including cognitive, metacognitive and affective variables in learning mathematics and sciences. Adult development and adult learning theories. Diversity in mathematics and sciences instruction. 3 lecture discussions.

**SME 502L Practicum for College Mathematics and Science Faculty (3)**

Development and practice of organizational and andragogical skills appropriate for the college mathematics or science instructor. 3 laboratories. Prerequisite: SME 501 and a concurrent teaching assignment in a college mathematics or science class.

**SME 503 Issues in Higher Education for College Faculty (3)**

The historical development of higher education: the California Master Plan; campus and system governance; the role of the faculty; educational and organizational responses to diversity, access, equity and excellence at the post-secondary level; student subgroups and the changing demographics. 3 lecture discussions.





## BIOLOGICAL SCIENCES

Majors in Biology, Biotechnology, Botany, Microbiology, and Zoology

Lenard R. Troncale, Chair

Jill P. Adler  
Keith E. Arnold  
Jonathan N. Baskin  
Jack L. Bath  
Kristin R. Bozak  
Gilbert D. Brum  
Stephen H. Bryant  
David P. Campbell  
Gary C. Carlton  
Peter Castro  
John K. Chan  
J. Curtis Clark  
Ronald S. Daniel  
Bruce L. Firstman  
Chris D. George  
Donald F. Hoyt

James O. Jackson  
Glenn H. Kageyama  
George W. Martinek  
Larry K. McKane  
David J. Moriarty  
Bijay K. Pal  
Ronald D. Quinn  
Fred Shafia  
Pamela J. Sperry  
David F. Steele  
Glenn R. Stewart  
Daniel F. Stiffler  
Martin F. Stoner  
Laszlo J. Szijj

The Biological Sciences Department offers bachelor's degree programs in Biology, Biotechnology, Botany, Plant Biotechnology, Microbiology, and Zoology. In addition, minors in Botany, Plant Biotechnology, Plant Pathology, Microbiology, and Zoology are offered, and the department participates in interdisciplinary minors in Comparative System Analysis, Environmental Health Specialist, Physiology, and Quantitative Research. Departmental facilities include molecular biology laboratories, greenhouses, controlled environmental units, a radiation biology laboratory, plant and animal collections, and an electron microscope facility. Ecological studies are facilitated by accessibility to natural habitats on campus and by the university's proximity to desert, mountain, and seashore areas. Courses in marine and fresh water biology provide preparation for teaching, conservation, wildlife management, or graduate research in aquatic biology. Courses in marine biology interact with the Ocean Studies Consortium of the CSU. A variety of field biology courses utilize the CSU Desert Studies Center at Zzyzx, near Baker, California. Students majoring in biological sciences and who have at least a 3.0 GPA have the opportunity to join Beta Beta Beta, an honorary society in the Biological Sciences Department. For additional information contact the department office.

A cumulative 2.0 GPA is required in core courses in all Biological Sciences majors in order to receive a degree in that major.

### ENVIRONMENTAL HEALTH SPECIALIST MINOR

The Environmental Health Specialist Minor is an interdisciplinary program which may be pursued by majors in any field. Its purpose is to prepare students for careers as environmental health specialists by meeting the standards for the state internship program. State-employed specialists enforce and administer laws governing water, food, and air contamination, noise, land-use planning, occupational health hazards, and animal vectors of disease. The minor is particularly suitable for students majoring in the biological sciences. A full description of the minor is in the "University Programs" section of this catalog.

### PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of physiology. It is

particularly appropriate for students majoring in the biological sciences. A full description of the minor is located in the "University Programs" section of this catalog.

### QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analysis in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited to students majoring in the biological sciences. A full description of this minor is included in the University Programs section of this catalog.

### BIOLOGY MAJOR

The Biology major stresses a balance between the theoretical aspects of biology and actual experience in field and laboratory. The variety of courses offered in a flexible curriculum provides an opportunity for a wide range of experience in both animal and plant sciences.

The offerings of this curriculum provide the student with a preparation for graduate and professional schools in fields ranging from molecular to field biology. The curriculum prepares prospective teachers for the secondary education credential. Graduate courses enable students to complete requirements for the junior college credential. For those planning a career as a secondary school teacher a credential is required. Contact department office for additional information.

### Core Courses for Major

(Required of all students)

Scientific Communication I	BIO	190	(1)
Environmental Conservation	BIO	201	(3)
Biometrics	BIO	211/211L	(3/1)
Principles of Evolution	BIO	213	(4)
Genetics	BIO	303	(4)
Cell, Molecular, and Developmental Biology	BIO	310	(4)
Principles of Ecology	BIO	325/325L	(3/1)
Cellular Physiology	BIO	435/435L	(3/2)
or Plant Physiology	BOT	422/422L	(3/2)
or Comparative Animal Physiology	ZOO	424/424L	(3/2)
Scientific Communication II	BIO	490	(1)
Plant Structures and Functions	BOT	124/124L	(3/2)
Plant Morphology	BOT	125/125L	(3/2)
Basic Microbiology	MIC	201/201L	(3/2)
Invertebrate Zoology	ZOO	137/137L	(3/2)
Vertebrate Zoology	ZOO	138/138L	(3/2)
Upper Division courses in Biological Sciences			(12)

### Support and Elective Courses

(Required of all students)

General Chemistry Laboratory	CHM	121L	(1)
General Chemistry	CHM	122/122L	(3/1)
General Chemistry	CHM	123/123L	(3/1)
Organic Chemistry	CHM	201	(3)
Organic Chemistry Laboratory	CHM	250L	(1)
Elements of Biochemistry	CHM	321/321L	(3/1)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Physics Laboratory	PHY	141L	(1)
College Physics Laboratory	PHY	142L	(1)
College Physics Laboratory	PHY	143L	(1)
Introduction to Statistics	STA	120	(4)



Approved electives. . . . . \*\* (14)  
Students considering graduate work or professional schools, see recommended courses for pre-professional preparation.

\*\* Approved electives include all 200, 300, and 400-level courses in the biological sciences not specifically designed for non majors (see course descriptions). Also included are any advanced Chemistry or Math courses. See advisor for approval of courses offered by other departments.

### General Education Courses

Underlined courses satisfy both major and GE requirements.

#### Area 1:

<u>A. Freshman English I</u> . . . . .	ENG	104	(4)
<u>B. Select from approved list</u> . . . . .			(4)
<u>C. Freshman English II</u> . . . . .	ENG	105	(4)

#### Area 2:

<u>A. Calculus for Life Science</u> . . . . .	MAT	120	(4)
<u>B. General Chemistry</u> . . . . .	CHM	121	(3)
<u>C. Basic Biology</u> . . . . .	BIO	115/115L	(3/2)
D. Select from approved list . . . . .			(4)

#### Area 3:

Select one course from each subarea (A-F). . . . .			(24)
Select one of the following for Subarea G:			
BIO 205, or KIN/FN 203 or			
PSY 201 or PSY 210 . . . . .			(4)

#### Area 4:

United States History . . . . .	HST	202	(4)
Introduction to American Government . . . . .	PLS	201	(4)

#### Area 5:

Select two courses from approved list. . . . .			(8)
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### BIOTECHNOLOGY MAJOR

The Biotechnology major is an interdisciplinary program which provides students with a strong background in both biology and chemistry. It provides the theoretical and practical knowledge needed to understand the numerous industrial applications of biological phenomena, while emphasizing the study of cell and molecular biology. Students can select their upper division electives from six clusters: (1) Physiology; (2) Molecular Biology and Genetics; (3) Microbiology and Pathology; (4) Biochemistry and Molecular Separation Techniques; (5) Agriculture; and, (6) Business. Twenty-three units must be chosen from one of these clusters (referred to as the student's primary cluster) and an additional 14 units from the other five clusters. This will allow the individual to specialize in a particular area. An important feature of this major is an internship in a biotechnology laboratory for practical experience in the field. This program also satisfies the admission requirements for various graduate and preprofessional schools. This major requires admission to the Biological Sciences Department and completion of the 198-199 units indicated below. There are no special admission requirements. The Biological Sciences Department also offers a curriculum leading to the Master of Science in Biology with emphasis in Biotechnology.

### Core Courses for Major

Biometrics . . . . .	BIO	211/211L	(3/1)
Horizons in Biotechnology . . . . .	BIO	230	(1)
Computer Applications in Biology . . . . .	BIO	256/256L	(1/1)
Cellular, Molecular, and Developmental Biology . . . . .	BIO	310	(4)
Internship in Biology . . . . .	BIO	441	(2)
or Cooperative Education . . . . .	SCI	470	(2)
Concepts of Molecular Biology . . . . .	BIO	450	(4)

Molecular Biology Techniques . . . . .	BIO	451/451L	(3/2)
Scientific Communication II . . . . .	BIO	490	(1)
or Undergraduate Seminar . . . . .	CHM	493	(2)
General Chemistry Laboratory . . . . .	CHM	121L	(1)
General Chemistry . . . . .	CHM	122/122L	(3/1)
General Chemistry . . . . .	CHM	123/123L	(3/1)
Quantitative Analysis . . . . .	CHM	221	(4)
Organic Chemistry . . . . .	CHM	314	(3)
Organic Chemistry . . . . .	CHM	315	(3)
Organic Chemistry . . . . .	CHM	316	(3)
Organic Chemistry Laboratory . . . . .	CHM	317L	(1)
Organic Chemistry Laboratory . . . . .	CHM	318L	(1)
Organic Chemistry Laboratory . . . . .	CHM	319L	(1)
Biochemistry . . . . .	CHM	327/327L	(3/1)
Biochemistry . . . . .	CHM	328/328L	(3/1)
Biochemistry . . . . .	CHM	329/329L	(3/1)
Basic Microbiology . . . . .	MIC	201/201L	(3/2)
Vertebrate Zoology . . . . .	ZOO	138/138L	(3/2)
or Plant Structure and Function . . . . .	BOT	124/124L	(3/2)
or Plant Morphology . . . . .	BOT	125/125L	(3/2)
Upper Division Courses . . . . .			(36)

At least 21 units from one ("Primary") cluster and 11 units from any of the other five clusters, to be selected in consultation with faculty advisor. See clusters listed under "Upper Division Course Clusters."

### Support Courses

College Physics . . . . .	PHY	121	(3)
College Physics . . . . .	PHY	122	(3)
College Physics . . . . .	PHY	123	(3)
College Physics Laboratory . . . . .	PHY	141L	(1)
College Physics Laboratory . . . . .	PHY	142L	(1)
College Physics Laboratory . . . . .	PHY	143L	(1)
Technical Calculus II . . . . .	MAT	131	(4)
Technical Calculus III . . . . .	MAT	132	(4)
Statistics with Applications . . . . .	STA	120	(4)

### General Education Courses

Underlined courses satisfy both major and GE requirements.

#### Area 1:

<u>A. Freshman English I</u> . . . . .	ENG	104	(4)
<u>B. Select from approved list</u> . . . . .			(4)
<u>C. Freshman English II</u> . . . . .	ENG	105	(4)

#### Area 2:

<u>A. Technical Calculus I</u> . . . . .	MAT	130	(4)
<u>B. General Chemistry</u> . . . . .	CHM	121	(3)
<u>C. Basic Biology</u> . . . . .	BIO	115/115L	(3/2)
D. Select from approved list . . . . .			(4)

#### Area 3:

Select one course from each subarea (A-F). . . . .			(24)
Subarea G. General Psychology . . . . .	PSY	201	(4)

#### Area 4:

United States History . . . . .	HST	202	(4)
Introduction to American Government . . . . .	PLS	201	(4)

#### Area 5:

Genetics . . . . .	BIO	303	(4)
Multicultural Organizational Behavior . . . . .	MHR	318	(4)
Total Units in General Education. . . . .			72
Total Units All Courses. . . . .			198-199

**Course Descriptions**

See course descriptions under appropriate department.

**Upper Division Course Clusters****Cluster 1 - Physiology**

Cellular Physiology	BIO	435/435L(3/2)
Endocrinology **	BIO	520/520L(3/1)
Renal Physiology **	BIO	521 (3)
Advanced Plant Physiology**	BIO	548/548L(3/2)
Bacterial Physiology **	BIO	560/560L (3/1)
Plant Physiology	BOT	422/422L (3/2)
Plant Anatomy	BOT	435/435L(2/2)
Fundamentals of Physical Chemistry	CHM	301/301L (3/1)
Nutrient Biochemistry and Metabolism	CHM	454 (3)
Biomedical Instrumentation	ECE	435 (3)
Biomedical Instrumentation Laboratory	ECE	485L (1)
Advanced Nutrition	FN	433 (4)
Biophysics	BIO/PHY	410 (4)
Comparative Animal Physiology	ZOO	424/424L (3/2)
Histology	ZOO	422/422L (2/3)

**Cluster 2 - Molecular Biology and Genetics**

Plant Breeding	AGR	404/404L(3/1)
Population Genetics	BIO	445/445L (3/1)
Advanced Genetics	BIO	421 (3)
Recombinant DNA Techniques	BIO	455/455L(2/2)
Cytogenetics **	BIO	510/510L (2/1)
Advanced Cell Biology **	BIO	535 (4)
Plant Growth & Development **	BIO	550/550L (2/2)
Molecular Biology of Development **	BIO	555 (3)
Animal Tissue Culture **	BIO	565/565L(2/2)
Transmission Electron Microscopy **	BIO	577/577L (2/3)
Scanning Electron Microscopy **	BIO	578/578L (2/3)
Plant Genetics	BOT	403/403L (3/1)
Plant Tissue Culture	BOT	456/456L (1/3)
Human Genetics	BIO	403/L (3/1)
Recombinant DNA Biochemistry	CHM	453 (3)
Microbial Structures and Function	MIC	300/300L (3/2)
Biophysics	BIO/PHY	410 (4)

**Cluster 3 - Microbiology and Pathology**

Radiation Biology	BIO	431/431L (3/1)
Cellular Immunity and Disease **	BIO	570/570L (3/1)
Advanced Immunology **	BIO	576/576L (2/1)
Plant Pathology	BOT	323/323L(2/2)
Mycology	BOT	426/426L(2/2)
Methods in Plant Pathology	BOT	441/441L (2/2)
Microbial Structures & Functions	MIC	300/300L (3/2)
Immunology-Serology	MIC	415/415L (3/2)
Medical Bacteriology	MIC	410/410L (3/2)
Medical Mycology	MIC	425/425L (3/2)
General Virology	MIC	430/430L (3/2)
Hematology	MIC	444/444L(3/1)

**Cluster 4 - Biochemistry and Molecular Separation Techniques**

Elements of Physical Chemistry	CHM	304/304A(3/1)
Elements of Physical Chemistry	CHM	305/305L(3/2)
The Chemist in Industry	CHM	340 (4)
Spectroscopic Methods	CHM	342/342L (2/2)
Separation Methods	CHM	343/343L (2/2)
Electroanalytical Methods	CHM	344/344L(2/2)
Theory of Chemical Instrumentation	CHM	347/347L (1/1)
Organic Analysis	CHM	424/424L (2/2)

Enzymology	CHM	451/451L (3/1)
Biochemical Preparations	CHM	452/452L (1/2)
Recombinant DNA Biochemistry	CHM	453 (3)
Biochemical Mechanisms **	CHM	565 (3)
Advanced Clinical Chemistry**	CHM	567 (3)

**Cluster 5 - Agriculture**

Food Process Engineering	AE	332/332L(3/1)
Plant Growth Regulators	AGB	470/470L (2/1)
Mammalian Endocrinology	AVS	412 (4)
Design and Analysis of Experimental Research **	AVS	545 (4)
Food Science and Technology	FN	317/317L(3/1)
Food Chemistry and Toxicology	FN	420/420L(2/2)
Advanced Plant Propagation	HOR	422/422L (3/1)
Soil Chemistry	SS	431/431L(3/1)
Immunology Procedures in Animal Production	AVS	405/405L (3/1)

**Cluster 6 - Business**

Management Information Systems	CIS	310 (4)
Training and Development	MHR	405 (4)
Management Policies and Systems	MHR	410 (4)
Principles of Marketing Management	IBM	301 (4)
Production and Operations Management I	OM	331 (4)

\*\*500-level courses: No more than 13 units may be counted toward an undergraduate degree. Students must have a 2.75 GPA, have senior standing, and file a special petition to receive undergraduate (or graduate) credit for graduate courses taken as a senior.

**BOTANY MAJOR**

The Botany curriculum offers a four-year sequence of foundation courses plus electives to provide the fundamentals of plant sciences as well as the flexibility to permit selection of courses for several lines of study. Such versatility covers the major disciplines of plant science: physiology, morphology and systematics, and also provides for careers in mycology, pathology, ecology, field biology, plant biotechnology and similar occupational areas which require a strong background of basic plant studies.

Of considerable advantage to the program are the various distinct plant communities available nearby for field study.

Other centers of botanical study and resources close at hand include the Los Angeles State and County Arboretum, Huntington Botanical Garden, and the Rancho Santa Ana Botanic Garden.

**Core Courses for Major**

(Required of all students)

Scientific Communication I	BIO	190 (1)
Principles of Evolution	BIO	213 (4)
Genetics	BIO	303 (4)
Cellular, Molecular, and Developmental Biology	BIO	310 (4)
Principles of Ecology	BIO	325/325L(3/1)
Scientific Communication II	BIO	490 (1)
Plant Structures and Functions	BOT	124/124L (3/2)
Plant Morphology	BOT	125/125L (3/2)
General Plant Pathology	BOT	323/323L(3/1)
Plant Ecology	BOT	421/421L (3/1)
Plant Physiology	BOT	422/422L (3/2)
Phycology	BOT	433/433L (2/2)
or Mycology	BOT	425/425L(2/2)
or Mycology	BOT	426/426L (2/2)
Plant Anatomy	BOT	435/435L(2/2)

Plant Taxonomy	BOT	436/436L(2/2)
Basic Microbiology	MIC	201/201L (3/2)
Invertebrate Zoology	ZOO	137/137L (3/2)
Vertebrate Zoology	ZOO	138/138L (3/2)

### Support and Elective Courses

(Required of all students)

General Chemistry Laboratory	CHM	121L	(1)
General Chemistry	CHM	122/122L	(3/1)
General Chemistry	CHM	123/123L	(3/1)
Organic Chemistry	CHM	201	(3)
Organic Chemistry Laboratory	CHM	250L	(1)
Elements of Biochemistry	CHM	321/321L	(3/1)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Physics Laboratory	PHY	141L	(1)
College Physics Laboratory	PHY	142L	(1)
College Physics Laboratory	PHY	143L	(1)
Basic Soil Science	SS	231/231L	(3/1)
Approved Electives	**		(21)

Students considering graduate work or professional schools should see recommended courses for preprofessional preparation.

\*\* Approved electives include any 200, 300, and 400-level courses in the Biological Sciences Department not specifically designed for non-majors. Approved electives also include: any advanced Chemistry or Math courses; PHY 304, 340 and 410; HOR 131/L, 323/L, 427/L, AGR 404/L and AGR 421/L. See advisor for approval of other courses offered by other departments.

### General Education Courses

Underlined courses satisfy both major and GE requirements.

#### Area 1:

<u>A. Freshman English I</u>	ENG	104	(4)
B. Select from approved list			(4)
<u>C. Freshman English II</u>	ENG	105	(4)

#### Area 2:

<u>A. Calculus for Life Science</u>	MAT	120	(4)
<u>B. General Chemistry</u>	CHM	121	(3)
<u>C. Basic Biology</u>	BIO	115/115L	(5)
D. Select from approved list			(4)

#### Area 3:

Select one course from each subarea (A through F)			(24)
Subarea G: Select one of the following:			
BIO 205, KIN/FN 203, PSY 201, or PSY 210.			(4)

#### Area 4:

United States History	HST	202	(4)
Introduction to American Government	PLS	210	(4)

#### Area 5:

Select two courses from approved list.			(8)
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**Unrestricted Electives** (4)

### BOTANY MINOR

Required Courses (all students)

Minimum units—32

Minimum upper division units—12

Basic Biology	BIO	115/115L (3/2)
Plant Structures and Functions	BOT	124/124L (3/2)
and Plant Morphology	BOT	125/125L (3/2)
and 6 units of BOT prefix courses not including BOT 316		

At least three of the following courses must be completed:

Plant Pathology	BOT	323/323L(2/2)
California Flora	BOT	343/343L (1/2)
Plant Ecology *	BOT	421/421L (3/1)
Plant Physiology **	BOT	422/422L (3/2)
Plant Anatomy	BOT	435/435L(2/2)

Any of the following courses may be used to complete the minor:

Principles of Evolution . . . . .	BIO	213	(4)
Genetics . . . . .	BIO	303	(4)
Plant Nematology . . . . .	BOT	423/423L	(3/1)
Principles of Ecology . . . . .	BIO	325/325L	(3/1)
Mycology . . . . .	BOT	425/425L	(2/2)
Mycology . . . . .	BOT	426/426L	(2/2)
Phycology . . . . .	BOT	433/433L	(2/2)
Morphology of Embryophytes . . . . .	BOT	434/434L	(3/2)
Plant Taxonomy . . . . .	BOT	436/436L	(2/2)
Diagnosis and Control of Plant Diseases . . . . .	BOT	440/440L	(2/2)
Methods in Plant Pathology . . . . .	BOT	441/441L	(2/2)
Elements of Organic Chemistry . . . . .	CHM	201	(3)
Organic Chemistry *** . . . . .	CHM	314	(3)

\*Prerequisite: BIO 325.

\*\*Prerequisite: CHM 201 or consent of instructor.

\*\*\*CHM 317 must be taken concurrently.

Note: This minor may not be earned by Botany majors, nor can both Botany and Plant Pathology minors be earned by one student.

### PLANT BIOTECHNOLOGY MINOR

May be taken by students majoring in Botany.

The following courses are required for the minor:

Plant Pathology *	BOT	323/323L(2/2)
Plant Genetics ***	BOT	403/403L(3/1)
Plant Physiology *	BOT	422/422L (3/2)

Any of the following courses may be taken to complete the minor:

Seed Production **	AGR	331/331L(3/1)
Plant Breeding **	AGR	404/404L (3/1)
Concepts of Molecular Biology	BIO	450 (4)
Molecular Biology Techniques	BIO	451/451L (3/2)
Mycology	BOT	426/426L(2/2)
Methods in Plant Pathology	BOT	441/441L (2/2)
Plant Tissue Culture	BOT	456/456L (1/3)

Minimum units: 30

\*Prerequisite: BOT 124.

\*\*Prerequisite: BIO 115/115L

\*\*\*Prerequisites: AGR 122 and AGR 221 or AGR 226.

**PLANT PATHOLOGY MINOR**

May be taken by students majoring in Botany.

Required Courses (all students)

Minimum units—32

Minimum upper division units—12

The following courses are required for the minor:

Basic Biology	BIO	115/115L	(3/2)
Plant Structures and Functions	BOT	124/124L	(3/2)
or Plant Morphology	BOT	125/125L	(3/2)
Plant Pathology	BOT	323/323L	(3/2)
Diagnosis and Control of Plant Diseases	BOT	440/440L	(2/2)
or Methods in Plant Pathology	BOT	441/441L	(2/2)

At least two of the following courses must be completed in addition:

Diagnosis and Control of Plant Diseases	BOT	440/440L	(2/2)
Methods in Plant Pathology	BOT	441/441L	(2/2)
Plant Anatomy	BOT	435/435L	(2/2)
Mycology	BOT	425/425L	(2/2)
Plant Physiology*	BOT	422/422L	(3/2)
Mycology	BOT	426/426L	(2/2)

Any of the above or following courses may be used to complete the minor:

Plant Nematology	BOT	423/423L	(3/1)
Diseases of Ornamental Plants	HOR	427/427L	(3/1)
Sports Turf and Advanced Turfgrass Science	HOR	437/437L	(3/1)
Crop Diseases	AGR	421/421L	(3/1)

\*Prerequisite: CHM 201 or consent of instructor.

**MICROBIOLOGY MAJOR**

The Microbiology major chooses one of the two options offered by the section, microbiology or medical technology. The core courses of the major provide a strong background in various areas of biology to better prepare students for their chosen field. The program offered in the microbiology major constitutes excellent undergraduate training and can also be oriented toward the preprofessional fields.

Completion of the medical technology option satisfies the eligibility requirements established by the California State Department of Health and the Registry of Medical Technologists of the American Society of Clinical Pathologists (ASCP) for acceptance into a one year clinical traineeship at an approved School of Medical Technology.

**Core Courses for Major**

(Required of all students)

Scientific Communication I	BIO	190	(1)
Genetics	BIO	303	(4)
Scientific Communication II	BIO	490	(1)
Plant Morphology	BOT	125/125L	(3/2)
Basic Microbiology	MIC	201/201L	(3/2)
Microbial Structures and Functions	MIC	300/300L	(3/2)
Medical Bacteriology	MIC	410/410L	(3/2)
Immunology-Serology	MIC	415/415L	(3/2)
General Virology	MIC	430/430L	(3/2)
Invertebrate Zoology	ZOO	137/137L	(3/2)
Vertebrate Zoology	ZOO	138/138L	(3/2)

**Option Courses for Major**

(Required for specific option)

**Microbiology Option**

Cellular Physiology	BIO	435/435L	(3/2)
Concepts of Molecular Biology	BIO	450	(4)
Plant Structures and Functions	BOT	124/124L	(3/2)
Applied Microbiology	MIC	310/310L	(3/2)

**Medical Technology Option**

Clinical Chemistry	CHM	331/331L	(2/2)
Medical Mycology	MIC	425/425L	(3/2)
Hematology	MIC	444/444L	(3/1)
Immunohematology	MIC	445/445L	(3/1)
Human Anatomy	ZOO	234/234L	(2/2)
Human Physiology	ZOO	235/235L	(3/1)
Medical Parasitology	ZOO	425/425L	(3/2)

**Support and Elective Courses**

(Required of all students)

General Chemistry Laboratory	CHM	121L	(1)
General Chemistry	CHM	122/122L	(3/1)
General Chemistry	CHM	123/123L	(3/1)
Quantitative Analysis	CHM	221/221L	(3/1)
Organic Chemistry	CHM	314	(3)
Organic Chemistry	CHM	315	(3)
Organic Chemistry	CHM	316	(3)
Organic Chemistry Laboratory	CHM	317L	(1)
Biochemistry	CHM	327/327L	(3/1)
Biochemistry	CHM	328/328L	(3/1)
Biochemistry	CHM	329/329L	(3/1)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Physics Laboratory	PHY	141L	(1)
College Physics Laboratory	PHY	142L	(1)
College Physics Laboratory	PHY	143L	(1)
Approved electives (Microbiology Option)			** (14)
Approved electives (Medical Technology Option)			** (3)

\*\* Approved electives include any 200, 300, and 400-level courses in the Biological Sciences Department not specifically designed for non-majors. Approved electives also include any advanced Chemistry or Math classes.

Students considering graduate work or professional schools should see recommended courses for preprofessional preparation and the professional advisor.

**General Education Courses**

Underlined courses satisfy both major and GE requirements.

**Area 1:**

<u>A. Freshman English I</u>	ENG	104	(4)
<u>B. Select from approved list</u>			(4)
<u>C. Freshman English II</u>	ENG	105	(4)

**Area 2:**

<u>A. Calculus for Life Science</u>	MAT	120	(4)
<u>B. General Chemistry</u>	CHM	121	(3)
<u>C. Basic Biology</u>	BIO	115/115L	(3/2)
D. Select from approved list			(4)



**Area 3:**

- Select one course from each subarea (A-F). . . . . (24)  
 Subarea G. Select one of following:  
 BIO 205, KIN/FN 203, PSY 201 or PSY 210. . . . . (4)

**Area 4:**

- United States History . . . . . HST 202 (4)  
 Introduction to American Government . . . . . PLS 201 (4)

**Area 5:**

- Select two courses from approved list. . . . . (8)

**MICROBIOLOGY MINOR**

Minimum units—40

Note: This minor may not be earned by Microbiology majors.

**Required Courses (all students)**

Basic Biology . . . . .	BIO	115/115L	(3/2)
College Chemistry . . . . .	CHM	104	(3)
College Chemistry . . . . .	CHM	105	(3)
College Chemistry Laboratory . . . . .	CHM	141L	(1)
College Chemistry Laboratory . . . . .	CHM	142L	(1)
Elements of Organic Chemistry . . . . .	CHM	201	(3)
Elements of Organic Chemistry Laboratory . . . . .	CHM	250L	(1)
Elements of Biochemistry . . . . .	CHM	321/321L	(3/1)
Basic Microbiology . . . . .	MIC	201/201L	(3/2)
Microbiology Structures and Functions . . . . .	MIC	300/300L	(3/2)

At least two courses from the following list of courses:

Applied Microbiology . . . . .	MIC	310/310L	(3/2)
or Food Microbiology . . . . .	MIC	320/320L	
Medical Bacteriology . . . . .	MIC	410/410L	(3/2)
Immunology-Serology . . . . .	MIC	415/415L	(3/2)
Medical Mycology . . . . .	MIC	425/425L	(3/2)
General Virology . . . . .	MIC	430/430L	(3/2)

Other courses may be substituted for those listed above in consultation with all of the faculty in the microbiology section.

**ZOOLOGY MAJOR**

Qualified Zoology majors are prepared for employment in a variety of state and federal agencies dealing with fisheries, wildlife management, and related subjects.

The curriculum in zoology provides strong premedical, pre dental, and preveterinary preparation, as well as preparing the student for graduate studies in zoology.

Facilities include a large animal colony, a representative collection of living local reptiles and amphibians and an extensive study collection of bird, mammal, amphibian, reptile and fish specimens. Unique and extensive wild areas are available on the campus for animal studies.

**Core Courses for Major**

(Required of all students)

Scientific Communication I . . . . .	BIO	190	(1)
Biometrics . . . . .	BIO	211/211L	(3/1)
Principles of Evolution . . . . .	BIO	213	(4)
Genetics . . . . .	BIO	303	(4)
Cell, Molecular, and Developmental Biology . . . . .	BIO	310	(4)
Principles of Ecology . . . . .	BIO	325/325L	(3/1)
Scientific Communication II . . . . .	BIO	490	(1)
Plant Structures and Functions . . . . .	BOT	124/124L	(3/2)

Plant Morphology . . . . .	BOT	125/125L	(3/2)
Basic Microbiology . . . . .	MIC	201/201L	(3/2)
Invertebrate Zoology . . . . .	ZOO	137/137L	(3/2)
Vertebrate Zoology . . . . .	ZOO	138/138L	(3/2)
Introduction to Entomology . . . . .	ZOO	426/426L	(3/1)
Comparative Animal Physiology . . . . .	ZOO	424/424L	(3/2)

Each student will complete at least 5 upper division

zoology (ZOO prefix) courses . . . . . (26)

Students considering graduate work or professional schools, see recommended courses for preprofessional preparation and consult with the professional advisor.

**Support and Elective Courses**

(Required of all students)

General Chemistry Laboratory . . . . .	CHM	121L	(1)
General Chemistry . . . . .	CHM	122/122L	(3/1)
General Chemistry . . . . .	CHM	123/123L	(3/1)
Organic Chemistry . . . . .	CHM	201	(3)
Organic Chemistry Laboratory . . . . .	CHM	250L	(1)
Elements of Biochemistry . . . . .	CHM	321/321L	(3/1)
College Physics . . . . .	PHY	121	(3)
College Physics . . . . .	PHY	122	(3)
College Physics . . . . .	PHY	123	(3)
College Physics Laboratory . . . . .	PHY	141L	(1)
College Physics Laboratory . . . . .	PHY	142L	(1)
College Physics Laboratory . . . . .	PHY	143L	(1)
Introduction to Statistics . . . . .	STA	120	(4)
Approved Electives. . . . .			** (11)

\*\*Approved electives include any 200, 300, or 400 level courses in the Biological Sciences Department not specifically designed for non-majors. Approved electives also include any advanced Chemistry or Math courses. See advisor for approval of courses offered by other departments.

**General Education Courses**

Underlined courses satisfy both major and GE requirements.

**Area 1:**

<u>A. Freshman English I</u> . . . . .	ENG	104	(4)
<u>B. Select from approved list</u> . . . . .			(4)
<u>C. Freshman English II</u> . . . . .	ENG	105	(4)

**Area 2:**

<u>A. Calculus for Life Science</u> . . . . .	MAT	120	(4)
<u>B. General Chemistry</u> . . . . .	CHM	121	(3)
<u>C. Basic Biology</u> . . . . .	BIO	115/115L	(3/2)
D. Select from approved list . . . . .			(4)

**Area 3:**

- Select one course from each subarea (A-F). . . . . (24)  
 Subarea G. Select one of following:  
 BIO 205, KIN/FN 203, PSY 201 or PSY 210 . . . . . (4)

**Area 4:**

United States History . . . . .	HST	202	(4)
Introduction to American Government . . . . .	PLS	201	(4)

**Area 5:**

- Choose two courses from approved list. . . . . (8)

**ZOOLOGY MINOR**

Minimum units—32

Minimum upper division units—12

Note: This minor may not be earned by Zoology majors.

**Required Courses (all students):**

Basic Biology .....	BIO	115/115L (3/2)
Genetics .....	BIO	303 (4)
Invertebrate Zoology .....	ZOO	137/137L (3/2)
Vertebrate Zoology .....	ZOO	138/138L (3/2)

**Any two from the following courses:**

Principles of Evolution .....	BIO	213 (4)
Principles of Ecology .....	BIO	325/325L(3/1)
Comparative Animal Physiology .....	ZOO	424/424L (3/2)

**At least two courses from the following list of courses to complete the minor:**

Human Anatomy .....	ZOO	234/234L(2/2)
Human Physiology .....	ZOO	235/235L (3/1)
Ornithology .....	ZOO	329/329L(2/1)
Embryology .....	ZOO	414/414L (2/3)
Animal Behavior .....	ZOO	419/419L (2/1)
Histology .....	ZOO	422/422L (2/3)
Medical Parasitology .....	ZOO	425/425L (3/2)
Introduction to Entomology .....	ZOO	426/426L (3/1)
Herpetology .....	ZOO	429/429L (2/2)
Mammalogy .....	ZOO	430/430L(2/2)
Public Health Entomology .....	ZOO	435/435L (3/1)
Evolution of the Invertebrates .....	ZOO	438 (4)
Physiological Ecology of Animals .....	ZOO	440/440L(3/1)
Ichthyology .....	ZOO	441/441L(2/2)
Comparative Anatomy of Vert .....	ZOO	451/451L (3/2)

**BIOLOGY COURSE DESCRIPTIONS**

NOTE: For all courses which have both a lecture component and a laboratory component (e.g. BIO 115/115L), both components are corequisites; that is, they must be taken concurrently.

When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted. Courses approved for CR/NC grading are designated by + and apply only to majors outside the Biological Sciences Department.

**BIO 100/100L Fundamentals of Biology (3/1)**

A lecture/laboratory demonstration and discussion course dealing with various aspects of scientific investigation, environmental problems, population, genetics, evolution, physiology and other student selected topics. 3 lectures, 1 three-hour laboratory. Prerequisite: consent of instructor. Staff.

**BIO 110 Life Science (3)**

Basic concepts in the study of living systems, including human beings. Uses the study of biology to illustrate approaches of science in understanding the universe. The role of science in modern society and the impact of human civilization on other organisms considered. Designed to satisfy the general education requirements for life science. 3 lectures/ problem-solving. Staff.

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

An optional laboratory to accompany BIO 110. A basic understanding of living organisms achieved through experiments and demonstrations. This course will satisfy the general education requirements for a laboratory course, 1 three-hour laboratory. Prerequisite: BIO 110 or concurrent enrollment in BIO 110. Staff.

**BIO 115/115L Basic Biology (3/2)**

Introduction to living things; basic concepts in biology from molecules to ecosystems. Designed as a prerequisite course for majors who take other courses in Biological Sciences. 3 lectures/problem-solving, 2 three-hour laboratories. Arnold, George.

**BIO 190 Scientific Communication I (1)**

An introduction to writing and information resources for biologists. One hour lecture/problem-solving. Staff

**BIO 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Enrollment requires: (1) Prior arrangement with a faculty member. (2) Completion of a supervisory form available only in the Biological Sciences Department office. Total credit for a degree in Biological Sciences is limited to 6 units of BIO 200 and/or 400, with a maximum of 2 units per quarter. Staff.

**+BIO 201 Environmental Conservation (3)**

Contemporary environmental issues, and conservation of natural resources. Topics include ecological concepts, population, food, energy, water, wildlife, land use, and pollution. 3 lectures/problem-solving. Prerequisite: BIO 110 or 115. Quinn, Stewart.

**BIO 205 Biological Perspectives on Contemporary Life (4)**

A course designed to enable students to make effective decisions for quality lifestyles by gaining practical knowledge and understanding of the roles that diet, stress, drugs, disease, heredity, sexuality, environmental pollution, and the normal life processes of aging and death play in our lives. 4 lecture discussions. Prerequisite: BIO 110 or BIO 115/115L. George, Quinn.

**BIO207 Careers in Biology (1)**

This course explores over 500 career options for majors in the biological sciences. Preparation for a career, finding the right career, and landing the job are covered. 1 lecture/problem-solving. Prerequisite: Bio 110 or BIO 115/115L. McKane.

**BIO 211/211L Biometrics (3/1)**

Applied statistical analysis of biological data. Understanding, interpreting, and performing data analysis in a research context. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: BIO 115/L, STA 120, and basic algebra skills. Bryant, Moriarty.

**BIO 213 Principles of Evolution (4)**

Introduction to organic evolution. 4 lectures/problem-solving. Prerequisite: BIO 110 or 115/L, and basic algebra skills. Bryant, Firstman, Troncale.

**BIO 220/220L Introduction to Marine Biology (3/1)**

Introduction to life in the oceans. General survey of its living resources, ecology of its major environments, impacts of man, and applications of technology to the exploitation of its living resources. 3 lectures/problem-solving. 1 three-hour laboratory (several weekend field trips required). Prerequisite: BIO 110, BIO 115/115L, or equivalent. Arnold, Baskin, Castro.

**BIO 230 Horizons in Biotechnology (1)**

A survey of the various applications of biotechnology in today's industrial community. Topics include theoretical explanations of recent

biotechnological developments, discussion of problems encountered in production, manufacturing, and marketing of new products, and future directions in biotechnological research. The course will feature guest lecturers from various biotechnological industries. 1 lecture. Adler.

#### **BIO 256/256L Computer Applications in Biology (1/1)**

Use of microcomputers in the acquisition, manipulation, and presentation of numeric and textual data in biology. 1 lecture/problem-solving, 1 three-hour laboratory. Prerequisites: BIO 110 or BIO 115/115L, CS 100 or CIS 101. Clark, Moriarty.

#### **BIO 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture/problems, laboratory problems, or a combination. Prerequisite: permission of instructor. Staff.

#### **BIO 300 Human Heredity (4)**

Nontechnical introduction to hereditary principles with emphasis on humans. Hereditary diseases, blood types, mutations, radiation, and evolution. For non majors. 4 lectures/problem-solving. Not for core or support credit for students with majors in the Biological Sciences Department. Prerequisite: BIO 110 or BIO 115/115L. Bryant, Campbell, Martinek.

#### **BIO 301 Human Sexuality (4)**

Frank and factual coverage of human sexuality through discussions, lectures, films and guest speakers. Topics include sexual response; myths and misconceptions; birth control; sex and the law; fertilization, pregnancy, and childbirth; diseases and dysfunctions; sex and drugs; genital structure and recent developments in the study of human sexuality. 4 lecture. May be used for Approved Elective credit but not upper division core credit by students with majors in the Biological Sciences Department. Prerequisite: BIO 110, BIO 115/115L, or equivalent. Adler, Daniel, George, McKane, Steele.

#### **+BIO 302 Biology of Cancer (4)**

Topics include causes and symptoms of cancer, molecular and cell biology of cancer, lung, skin and other major "site" cancers, chemotherapy, immunotherapy, present research and psychosocial aspects. Material is presented by guest lecturers including specialists and cancer patients. May be used for approved elective credit but not upper division core credit by students with majors in the Biological Sciences Department. 4 lectures/problem-solving. Prerequisites: BIO 110, or BIO 115/115L or consent of instructor. Troncale.

#### **BIO 303 Genetics (4)**

Principles of heredity. Introduction to transmission genetics, cytogenetics, molecular genetics and population genetics. 4 lectures/problem-solving. Prerequisite: BIO 110 or 115/115L, and basic algebra skills. Bozak, Bryant, Campbell, Troncale.

#### **+BIO 305 Aquatic Ecology for Environmental Engineers (4)**

Ecological principles and their application to productivity, pollution, and other problems with emphasis on natural and man-made aquatic habitats. Not for core or support credit for students with majors in the Biological Sciences Department. 4 lectures/problem-solving. Prerequisite: BIO 110. Arnold.

#### **BIO 310 Cell, Molecular, and Developmental Biology (4)**

Cellular processes and molecular interactions, including transport,

chemical signaling, cell-cell adhesion, intercellular communication, support and movement, energy conversions, digestion, assembly of macro-molecules and organelles, gene control in prokaryotes and eukaryotes; cellular mechanisms of development. 4 lectures/problem-solving. Prerequisites: BIO 303 and CHM 106 or 113 and CHM 201 or 314/314L. Bozak, Sperry, Troncale.

#### **+BIO 311 AIDS: Current Topics and Concerns (4)**

Course covers prevalent sexually transmitted diseases in the United States with emphasis on AIDS. Topics covered include distribution, transmission, sexual practices, current research, effects on immune system, treatments, testing, counseling and availability of support groups. Selected topics will be presented by guest speakers. Open to all majors for credit/no credit. May be used for approved elective credit (if taken for grade), but not upper division core credit by students with majors in the Biological Sciences Department. 4 lectures. Prerequisite: BIO 110, BIO 115/115L, or equivalent, or consent of instructor. Adler, George.

#### **BIO 325/325L Principles of Ecology (3/1)**

A study of ecosystems; the interactions between organisms and environment. 3 lectures/problem-solving, 1 three-hour laboratory. 3 one-day weekend field trips. Prerequisite: BIO 115/115L and BIO 211/211L. Bryant, Moriarty, Quinn, Szijj.

#### **BIO 330/330L Marine Biology (3/1)**

Characteristics of the marine environment and its life, with an emphasis on the ecology of marine ecosystems and the impact of humans. A discussion of the living marine resources and the significance of their use. 3 lecture problems; several week-end field trips required. Prerequisite: BIO 110 or BIO 115/115L or equivalent.

#### **BIO 333 Genetics Laboratory (1)**

Hands-on experience in collection and analysis of genetic data. Students will master methodologies for handling DNA, fruit flies and chromosomes. Solution of genetics problems using current analysis techniques. 1 three-hour laboratory. Prerequisite: BIO 303. Bryant, Troncale.

#### **BIO 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation of selected problems or supervised attendance for juniors and seniors at department seminars. Discussions and reports required. Enrollment requires: (1) Prior arrangement with a faculty member. (2) Completion of a supervisory form available from the Biological Sciences Department office. Total credit for a degree in biological sciences is limited to 6 units of BIO 200 and/or BIO 400, with a maximum of 2 units per quarter. Staff.

#### **BIO 403/403L Human Genetics (3/1)**

Study of single and multi-gene human diseases, chromosome aberrations, sex determination, immunogenetics, genetic counseling. Problem-solving, and mastering the methodology of human karyotyping. 3 lecture/problems, 1 three-hour laboratory, 1 or 2 field trips. Prerequisites: BIO 211 and BIO 303. Bryant.

#### **BIO 406 Biological Systematics (3)**

Interpretation of biological variability; kinds and origins of organismic variation, the species and speciation, phylogenetic inference, classification and nomenclature. 3 lectures/problem-solving. Prerequisite: BOT 124/124L or 125/125L, ZOO 137/137L or 138/138L, BIO 213; recommended: BIO 303, 325. Clark.

**BIO 407/407L Biology of Ants (3/2)**

Study of general ant biology, including internal and external morphology, identification, behavior, distribution ecology; evolution of social behavior and its significance in ants. 3 lectures/problem-solving, 2 three-hour laboratory/field problems. Prerequisite: ZOO 426/426L or BIO 325/325L or equivalents, or consent of instructor. George.

**BIO 410 Biophysics (4)**

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. 4 lecture/problems. (This course is also listed as PHY 410.) Prerequisite: PHY 123 or permission of instructor. Staff.

**BIO 415L Field Studies in the Southwest (4)**

Ecology and natural history of Southwest habitats; field research projects involving species diversity and community organization. one-week trip to Chiricahua Mts., Arizona. Field trip fee expense required. Lecture, laboratory. Prerequisites: BIO 325/325L. Bryant, Moriarty, Quinn.

**BIO416L Field Studies in Baja California (4)**

One-week field trip covering the ecology and natural history of Baja California. Field research projects in and near Bahia de Los Angeles. Field trip expense required. Lectures/problem-solving, laboratory. Prerequisite: BIO 325/325L. George, Stewart, Szijj.

**BIO 418/418L Population Ecology (2/1)**

Factors affecting the abundance and distribution of animal populations in their natural environment. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: BIO 325/325L. Bryant, Carleton, Moriarty, Szijj.

**+BIO 420 Water Pollution Biology (3)**

Major pollutants and their effects on aquatic organisms, human health, and use of water resources. 3 lectures/problem-solving. Prerequisite: BIO 110, BIO 115/115L, or equivalent. Prerequisite: consent of instructor. Arnold.

**BIO 421 Advanced Genetics (3)**

Recent advances in genetics with emphasis on gene structure, function, and regulation. 3 lectures/problem-solving. Prerequisite: BIO 303. Bozak, Bryant, Campbell.

**+BIO 423/423L Cell Biology (2/2)**

General structure and ultrastructure of the cell. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 124/124L, ZOO 138/138L. Campbell, Kageyama, Troncale.

**BIO 424 Neuroscience (2)**

Structural and functional organization of the nervous system, its evolution's, development, and plasticity. Basic anatomy and physiology of neurons, sensory processing, learning and memory, neuroanatomical pathways, brain imaging, and neuropathology. 2 lectures/problem-solving, demonstrations. Prerequisites: BIO 115/115L, CHM 201/250L or CHM 314/317L, or consent of instructor. Kageyama.

**BIO 425/425L Chaparral Biology (3/1)**

Structure, function, and management of the California chaparral. 3 lectures/problem-solving, 1 three-hour laboratory. Some one-day field trips. Prerequisite: BIO 325/325L. Quinn.

**BIO 430/430L Fresh Water Biology (3/2)**

Ecology and natural history of major plant and animal groups in various

fresh water habitats, and their relationship to fisheries, wildlife management, water, sanitation, and conservation. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 125/125L, ZOO 137/137L or consent of instructor. Staff.

**BIO 431/431L Radiation Biology (3/1)**

Introduction to radioisotope tracer techniques, radiometric analysis, effects of ionizing radiation, radiation safety and health physics as applied to life sciences and public health. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: 12 units of Biological Sciences, 8 units of Chemistry, 8 units of Physics. Staff.

**BIO 435/435L Cellular Physiology (3/2)**

Physiological mechanisms at the cellular level. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: CHM 201/250L or 314/317L. Kageyama.

**BIO 436 History and Philosophy of Biology (4)**

Introduction to the historical relationship between natural philosophy and natural science, with special reference to the life sciences, including a consideration of the development of the scientific method in biology; an overview of the growth of biology in relation to the Western scientific revolution, with special emphasis upon the 19th century, including a consideration of humanist values in biology. 4 lecture/problems. Prerequisite: BIO 110, BIO 115/115L, or equivalent. Firstman.

**BIO 441 Internship in Biology (1-2)**

On-the-job training in student's area of interest or academic and practical experience in assisting and tutoring in laboratory or field courses. Limited to upper division students in good standing. Written evaluation from job supervisor or instructor required upon completion. Credit for assisting or tutoring limited to a maximum of 3 units to be earned in at least two courses. Total credit for on-the-job training limited to 6 units. Prerequisite: internship coordinator or laboratory instructor approval of student's application for internship credit (forms available from Biological Sciences Department). Staff.

**BIO 442/442L Marine Ecology (3/2)**

Structure and function of marine ecosystems with emphasis on littoral environments. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BIO 325/325L, or consent of instructor. Arnold.

**BIO 445/445L Population Genetics (3/1)**

Theory and experimental results in population genetics; the interrelation of population genetics and ecological and evolutionary studies. 3 lectures/problem-solving, 1 three-hour laboratory. Possible required field trips. Prerequisites: BIO 211/211L and BIO 303. Bryant.

**BIO 450 Concepts of Molecular Biology (4)**

The molecular basis and control mechanisms of biological processes such as information-processing, energy-processing, assembly of macromolecules into functional units, and evolution of macromolecules. 4 lectures/problem-solving. Prerequisite: consent of instructor. Bozak, Sperry, Troncale.

**BIO 451/451L Molecular Biology Techniques (3/2)**

Principles and practice of major techniques used in isolation and characterization of biologically important macromolecules, with primary emphasis on centrifugation, chromatography, and electrophoresis. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: Consent of instructor. Bozak, Sperry, Troncale.



**BIO 455/455L Molecular Biology of Recombinant DNA (2/2)**

Molecular biology of nucleic acids including isolation, purification and analysis of virus, plasmid, procaryotic and eucaryotic DNA; restriction endonuclease analysis, Southern blotting and molecular hybridization with radioactive probe; concepts on strategies of gene cloning and usefulness of cloned genes. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: BIO 303, MIC 201/201L, and CHM 321/321L or consent of instructor. Bozak, Pal.

**BIO 461, 462 Senior Project (2) (2)**

Research conducted under faculty supervision. Written thesis in accordance with professional standards required upon completion of project. Total credit limited to 6 units. Recommended for students in any of the biological sciences majors contemplating graduate or professional school training. Prerequisite: written consent of student's research advisor prior to enrolling. Staff.

**BIO 485 Tropical Biology (3)**

A lecture course designed to introduce the physical and biological characteristics of tropical environments, with special emphasis on the ecosystems found in the northern portion of South America. Requirements: advanced senior or graduate standing, and consent of the instructor. 3 lecture discussions. Prerequisites: BIO 325/325L or equivalent. Szijj.

**BIO 490 Scientific Communication II (1)**

Oral and written presentation of selected topics in biology. 1 lecture/problem-solving. Prerequisites: BIO190, COM 204, and MAT 120 or MAT 130, and BIO 303. Staff.

**BIO 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lectures/problem-solving, laboratory problems, or a combination. Prerequisite: permission of instructor. Staff.

Graduate courses are listed in the graduate section of the catalog.

**BOTANY COURSE DESCRIPTIONS**

NOTE: For all courses which have both a lecture and a laboratory component (e.g. BOT 124/124L), both components are corequisites; that is, they must be taken concurrently.

When appropriate, the names of faculty associated with each course are specified; otherwise "Staff" is noted.

**BOT 124/124L Plant Structures and Functions (3/2)**

Introduction to the relationship between the structures of plants and their functions. Topics also include plant classification, genetics, growth and development, evolution and ecology. Emphasis on flowering plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115/115L. Bozak, Stoner.

**BOT 125/125L Plant Morphology (3/2)**

Comparative morphology and phylogenetic relationships of plant groups from bacteria to angiosperms. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115/115L. Arnold, Clark.

**BOT 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter.

Instruction is by lectures/problem-solving, laboratory, or a combination. Prerequisite: permission of instructor. Staff.

**BOT 307/307L Plants and People (3/1)**

Natural history and uses of plants important to people. Open to all majors. May be used for approved elective credit but not upper division core credit by students with majors in the Biological Sciences Department. 3 lectures/problem-solving plus field activity. Stoner.

**BOT 316/316L Plant Environments (3/1)**

Effects of environmental factors on the growth and distribution of plant materials used in landscaping. Not for core or support credit for majors in the Biological Sciences Department. 3 lectures/problem-solving, 1 three-hour laboratory. Carlton.

**BOT 323/323L General Plant Pathology (2/2)**

Principles of the nature, diagnosis, and control of plant diseases caused by bacteria, fungi, nematodes, viruses, and physiological factors. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 124/124L or 125/125L. Stoner.

**BOT 343/343L California Flora (1/2)**

Identification of California wildland plants using dichotomous keys. Recognition of common plant families. Overview of the geographic distribution of plants in southern California. 1 lecture, 2 three-hour laboratories, required field trips. Prerequisites: BIO 115/115L or BIO 110 and BIO 111L. Recommended course: BOT 124/124L. Clark.

**BOT 403/403L Plant Genetics (3/1)**

Principles of plant inheritance and reproduction. Discussion of cytogenetics, population genetics, cytoplasmic inheritance, and gene transfer. Introduction to the methods of plant biotechnology. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: BOT 124/124L, BIO 303. Bozak.

**BOT 421/421L Plant Ecology (3/1)**

A survey of the interactions between plants and the environment. Examination of the classification, development and structure of major vegetation types, plant communities, and ecosystems. Introduction to the effects of climate, soil and animals on plant growth, development, reproduction, and distribution. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: BIO 325/325L. Carlton.

**BOT 422/422L Plant Physiology (3/2)**

Life processes of plants; water relations; nutrition and metabolism; growth and development. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: CHM 105/142L and BOT 124/124L. Bozak.

**+BOT 423/423L Plant Nematology (3/1)**

Classification, morphology, biology, and control of important plant parasitic nematodes. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: BIO 115/115L. May be taken on a CR/NC basis. Staff.

**BOT 425/425L Mycology (2/2)**

Morphology, physiology, culture, pathology, taxonomy, and general biology of Acrasiales, Labyrinthulales, Myxomycetes, Oomycetes, and Zygomycetes. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 124/124L or 125/125L or consent of instructor. Stoner.

**BOT 426/426L Mycology (2/2)**

Morphology, physiology, culture, pathology, taxonomy and general biology of Ascomycetes, Deuteromycetes, and Basidiomycetes. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 124/124L or 125/125L or consent of instructor. Stoner.

**BOT 433/433L Phycology (2/2)**

Morphology, taxonomy, ecology, and physiology of marine and freshwater algae. Emphasis on local marine habitat. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 124/124L, BOT 125/125L. Arnold.

**BOT 434/434L Evolution of Plants (3/2)**

Evolution of plants as illustrated by the comparative morphology, reproductive patterns, and fossil record of green algae, bryophytes, and vascular plants. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 124/124L, BOT 125/125L, BIO 213, or consent of instructor. Clark.

**BOT 435/435L Plant Anatomy (2/2)**

Microscopic study of representative common plants dealing with origin, development, and structure of cells, tissues and tissue systems in roots, stems, and leaves. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 124/124L or BOT 125/125L. Clark.

**BOT 436/436L Plant Taxonomy (2/2)**

Principles of classification and nomenclature of plants, with emphasis on the angiosperms. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 124/124L or BOT 343/343L. Clark.

**BOT 440/440L Diagnosis and Control of Plant Diseases (2/2)**

Principles and practice in the diagnosis of plant diseases and in the prescription of control measures; cultural remedies, disease management, and integrated controls; field practice; and a review of advances in plant pathology. 2 lectures/problem-solving, 2 three-hour laboratories. Field trips required. Prerequisite: BOT 323/323L. Stoner.

**BOT 441/441L Methods in Plant Pathology (2/2)**

Laboratory and greenhouse methods for isolation, identification, inoculation, and disease assessment for plant pathogenic bacteria, fungi, and viruses which are plant pathogens. Emphasis on screening procedures and other experimental skills. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BOT 323/323L. Stoner.

**BOT 456/456L Plant Tissue Culture (1/2)**

Methods and applications, including: selection and sterilization of explants; preparation and sterilization of media; sterile techniques; incubation of cultures; review of literature. 1 lecture/problem, 2 three-hour laboratories. Prerequisite: BOT 422/422L. Bozak.

**BOT 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture/problem, laboratory, or a combination. Prerequisite: permission of instructor.

**MICROBIOLOGY COURSE DESCRIPTIONS**

NOTE: For all courses which have both a lecture component and a laboratory component (e.g. BIO 115/115L), both components are corequisites; that is, they must be taken concurrently.

When appropriate, the names of faculty associated with each course are specified, otherwise, "Staff" is noted.

**MIC 100 World of Microbes (4)**

Microorganisms and the existence of humans. Elements of microbiology and applications to daily life. For nonbiological science majors. 4 lecture/discussions. Chan, Jackson.

**MIC 201/201L Basic Microbiology (3/2)**

A study of morphology, metabolism, classification, and cultivation of bacteria with emphasis on problem-solving, identification, and growth of microbes. The role of microbes in disease processes and concepts of immunity and resistance are discussed. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 110 or 115/115L; CHM 104, 141L or CHM 111, 151L. McKane, Shafia, Staff.

**MIC 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture/problem, laboratory, or a combination of both. Prerequisite: Permission of instructor. Staff.

**MIC 300/300L Microbial Structures and Functions (3/2)**

Advanced aspects of general microbiology with emphasis upon structure and function of cell components, nutritional types of bacteria, and growth and enumeration of bacteria. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: MIC 201/201L, CHM 201, and 250L or 314, 315 and 317L. Staff.

**MIC 310/310L Applied Microbiology (3/2)**

The microbiology of foods, air, water, and sewage, stressing the utilization of microbial activities in manufacturing processes of foods, types and prevention of food spoilage, aims and methods of water treatment and sewage disposal. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: MIC 201, CHM 201, and 250L or 314, 315, and 317L. Staff.

**MIC 320/320L Food Microbiology (2/2)**

The microbiology of foods as related to storage, transit, human consumption, and health. For foods and nutrition majors. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: MIC 201/201L, CHM 201 and 250L. Staff.

**MIC 330 General Epidemiology (4)**

Fundamental concepts in the study of disease occurrence in human populations. Emphasis on descriptive epidemiology, formulation of hypotheses, and analytic epidemiology, and case studies with problem solving. 4 lectures/problem-solving. Prerequisites: MIC 201, BIO 211/211L. Chan.

**MIC 410/410L Medical Bacteriology (3/2)**

Characteristics of disease-producing bacteria, their means of transmission, host-parasite interactions, and laboratory methods of diagnosis. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: MIC 300/300L. Jackson.

**MIC 415/415L Immunology-Serology (3/2)**

Principles of serology and immunology with emphasis on mechanisms of evaluating resistance to pathogens, and on mechanism of response to antigens on the molecular and cellular level. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: MIC 300/300L. Adler.

**MIC 422/422L Clinical Laboratory Procedures (2/2)**

Principles and methods in clinical analysis and evaluation of fluids, cells, tissues, and other body components, waste products, or derivatives. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: CHM 328/328L, ZOO 235/235L. Staff.

**MIC 425/425L Medical Mycology (3/2)**

Characteristics, habitats and laboratory identification of fungi-inciting human and animal diseases. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: MIC 201/201L. Adler.

**MIC 430/430L General Virology (3/2)**

Chemical composition and physical structure of viruses; their mechanism of reproduction; relationship to humans, animals, and plants. Introduction to diagnostic techniques used in the isolation and identification of viruses. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: MIC 300/300L. Pal.

**MIC 444/444L Hematology (3/1)**

The anatomy, physiology, and pathology of the normal hematopoietic system; frequently encountered blood dyscrasias related to human red blood cells. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ZOO 138/138L or permission of instructor. Chan.

**MIC 445/445L Immunohematology (3/1)**

General characteristics of human blood group antigens; antigen-antibody reactions related to human red blood cells and human diseases. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisite: MIC 415/415L or permission of instructor. Chan.

**MIC 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lectures/problem-solving, laboratory, or a combination. Prerequisite: permission of instructor. Staff

**ZOOLOGY COURSE DESCRIPTIONS**

For all courses which have both a lecture component and a laboratory component (e.g. ZOO 137/137L), both components are co-requisites, that is, they must be taken concurrently.

When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted.

**ZOO 112/112L The World of Animals (3/1)**

Characteristics, reproduction, behavior, ecology, and interactions with mankind of the major groups of invertebrate and vertebrate animals. 3 lectures, 1 two-hour activity. Staff.

**ZOO 137/137L Invertebrate Zoology (3/2)**

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

**ZOO 138/138L Vertebrate Zoology (3/2)**

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

**ZOO 234/234L Human Anatomy (2/2)**

Lectures devoted to a description of human gross anatomy. Laboratories emphasize systematic anatomy and use preserved human organs and dissected cadavers when available. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: BIO 115/115L. Bath.

**ZOO 235/235L Human Physiology (3/1)**

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

**ZOO 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lectures/problem-solving, laboratory, or a combination of both. Prerequisite: permission of instructor. Staff.

**ZOO 329/329L Ornithology (2/1)**

The evolution, anatomy and physiology of birds with special emphasis on behavior and ecological relationships of species of the Pacific Coast. 2 lectures/problem-solving, 1 three-hour laboratory, or field exercises, or projects. Two weekend field trips are required for credit in this course. Prerequisite: ZOO 138/138L or consent of instructor. Moriarty, Szijj.

**ZOO 411/411L Biology of Spiders (1/2)**

Recognition of the local spider families, and study of general spider biology, including basic morphology, behavior, ecology, ontogeny, evolution and higher systematics. 1 lecture/problem, 2 three-hour laboratories. Prerequisite: ZOO 137/137L or consent of instructor. Firstman.

**ZOO 414/414L Embryology (2/3)**

Embryonic development of the vertebrate body. 2 lectures/problem-solving, 3 three-hour laboratories. Prerequisite: ZOO 138/138L. Firstman.

**ZOO 415/415L Human Embryology (4)**

Descriptive human developmental anatomy, including general embryogeny through fetal period, the origins of the major organ systems, and sense organs. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ZOO 138/138L or equivalent. Firstman.

**ZOO 419/419L Animal Behavior (2/1)**

Biological, physiological, genetic and anatomical principles of animal behavior. Ethology and experimental psychology involving wild and laboratory animals. 2 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: ZOO 138/138L or consent of instructor. Szijj.

**ZOO 422/422L Histology (2/3)**

Microscopic study of vertebrate tissues; organology and correlation of form with function. 2 lectures/problem-solving, 3 three-hour laboratories, taught in the audio-tutorial mode. Prerequisite: ZOO 138/138L. Staff.

**ZOO 424/424L Comparative Animal Physiology (3/2)**

Introduction to functions of vertebrate and invertebrate organ systems. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: ZOO 138/138L, CHM 123/123L (formerly 106/143L), BIO 211/211L. Stiffler, Hoyt.

**ZOO 425/425L Medical Parasitology (3/2)**

Study of protozoan and helminth parasites of man: diagnosis, life cycles, pathology, epidemiology and control. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: ZOO 137/137L. Castro.

**ZOO 426/426L Introduction to Entomology (3/1)**

General aspects of insect structure and function, development, behavior and influence on human activity; includes a survey of the principal insect groups. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: BIO 115/115L, ZOO 137/137L or consent of instructor. Edmonds, George.

**ZOO 429/429L Herpetology (2/2)**

Morphology, classification, distribution, ecology, behavior and conservation of amphibians and reptiles; identification, and field study of local species. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: ZOO 138/138L or equivalent. Stewart.

**ZOO 430/430L Mammalogy (2/2)**

Morphology, classification, distribution, ecology, behavior and conservation of mammals; identification, and field study of local species. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: ZOO 138/138L or equivalent. Stewart.

**ZOO 435/435L Public Health Entomology (3/1)**

Role of insects, mites, ticks and other arthropods in the causation and transmission of human disease. 3 lectures/problem-solving, 1 three-hour laboratory. Staff.

**ZOO 437 Evolution of the Vertebrates (4)**

A survey of vertebrate adaptive radiation since the first appearance of the subphylum Vertebrata in the late Cambrian, including a study of the fossil evidence, and the macroevolutionary novelties which permitted the success of the various vertebrate clades. 4 lectures. Prerequisite: ZOO 138/138L. Firstman.

**ZOO 438 Evolution of the Invertebrates (4)**

A systematic survey of all invertebrate groups including the minor phyla, with emphasis upon comparative morphology and phylogeny, including also comparative developmental and physiological evidence of evolutionary relationships between the higher taxa. 4 lectures/problem-solving. Prerequisite: ZOO 137/137L or equivalent. Firstman.

**ZOO 440/440L Physiological Ecology of Animals (3/1)**

A combined lecture and group discussion of the physiological and behavioral adaptations of animals to their environment. Emphasis on energetics, thermoregulation, and the evolution of endothermy and homeothermy in terrestrial vertebrates. Additional topics selected by students. Lab consists of an independent research project. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: BIO 211/211L, ZOO 424/424L or consent of instructor. Hoyt.

**ZOO 441/441L Ichthyology (2/2)**

The structure, relationships, classification, general biology and zoogeography of fishes. Collection identification and field study of local species, and laboratory work with preserved and living material. 2 lectures/problem-solving and 2 three-hour laboratories. Prerequisite: ZOO 138/138L and consent of instructor. Baskin.

**ZOO 451/451L Comparative Anatomy of Vertebrates (3/2)**

An evolutionary analysis of the vertebrates based on the structure of organ systems. Includes discussion of the principles of comparative biology, and the significance of comparative morphological data for understanding vertebrate history. 3 lectures/problem-solving. 2 three-hour laboratories. Prerequisite: ZOO 138/138L. Baskin.

**ZOO 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lectures/problem-solving, laboratory, or a combination. Prerequisite: consent of instructor. Staff.



## CHEMISTRY

Keith Howard, Chair

Victor P. Abegg  
Philip Beauchamp  
Fredrick Bet-Pera  
Charles Bowen  
Ruth J. Bowen  
David Brown  
Barbara Burke  
Joe Casalnuovo  
Vasu Dev  
Francis Flores  
Elisheva Goldstein  
George Gutnikov  
David A. Haner

Paul C. Hiemenz  
Yu-Ping Hsia  
Michael L. Keith  
Douglas A. Klumpp  
Mary Zi-ping Luo  
Charles Millner  
Patrick William Mobley  
Nelson Scott  
J. Ernest Simpson  
Laurie S. Starkey  
Edward D. Walton

The Chemistry Department offers a flexible program of studies designed to prepare students for careers in private industry and government or for highly diverse graduate study. Students may direct their efforts into all the major areas of chemistry and into certain interdisciplinary areas. This is accomplished by choosing one of three rigorous tracks or options of study leading to the Bachelor of Science degree in Chemistry.

The Chemistry option emphasizes the chemistry-physics interface. The curriculum of this option leads to the more traditional careers and graduate training in chemistry.

The Chemical Sciences option stresses the growing body of knowledge at the chemistry-life sciences interface. Beyond the core curriculum students may pursue programs in the chemistry of plants, animals or human beings (biochemistry, clinical chemistry, marine biochemistry, pre-medicine, pre-dentistry, etc.). Upon consultation with a departmental advisor, the student may select courses from a list of restricted electives thereby achieving a program meeting that individual's career goals.

The Industrial Chemistry option is designed for those students who plan a career in the chemical industries and businesses. Option courses have been chosen to provide some background in material sciences as well as industrial chemistry. Restricted elective packages create a flexible program which will meet a variety of career goals.

The baccalaureate degree in chemistry earned by following any of the options may be certified by the American Chemical Society as having met its standards for professionalism at the undergraduate level, provided that a suitable pattern of electives is chosen. Students should consult with departmental advisors to determine which courses are required in their option for certification.

Chemistry majors following either the Chemistry or Chemical Sciences Option are reminded that up to 16 units of credit can be earned for approved work experience under the heading of Cooperative Education. This work experience is an integral part of the Industrial Chemistry Option. Additional details will be found listed at the beginning of the College of Science section of this catalog.

The department also offers a minor in chemistry to students from other majors. This should be of special interest to non-chemistry majors whose curriculum already involves substantial chemistry requirements, such as chemical engineering, microbiology and pre-professional majors.

For those planning a career as a secondary school science teacher, a single subject credential in Science is required. This credential is obtained by completing coursework in Education and passing the National Teacher Examination. The latter can be waived by taking the

courses listed in the Waiver Program. See the Director of the Centers for Education and Equity in Mathematics, Science and technology for additional information.

Students interested in becoming members of the American Chemical Society may join the Student Affiliates of the American Chemical Society. Additional information can be obtained from the Chemistry Department.

**ONE YEAR MASTER OF SCIENCE PROGRAM:** The department offers a Master's degree which can be completed in five years of combined undergraduate and graduate study. Should a student decide to pursue this program, a decision should be made in the beginning of the junior year so that a departmental petition may be initiated. The petition will outline the tentative program for the 4th and 5th years and should be planned together with completion of appropriate petitions to the Office of Graduate Studies. Interested students should contact the department's graduate advisor.

Two notable features are associated with the program. 1) Students will be eligible to take selected graduate courses in their senior year and 2) the senior project which is required of all Chemistry majors can be extended into an appropriate research problem which would be the subject of the student's master's thesis.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

General Chemistry	.CHM	121/121L	(3/1)
General Chemistry	.CHM	122/122L	(3/1)
General Chemistry	.CHM	123/123L	(3/1)
Quantitative Analysis	.CHM	221/221L	(2/2)
Organic Chemistry	.CHM	314	(3)
Organic Chemistry	.CHM	315	(3)
Organic Chemistry	.CHM	316	(3)
Organic Chemistry Laboratory	.CHM	317L	(1)
Organic Chemistry Laboratory	.CHM	318L	(1)
Organic Chemistry Laboratory	.CHM	319L	(1)
Spectroscopic Methods	.CHM	342/342L	(2/2)
Separation Methods	.CHM	343/343L	(2/2)
Electroanalytical Methods	.CHM	344/344L	(2/2)
Physical Chemistry Laboratory	.CHM	352L	(3)
Organic Analysis	.CHM	424/424L	(2/2)
Senior Research Project	.CHM	491	(3)
Senior Research Project	.CHM	492	(3)
Undergraduate Seminar	.CHM	493	(2)
Advanced Chemistry Electives			(6)
(Two elective courses, approved 300, 400-level or higher excluding CHM 400, 491, 492, 493, 499. For the Industrial Chemistry Option only, choose from the following: CHM 402, 409, 413, 422/422L, 442, 442L, 446/446L, 450, 452, 452L, 460.)			

### OPTION COURSES FOR MAJOR\*

(Required for specific options)

### CHEMISTRY

Physical Chemistry	.CHM	311	(3)
Physical Chemistry	.CHM	312	(3)
Physical Chemistry	.CHM	313	(3)
Physical Chemistry Laboratory	.CHM	353L	(2)
Inorganic Chemistry	.CHM	401	(3)
Inorganic Chemistry	.CHM	402	(3)

**CHEMICAL SCIENCES**

Elements of Physical Chemistry	.CHM 304/304A	(3/1)
Elements of Physical Chemistry	.CHM 305	(3)
Biochemistry	.CHM 327/327L	(3/1)
Biochemistry	.CHM 328/328L	(3/1)
Biochemistry	.CHM 329/329L	(3/1)

**INDUSTRIAL CHEMISTRY**

Elements of Physical Chemistry	.CHM304/304A	(3/1)
and Elements of Physical Chemistry	.CHM 305	(3)
or Physical Chemistry	.CHM 311	(3)
and Physical Chemistry	.CHM 312	(3)
and Physical Chemistry	.CHM 313	(3)
Chemistry in Industry	.CHM 340	(4)
Elements of Biochemistry	.CHM 321/321L	(3/1)
or Biochemistry	.CHM 327/327L	(3/1)
or Inorganic Chemistry	.CHM 401	(3)

**SUPPORT AND ELECTIVE COURSES**

(Required of all students)

Pascal	.CS 120	(4)
or FORTRAN	.CS 125	(4)
Calculus and Analytic Geometry	.MAT 115	(4)
Calculus and Analytic Geometry	.MAT 116	(4)
General Physics	.PHY 132/152L	(3/1)
General Physics	.PHY 133/153L	(3/1)

**CHEMISTRY OPTION**

Elementary Statistics with Applications	.STA 120	(4)
Differential Equations	.MAT 216	(4)
Electives, unrestricted.		(23-25)

**CHEMICAL SCIENCES OPTION**

Elementary Statistics with Applications	.STA 120	(4)
*Electives, restricted.		(14-20)
Electives, unrestricted		(19-25)

**INDUSTRIAL CHEMISTRY OPTION**

FORTRAN	.CS 125	(4)
or Discrete Structures	.CS 130	(4)
Statistical Methods in Engineering		
and Physical Science	.STA 309	(3)
Materials Science and Engineering	.MTE 207	(3)
Materials Science and Engineering Laboratory.	.MTE 317L	(1)
**Co-operative Education	.SCI 470	(4)
or Co-operative Education	.SCI 471	(2)
and Co-operative Education	.SCI 472	(2)
*Electives, restricted.		(42-49)
Electives, unrestricted.		(2-9)

\*Consult the Chemistry Department for details and restrictions.

\*\*If a suitable Co-operative Education position is not available, an additional advanced chemistry elective should be taken.

**GENERAL EDUCATION COURSES****Area 1:**

A. Freshman English I	.ENG 104	(4)
B. and C. Consult the catalog		(8)

**Area 2:**

A. Calculus and Analytic Geometry	.MAT 114	(4)
B. General Physics	.PHY 131/151L	(3/1)

C. Basic Biology	.BIO 115/115L	(3/2)
D. Select one course.		(4)

**Area 3:**

A. Select one course.		(4)
B. Select one course.		(4)
C. Select one course.		(4)

A reading knowledge of a foreign language, especially German, is strongly recommended for students planning advanced study in science.

**D. For industrial Chemistry option:**

Principles of Economics	.EC 201	(4)
For other options: See approved List.		(4)

**E. Select one course.** (4)**F. Select one course.** (4)**G. For Industrial Chemistry Option:**

General Psychology	.PSY 201	(4)
For other options: See approved list		(4)

**Area 4:**

United States History	.HST 202	(4)
Introduction to American Government	.PLS 201	(4)

**Area 5:**

Upper division. Minimum (8)

Consult the Chemistry Department or an advisor about the specific groups of courses allowed in this area.

**CHEMISTRY MINOR**

Minimum units 29

Minimum upper-division units 12

General Chemistry	.CHM 121/121L	(3/1)
General Chemistry	.CHM 122/122L	(3/1)
General Chemistry	.CHM 123/123L	(3/1)
Organic Chemistry Elements	.CHM 201/250L	(3/1)
or Organic Chemistry	.CHM 314/317L	(3/1)
Quantitative Analysis	.CHM 221/221L	(2/2)
Physical Chemistry Fundamentals	.CHM 301/301A	(3/1)
or Elements of Physical Chemistry	.CHM 304/304A	(3/1)
or Physical Chemistry	.CHM 311	(3)
Chemistry Electives		(5)
(Two courses 300-level or higher excluding CHM 400, 491, 492, 493, 499.)		

**COURSE DESCRIPTIONS**

The notations F, W, Sp, Su, and even or odd indicate which quarter(s) of even or odd numbered calendar years the course is normally offered. Courses not designated "even" or "odd" are offered each year.

**CHM 101/101L Consumer Chemistry (3/1)**

Introduction to atoms, molecules and bondings. Petrochemicals, plastics and fibers. Air and water pollution. Body chemistry, foods, drugs and poisons. Chemical and nuclear energy. Not open to students who have credit for CHM 103 or 121. 3 lectures, 1 laboratory. Concurrent enrollment required.

**CHM 103/103A Fundamentals of Chemistry (3/1) FWSp**

Atoms, molecules and physical states of matter. Important classes of chemical compounds and chemical reactions. Experimentation as the approach to solving problems of natural phenomena. Not open to students who have credit for CHM 121. 3 lectures, 1 recitation. Concurrent enrollment required.

**CHM 121, 122, 123 General Chemistry (3) (3) (3) FWSpSu**

Atomic theory of structure and bonding, chemical equations, gas laws, oxidation-reduction, electrochemistry, states of matter, equilibrium, acids and bases, thermodynamics and reaction kinetics and their applications to chemistry, physics, and engineering sciences. 3 lectures/problem-solving. To be taken in sequence. Prerequisite to CHM 121: high school chemistry or CHM 103/103A and high school algebra. Concurrent: CHM 121L, 122L, 123L, respectively.

**CHM 121L, 122L, 123L General Chemistry Laboratory (1) (1) (1) FWSpSu**

Laboratory to accompany General Chemistry lecture series. Experiments in basic quantitative analysis techniques, gas measurements, acid-base, pH, and redox titrations, electrochemistry, kinetics, thermo-dynamics, and ionic equilibria and qualitative analysis procedures. 1 three-hour laboratory. To be taken in sequence concurrently with CHM 121, 122, 123, respectively.

**CHM 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**CHM 201 Elements of Organic Chemistry (3) FWSpSu**

The fundamental concepts of organic chemistry with emphasis on practical applications. For students who are required to take one quarter of organic chemistry. Not open for credit to chemistry majors. 3 lectures/problem-solving. Prerequisite: CHM 122. Concurrent: CHM 250L.

**CHM 210 Chemistry in Life, Civilization and the World (4) FWSu**

A study of the impact of chemistry on life, civilization, and the world. How applications of chemical knowledge, science and technology affect the human experience. Chemistry as a central science of technology. Benefits and risks of science and technology. 4 lectures/problem-solving. Prerequisites: One course each in G.E. Categories IIA, IIB and IIC.

**CHM 221/221L Quantitative Analysis (2/2) FWSpSu**

Fundamentals of gravimetric and volumetric analysis. Focus on laboratory work, with class discussion supplying supporting theory. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: CHM 123/123L. Students are advised to take 221/221L as soon as possible after completing 123/123L. Concurrent enrollment required.

**CHM 250L Elements of Organic Chemistry Laboratory (1) FWSpSu**

Introduction to general techniques of the organic laboratory for the separation, purification and identification of organic substances. Survey of the laboratory preparation and reactions of different functional groups with emphasis on the practical application. 1 three-hour laboratory. Not open for credit to chemistry majors. Prerequisite: CHM 122/122L. Concurrent: CHM 201.

**CHM 256L Glassblowing (1) Sp**

Fundamental techniques of laboratory glassblowing. A practical course to teach students to construct and repair special pieces of glass apparatus used in advanced chemistry courses and senior project work. 1 three-hour laboratory, scheduled by arrangement.

**CHM 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: Permission of instructor.

**CHM 301/301A Fundamentals of Physical Chemistry (3/1) FSp**

Thermodynamic properties of chemical species and their application; kinetics, measurements of physical properties of molecules. Not open to students whose majors require CHM 304 or CHM 311. 3 lectures/problem-solving, 1 recitation. Prerequisite: CHM 123.

**CHM 304/304A, 305 Elements of Physical Chemistry (3/1) (3) FW**

A two-quarter sequence of physical chemistry covering properties of gases, chemical thermodynamics, solutions, electrochemistry, reaction kinetics, and atomic and molecular structure. To be taken in sequence. 3 lectures/problem-solving, 1 recitation for 304, 3 lectures/problem-solving for 305. Prerequisite: MAT 116, CHM 123, PHY 133, or their equivalents. Concurrent with CHM 305: CHM 352L.

**CHM 306 History and Philosophy of Chemistry (4) W**

The history of chemistry from antiquity to the present, milestones in the development of chemistry and their impact on science and technology. How the chemistry way of knowing (using the scientific method) differs from that used in other disciplines. The philosophical atmosphere in which a particular chemist lived and its limiting or directing influence on the making of that chemist. 4 lectures per week.

**CHM 311, 312, 313 Physical Chemistry (3) (3) (3) FSu, WSu, SpF**

Properties of gases, kinetic molecular theory, chemical thermodynamics, phase equilibria, solutions, electrochemistry, chemical kinetics, atomic and molecular spectroscopy, photochemistry, colloids and macromolecules. To be taken in sequence. 3 lectures/problem-solving. Prerequisite: MAT 216 or equivalent, CHM 123 and one year of college physics.

**CHM 314, 315, 316 Organic Chemistry (3)(3)(3) FWSpSu**

Modern concepts of chemical bonding, molecular structure, principles of stereochemistry and conformation, reaction mechanisms and synthetic pathways. All common classes and substituents of organic compounds treated. Carbohydrates, heterocyclics and other biologically significant compounds may be introduced. To be taken in sequence. 3 lectures/problem-solving. Prerequisite: CHM 123/123L. Concurrent: CHM 317L, 318L, 319L, respectively for Chemistry majors.

**CHM 317L Organic Chemistry Laboratory (1) FWSpSu**

Introduction to general techniques of the organic laboratory for the separation, purification and identification of organic substances. Interpretation of IR spectra of organic compounds. 1 three-hour laboratory. Prerequisite: CHM 123/123L. Concurrent: CHM 314.

**CHM 318L Organic Chemistry Laboratory (1) FWSpSu**

Application of reaction mechanisms toward the synthesis of organic molecules. Interpretation of IR and NMR spectra of organic molecules. 1 three-hour laboratory. Prerequisite: CHM 317L. Concurrent: CHM 315.

**CHM 319L Organic Chemistry Laboratory (1) FWSpSu**

Multistep syntheses. Extensive interpretation of IR and NMR spectra of organic compounds. 1 three-hour laboratory. Prerequisite: CHM 318L. Concurrent: CHM 316.

**CHM 321/321L Elements of Biochemistry (3/1) FWSpSu**

The fundamental concepts of biochemistry with emphasis on structure-function relationships as they relate to carbohydrates, lipids, proteins, and nucleic acids. Designed for students who are required to take one quarter of biochemistry. Not open for credit to Chemistry majors. 3 lectures/problem-solving, 1 three-hour laboratory.

Concurrent enrollment required. Prerequisite: CHM 201 and 250L, or CHM 315 and 318L.

### **CHM 327 Biochemistry (3) FW**

Chemistry of carbohydrates, lipids, proteins and enzymes. Enzyme reactions and kinetics; glycolysis and the citric acid cycle metabolism. Prerequisite: CHM 315 and 317. Corequisite: CHM 327L.

### **CHM 327L Biochemistry Laboratory (1) FW**

Laboratory work includes the study of pH and buffers, carbohydrates, lipids, proteins and enzyme kinetics. Qualitative and quantitative methods employing instrumental analysis are included. Corequisite: CHM 327.

### **CHM 328 Biochemistry (3) WSp**

Chemistry of vitamins, trace metals and important agents in metabolic control; glyoxalate cycle, pentose phosphate pathway, electron transport, cellular control, photosynthesis and nucleic acid structures. Nutritional chemistry, as it relates to vitamin function, is also covered. Prerequisite: CHM 327, 327L. Corequisite: CHM 328L.

### **CHM 328L Biochemistry Laboratory (1) WSp**

Standard curve for protein analysis as well as spectrophotometric quantitation, isolation and partial purification of biomolecules using centrifugation, liquid column chromatography, salts, heat treatment and electrophoresis. Laboratory work includes study of tissue extracts and other instrumental methods in biochemistry. Corequisite: CHM 328.

### **CHM 329 Biochemistry (3) SpSu**

Metabolism of lipids and nucleic acids, biochemistry of DNA replication, RNA transcription, protein translation and membrane dynamics. Prerequisite: CHM 328, 328L. Corequisite: CHM 329L.

### **CHM 329L Biochemistry Laboratory (1) SpSu**

Purification and analysis of membranes, analysis of protein ligand interactions, extraction and denaturation of DNA. Laboratory work includes denaturing electrophoresis, spectrophotometry and other instrumental methods in biochemistry. Corequisite: CHM 329.

### **CHM 331/331L Clinical Chemistry (2/2) WSp**

Introduction to the principles and procedures used in the clinical laboratory for the analysis of blood and urine specimens. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: CHM 221/221L and 327/327L or 321/321L. Concurrent enrollment required.

### **CHM 340 The Chemist in Industry (4) FSp**

Survey of roles and expectations for chemists in industry and applications of chemical reactions and principles in the petroleum, biotechnology, pharmaceuticals, food, inorganics, polymers, aerospace, coatings and metal industries. Interfaces with economics, patents, chemical engineering and communication. Guest speakers and plant visits. 4 lectures/problem-solving. Prerequisites: CHM 123/123L and 201 or 314.

### **CHM 342/342L Spectroscopic Methods (2/2) (F)**

Theory and practice of modern analytical techniques based primarily on optical spectroscopy such as UV, IR, AAS, AFS, AES and fluorescence. 2 lectures/problem-solving, 2 three-hour laboratories. Involves some inorganic synthesis. Prerequisite: CHM 221/221L. Concurrent enrollment required.

### **CHM 343/343L Separation Methods (2/2) (W)**

Theory and practice of modern analytical separation methods primarily encompassing various chromatographic techniques. 2 lectures/problem-solving, 2 three-hour laboratories. Involves some inorganic synthesis. Prerequisite: CHM 221/221L. Concurrent enrollment required.

### **CHM 344/344L Electroanalytical Methods (2/2) (Sp)**

Theory and practice of modern analytical electrochemistry, with particular emphasis on potentiometry, voltammetry, amperometry, coulometry, chronopotentiometry and cyclic and pulse methods. 2 lectures/problem-solving, 2 three-hour laboratories. Involves some inorganic synthesis. Prerequisite: CHM 221/221L.

### **CHM 347/347L Theory of Chemical Instrumentation (1/1) Sp**

Theory of chemical instrument systems with emphasis on the selection of instrumentation appropriate to a measurement or control problem. 1 lecture/problem, 1 three-hour laboratory. Prerequisite: CHM 344/344L.

### **CHM 352A/352L Physical Chemistry Laboratory (1/2) W**

Laboratory experiments illustrating principles of physical chemistry. 1 recitation and 2 three-hour laboratories. Prerequisite: CHM 221/221L; CHM 304 or 311. Concurrent: CHM 305 or 312.

### **CHM 353L Physical Chemistry Laboratory (2) Sp**

Advanced laboratory applications of physical chemistry. 2 three-hour laboratories. Prerequisite: CHM 352L. Concurrent: CHM 313.

### **CHM 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### **CHM 401, 402 Inorganic Chemistry (3) (3) FW**

Modern concepts of inorganic chemistry including chemical bonding, acid/base, coordination chemistry, kinetics, organo-metallics and catalysis. To be taken in sequence. 3 lectures/problem-solving. Prerequisite: CHM 313 or 305.

### **CHM 409 Polymer Chemistry (3) Sp, odd years**

Types of polymers and polymerization reactions; properties of polymer solutions and the determination of molecular weights; elasticity and other bulk properties. 3 lectures/problem-solving. Prerequisites: CHM 316 and 305 or 313.

### **CHM 411 Reaction Kinetics (3) W**

Kinetics and mechanisms of chemical reactions. Transition state theory, collision theory, photochemical excitation and dissociation, homogeneous and heterogeneous catalysis. Analysis and solution of problems. 3 lectures/problem-solving. Prerequisite: CHM 305 or 313.

### **CHM 413 Introduction to Colloid and Surface Chemistry (3) Sp, even years**

Gas-liquid, gas-solid and solid-liquid interfaces. Adsorption and surface area determination. The electrical double layer and its relation to flocculation and electrokinetic phenomena. 3 lectures/problem-solving. Prerequisite: CHM 305 or 313.

### **CHM 415 Chemical Thermodynamics (3) F**

Fundamental aspects of chemical thermodynamics, including the first, second, and third laws. Studies of chemical and phase equilibria, enthalpy, entropy, work and free energy. Relationship to molecular



structure and statistical mechanics. 3 lectures/problem-solving. Prerequisite: CHM 305 or 313.

#### **CHM 419 Introduction to Quantum Chemistry (3) F, even years**

Mathematical preliminaries, postulates of quantum chemistry, wave functions for some simple chemical models, the central force problem, the Aufbau principle, hybrid orbitals, approximation methods and Hund's multiplicity rule. 3 lectures/problem-solving. Prerequisite: CHM 305 or 313.

#### **CHM 420 Computational Chemistry (4) Sp, odd years**

Applied quantum mechanical studies of molecular geometries, electronic excited states, potential energy surfaces and conformational structures spanning from small diatomic species to large biochemical molecules. Spectroscopic problems emphasized. Molecular graphics used to aid in both ab initio and molecular mechanics. 4 lectures/problem-solving. Prerequisite: CHM 313, MAT 216.

#### **CHM 421 Solution Equilibria in Analytical Chemistry (2) F**

Study of advanced acid-base theory, complexation, nonaqueous acid-base, solvent extraction and ion-exchange equilibria. 2 lectures. Prerequisite: CHM 313 or 305.

#### **CHM 422/422L Organic Synthesis (2/2) W, even years**

Theoretical and practical study of synthetic strategies in organic chemistry. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: CHM 221/221L, 316 and 319L. Concurrent enrollment required.

#### **CHM 423/423L Physical Organic Chemistry (2/2) W, odd years**

Theoretical and practical study of experimental techniques used by organic chemists to investigate problems in reaction mechanisms, catalysis, solution chemistry and substituent effects. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: CHM 221/221L, 316 and 319L and 313 or 305.

#### **CHM 424/424L Organic Analysis (2/2) FSp**

Structure determination of organic compounds by elemental and functional group analysis using classical methods and modern chromatographic and spectroscopic methods. 2 lectures, 2 three-hour laboratories. Prerequisites: CHM 221/221L, 316 and 319L. Concurrent enrollment required.

#### **CHM 446/446L Corrosion Chemistry (3/1) W**

The basic principles of theoretical and applied electrochemistry as it pertains to corrosion. Thermodynamics and kinetics of oxidation. Aqueous corrosion, stress corrosion, hydrogen cracking, fatigue. Corrosion testing, inhibition and design. Cathodic and anodic protection, metal and chemical coatings. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CHM 305 or 313 or consent of instructor.

#### **CHM 448/448L Modern FT-NMR (3/1) F**

Fundamentals of one- and two-dimensional NMR and basic understanding of the pulse sequences for a variety of NMR experiments (proton, C-13, SPT, INEPT, DEPT, COSY, HETCOR and NOE). Interpretation of such spectra to determine organic structures. Experience on FT-NMR instrument in weekly sessions to be arranged with instructor. Prerequisites: CHM 316, 319 and CHM 305 or 313, or consent of instructor.

#### **CHM 450 Bioanalytical Chemistry (4) Sp, odd years**

Application of instrumental analytical techniques to problems in biotechnology and clinical medicine. Uniqueness of problems inherent in analysis of biological samples and the application of state-of-the-art separation and assay techniques. Prerequisites: CHM 221/221L and CHM 327/327L or CHM 221/221L and CHM 321/321L with consent of instructor. 4 lectures/problem-solving.

#### **CHM 451/451L Enzymology (3/1) F, even years**

The nature of enzymes including enzyme kinetics, mechanisms of enzyme-catalyzed reactions, enzyme inhibitors, classification of enzymes. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: CHM 329/329L or consent of instructor. Concurrent enrollment required.

#### **CHM 452/452L Biochemical Preparations (1/2) W, even years**

Isolation of some eight different materials from plant and animal sources, such as a blood protein fraction, a plant nucleic acid, a plant terpene, a hormone preparation, a metabolic intermediate and a urinary excretion product. 1 lecture/problem, 2 three-hour laboratories. Prerequisite: CHM 329/329L or consent of instructor. Concurrent enrollment required.

#### **CHM 453 Recombinant DNA Biochemistry (3) Sp**

Fundamental aspects of the biochemistry of Recombinant DNA and its applications to current biochemical research and industry. Includes germane aspects of the chemistry, structure and biochemistry of RNA and DNA macromolecules. 3 lectures/problem-solving. Prerequisite: CHM 329/329L or taken concurrently.

#### **CHM 454 Nutrient Biochemistry and Metabolism (3) W, odd years**

An advanced course covering the biochemistry of vitamins, minerals, carbohydrates, lipids and proteins. For example: absorption, transport metabolism and storage of these important biochemicals. 3 lectures/problem-solving. Prerequisite: CHM 329/329L or consent of instructor.

#### **CHM 460 Air Pollution Problems (3) W**

Concepts of air pollution: major air pollutants; sources; future problems. 3 lectures/problem-solving. Prerequisite: senior standing or consent of instructor.

#### **CHM 491, 492 Senior Research Project (3) (3) FWSpSu**

Senior level research or project. Individual consultation and supervision. Independent literature review, project design, data collection and interpretation of results. Formal report. Prerequisite: minimum GPA of 2.0 in major.

#### **CHM 493 Undergraduate Seminar (2) FWSp**

A study of current developments in chemistry and a discussion of periodical literature at an appropriate level. 2 lecture discussions. Prerequisites: All required 300-level chemistry courses.

#### **CHM 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: permission of Instructor.

Graduate courses are listed in the Graduate Studies section of the catalog.

## COMPUTER SCIENCE

Barry I. Soroka, Chair

Debra A. Brum  
John R. Fisher  
Bruce P. Hillam  
Peter A. Laszlo  
Chung Lee  
Hsi-Chiu Liu  
Hsun K. Liu

Halina Przymusinska  
Craig A. Rich  
H. Norton Riley  
Daisy F. Sang  
Mandayam Srinivas  
Lan Yang

The Computer Science program blends practice and theory in both hardware and software, and it provides an excellent foundation in computer languages, computer architecture, large-scale system software and the design, analysis, and application of many types of algorithms. Success in mathematics is a good indicator for success in the Computer Science program. High school students planning to major in Computer Science should take as much math and science as possible. Entering freshmen who do not meet the prerequisites for the first year calculus sequence (Mat 114-116) should expect to take between one and three quarters longer to graduate. Transfer students should try to take two years of calculus, a year of physics and programming through data structures (equivalent to CS 140, 141, 240, 241). Transfer students without this background should expect to take an additional year to finish the program.

On-campus students wishing to change their major to Computer Science should first pass both Mat 114 and CS 140 with a grade of C or better before petitioning for change of major. Computer Science majors on probation or subject to disqualification for three or more quarters may be disqualified at the discretion of the department chair.

The department also offers a graduate program leading to the M.S. degree. Details are given in the Graduate Studies section of the catalog.

Membership is open to CS majors in the Bits and Chips Computer Club and local chapters of ACM and IEEE and they may also be invited to join UPE, the national honor society in computer science. Students must have a grade of "C" or better in all the CS prerequisites.

The department's Bachelor of Science program in Computer Science is fully accredited by the Computing Sciences Accreditation Commission (CSAC).

### CORE COURSES

(Required of all students)

Discrete Structures	CS	130	(4)
Introduction to Computer Science	CS	140	(4)
Introduction to Programming and Problem Solving	CS	141	(4)
Computer Logic	CS	210	(4)
Data Structures and Algorithms I	CS	240	(4)
Data Structures and Algorithms II	CS	241	(4)
Assembly Language Programming	CS	264	(4)
Numerical Methods	CS	301	(4)
Formal Languages	CS	310	(4)
Design and Analysis of Algorithms	CS	331	(4)
Symbolic Programming	CS	352	(4)
Computer Organization	CS	365	(4)
Microprocessor Systems	CS	405	(4)
Programming Languages	CS	408	(4)
Artificial Intelligence	CS	420	(4)
Operating Systems	CS	431	(4)
Database Systems	CS	435	(4)

Compiler Design	CS	440	(4)
Undergraduate Seminar	CS	463	(2)

Computer Science Electives (including 12 units from the following list) (16)

Introductory Computer Graphics	CS	245	(4)
Object-Oriented Design and Programming	CS	356	(4)
Parallel Processing	CS	370	(4)
Introduction to Computer Networks	CS	380	(4)
Computer Simulation	CS	390	(4)
Advanced Operating Systems	CS	432	(4)
Advanced Compiler Design	CS	441	(4)
Advanced Computer Graphics	CS	445	(4)
Computability	CS	450	(4)
Secure Communication	CS	460	(4)
Software Engineering	CS	480	(4)
Software Engineering	CS	481	(4)
Honors	CS	490	(4)

### SUPPORT COURSES

(Required of all students)

General Physics	.PHY	132	(3)
General Physics	.PHY	133	(3)
General Physics Laboratory	.PHY	152L	(1)
General Physics Laboratory	.PHY	153L	(1)
General Chemistry	.CHM	121	(3)
General Chemistry	.CHM	121L	(1)
Analytic Geometry and Calculus	.MAT	116	(4)
Linear Algebra	.MAT	208	(4)
Calculus of Several Variables	.MAT	214	(3)
Statistical Methods for Computer Scientists	.STA	326	(4)

### GENERAL EDUCATION COURSES

(Required of all students)

#### Area 1:

Freshman English I	.ENG	104	(4)
Other			(8)

#### Area 2:

Life Science	.BIO	110	(3)
Analytic Geometry and Calculus	.MAT	114	(4)
Analytic Geometry and Calculus	.MAT	115	(4)
General Physics	.PHY	131	(3)
General Physics Laboratory	.PHY	151L	(1)
Other			(4)

#### Areas 3-5:

As required by the University (44)

UNRESTRICTED ELECTIVES (6)

### MINOR IN ARTIFICIAL INTELLIGENCE

Required Courses

Discrete Structures	CS	130	(4)
Introduction to Computer Science	CS	140	(4)
Introduction to Programming and Problem-Solving	CS	141	(4)
Data Structures and Algorithms I	CS	240	(4)
Data Structures and Algorithms II	CS	241	(4)
Formal Languages	CS	310	(4)
Symbolic Programming	CS	352	(4)

Artificial Intelligence .....	CS	420	(4)
Cognitive Processes .....	PSY	334	(4)
Critical Thinking .....	PHL	202	(4)
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Total units required for the Minor: .....		40	

**MINOR IN COMPUTER SYSTEMS ORGANIZATION****Required Courses**

Discrete Structures .....	CS	130	(4)
Introduction to Computer Science .....	CS	140	(4)
Introduction to Programming and Problem-Solving .....	CS	141	(4)
Data Structures and Algorithms I .....	CS	240	(4)
Data Structures and Algorithms II .....	CS	241	(4)
Computer Logic .....	CS	210	(4)
Assembly Language Programming .....	CS	264	(4)
Computer Organization .....	CS	365	(4)
Microprocessor Systems .....	CS	405	(4)
Operating Systems .....	CS	431	(4)
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Total units required for the Minor: ..... 40

**MINOR IN SCIENTIFIC COMPUTER PROGRAMMING****Required Courses**

Discrete Structures .....	CS	130	(4)
Introduction to Computer Science .....	CS	140	(4)
Introduction to Programming and Problem-Solving .....	CS	141	(4)
Data Structures and Algorithms I .....	CS	240	(4)
Data Structures and Algorithms II .....	CS	241	(4)
Numerical Methods .....	CS	301	(4)

Choose 3 of the following courses:

Introduction to Computer Graphics .....	CS	245	(4)
Design and Analysis of Algorithms .....	CS	331	(4)
Computer Simulation .....	CS	390	(4)
Numerical Methods in Differential Equations .....	MAT	402	(4)
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Total units required for the Minor: ..... 36

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

Basic concepts of computer hardware and software. Computer literacy. Detailed instruction in the use of a microcomputer software package including word processor, spreadsheet and database manager. Computer applications, impact of computers on society, responsibilities of the user. 4 lectures/problem-solving. Cannot be used for CS elective credit.

**CS 120 Pascal (4)**

The stored program computer, central processing unit, memory, input/output, control of information flow. Simple data types, loop control, conditional statements, file I/O. Structured data types: arrays, records, sets, strings. Functions and procedures. Problem analysis and algorithm design. 4 lectures/problem-solving. Prerequisites: MAT 105 and MAT 106 with grades of C or better, or consent of instructor. Cannot be used for CS elective credit.

**CS 125 FORTRAN (4)**

Data types, evaluation of expressions, control statements, functions and subroutines, interactive and file I/O. Program development,

documentation, and testing. Problem analysis and algorithm design. Applications to numeric problems and character-processing. 4 lectures/problem-solving. Prerequisites: MAT 105 and MAT 106 with grades of C or better, or consent of instructor.

**CS 130 Discrete Structures (4)**

Fundamental topics for Computer Science, such as logic, proof techniques, sets, basic counting rules, relations, functions and recursion, graphs and trees. 4 lectures/problem-solving. Prerequisite: MAT 105 with a grade of C or better, or consent of instructor.

**CS 140 Introduction to Computer Science (4)**

Basic concepts of Computer Science, including overview of hardware and software. Ethical and social impacts of computing. Problem-solving methods. Programming in a high-level language. Written essay required. Prerequisite: MAT 114 with a grade of C or better, or concurrent enrollment in MAT 114, or consent of instructor.

**CS 141 Introduction to Programming and Problem-Solving (4)**

Program design and development, documentation and testing of written programs. Modularization and reusability of software. Input, output and auxiliary storage. Prerequisite: CS 140 with a grade of C or better, or consent of instructor.

**CS 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**CS 210 Computer Logic (4)**

Boolean algebra with applications to computers and logic design. The Arithmetic Logical Unit, logical properties of flip-flops and sequential machines. Applied projects. 4 lectures/problem-solving. Prerequisite: CS 130 with a grade of C or better, or consent of instructor.

**CS 240 Data Structures and Algorithms I (4)**

Abstract data types. Searching and sorting. Linked lists, stacks, queues, sets. Analysis of algorithms. Sequential files. 4 lectures/problem-solving. Prerequisite: CS 130 and CS 141 with grades of C or better, or consent of instructor.

**CS 241 Data Structures and Algorithms II (4)**

Trees, graphs, hash tables. Random access and indexed files. 4 lectures/problem-solving. Prerequisite: CS 240 with a grade of C or better, or consent of instructor.

**CS 245 Introductory Computer Graphics (4)**

Basic concepts in 2-dimensional graphics. Display devices, programming for vector and raster graphics, language structure and components, 2-dimensional transformations, windowing, clipping, simple hidden line removal, coloring. 4 lectures/problem-solving. Prerequisite: CS 241 with a grade of C or better, or consent of instructor.

**CS 256 C and C++ for Programmers (4)**

Data types, expressions, control structures, functions, file and stream I/O. Use of pointers and dynamic storage allocation. Structured and abstract data types. Class encapsulation, inheritance and polymorphism. Problem solving and testing techniques. 4 lectures/problem-solving. Prerequisite: CS 120 or CS 125 or CS 141 with a grade of C or better, or consent of instructor.

**CS 264 Assembly Language Programming (4)**

Assembly and machine coding of computers. Archetypal Von Neumann architecture and cycle of operation, instruction sets, addressing modes, macros and system I/O. Applied programming projects. 4 lectures/problem-solving. Prerequisite: CS 210 and CS 240 with grades of C or better, or consent of instructor.

**CS 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: consent of instructor.

**CS 301 Numerical Methods (4)**

Error analysis, zeros of a function, systems of linear equations, interpolation, Chebyshev approximation, least squares approximation, numerical integration and differentiation, random processes. 4 lectures/problem-solving. Prerequisites: MAT 208 and MAT 214 and either CS 125 or CS 141 with grades of C or better, or consent of instructor.

**CS 310 Formal Languages (4)**

Regular and context-free grammars and languages, acceptors, ambiguity, closure properties, normal forms, non-deterministic machines, limitations of context-free languages. 4 lectures/problem-solving. Prerequisite: CS 210 and CS 240 with grades of C or better, or consent of instructor.

**CS 331 Design and Analysis of Algorithms (4)**

Development of algorithms, top-down structured programming, program correctness, backtrack programming, branch and bound methods, efficient algorithm implementation, algorithm complexity analysis. 4 lectures/problem-solving. Prerequisite: CS 241 and MAT 116 with grades of C or better, or consent of instructor.

**CS 352 Symbolic Programming (4)**

Languages for processing symbolic data with emphasis on applications in artificial intelligence. Coverage of Lisp and Prolog. 4 lectures/problem-solving. Prerequisite: CS 241 with a grade of C or better, or consent of instructor.

**CS 356 Object-Oriented Design and Programming (4)**

Elements of the object model. Abstraction, encapsulation, modularity and hierarchy. Algorithmic decomposition vs. object-oriented decomposition. Class diagrams, object diagrams, module diagrams, and process diagrams. Comprehensive examples using a case study approach. 4 lectures/problem-solving. Prerequisite: CS 240 and CS 256 with grades of C or better, or consent of instructor.

**CS 365 Computer Organization (4)**

Fundamental characteristics of logical devices used in an architecture. Application of logic devices in a processing systems context. Study and construction of a 4-bit processor. Development and application of instruction sets and microcode. 4 lectures/problem-solving. Prerequisite: CS 264 and PHY 133 with grades of C or better, or consent of instructor.

**CS 370 Parallel Processing (4)**

The taxonomy of concurrent and parallel systems. Communication and synchronization, multicomputer and multiprocessor systems. Shared-memory and message passing programming paradigms; parallel problem solving. 4 lectures/problem-solving. Prerequisite: CS 331 with a grade of C or better, or consent of instructor.

**CS 380 Introduction to Computer Networks (4)**

Network architectures and layered protocols. Network service interfaces; addressing and routing; flow and congestion control. Local and metropolitan area networks. Higher level protocols. 4 lectures/problem-solving. Prerequisite: CS 241 and CS 365 with grades of C or better, or consent of instructor.

**CS 390 Computer Simulation (4)**

Overview of computer simulation. Model building, implementation, validation. Discrete and continuous simulation models. Use of the languages GPSS, Simscript, Dynamo. 4 lectures/problem-solving. Prerequisite: STA 326 and either CS 125 or CS 141 with grades of C or better, or consent of instructor.

**CS 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**CS 405 Microprocessor Systems (4)**

The microprocessor and support integrated circuits (ICs) as a unified system and their programming implications. Study and application of ICs for communications, peripheral adaptors, arithmetic processors, floppy disc and CRT controllers in a system context. 4 lectures/problem-solving. Prerequisite: CS 365 with a grade of C or better, or consent of instructor.

**CS 408 Programming Languages (4)**

Formal definition of programming languages. Global properties of algorithmic languages including scope of declarations, storage allocation, grouping of statements, binding time, subroutines, coroutines. List processing, string manipulation and data description. Run time representation of program and data structures. 4 lectures/problem-solving. Prerequisite: CS 264, and CS 352 with grades of C or better, or consent of instructor.

**CS 420 Artificial Intelligence (4)**

Heuristic programming, searching problem spaces, theorem-proving programs, game playing programs, decision-making programs, question answering programs. Consideration of ethical and social dilemmas posed by AI. Technical paper required. 4 lectures/problem-solving. Prerequisite: CS 352 with a grade of C or better, or consent of instructor.

**CS 431 Operating Systems (4)**

Modern operating systems overview. Loading, linking, address binding and memory management. Processes and their synchronization primitives, resource management. Monitors and kernels. Multiprogramming and multiprocessing. Concurrent operations and hardware I/O. Deadlock, file management and job control. Issues of security, privacy and property rights as they relate to operating system functions. Technical paper required. 4 lectures/problem-solving. Prerequisite: CS 241 and CS 264 with grades of C or better, or consent of instructor.

**CS 432 Advanced Operating Systems (4)**

Current trends and issues in the development of operating systems. The role of operating systems in complex architectures. Detailed examination of the internal algorithms and data structures of one or more specific operating systems. 4 lectures/problem-solving. Prerequisite: CS 431 with a grade of C or better, or consent of instructor.



**CS 435 Database Systems (4)**

Database system fundamentals. Physical file organization: SAM, ISAM, DAM and multi-index systems. Data models: relational, network, hierarchical and E-R. DDL and DML design and implementation. DBMS design issues including interrogation, maintenance, concurrency, recovery and security. Individual and organizational concerns regarding accuracy and privacy of data. Technical paper required. 4 lectures/problem-solving. Prerequisite: CS 241 with a grade of C or better, or consent of instructor.

**CS 440 Compiler Design (4)**

Lexical analysis, parsing and basic compiling techniques including syntax-directed translation. 4 lectures/problem-solving. Prerequisite: CS 241, CS 264 and CS 310 with grades of C or better, or consent of instructor.

**CS 441 Advanced Compiler Design (4)**

Run-time environments, parsing techniques, intermediate code generation and optimization, object code generation and optimization. 4 lectures/problem-solving. Prerequisite: CS 440 with a grade of C or better, or consent of instructor.

**CS 445 Advanced Computer Graphics (4)**

Advanced concepts in the design of 3-dimensional graphics. Transformations, curve and patch generation, hidden line and surface removal, shading, animation. Interactive graphics applications in CAD/CAM. 4 lectures/problem-solving. Prerequisite: CS 245 with a grade of C or better, or consent of instructor.

**CS 450 Computability (4)**

Turing machines, RAM machines, primitive and mu recursion, Godel numbering, Church-Turing thesis, decidability, Markov and Post systems, algorithmically unsolvable problems. 4 lectures/problem-solving. Prerequisite: CS 310 with a grade of C or better, or consent of instructor.

**CS 460 Secure Communication (4)**

Public-key systems, digital signatures, ciphers, the Data Encryption Standard, access security, control of information flow. 4 lectures/problem-solving. Prerequisite: senior standing in Computer Science and CS 301 with a grade of C or better, or consent of instructor.

**CS 461, 462 Senior Project (2)(2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time.

**CS 463 Undergraduate Seminar (2)**

Technical presentations by students on current developments in computer science. Seminar discussions of ethical, social and economic impacts of technology. Essays on seminar topics. 2 lecture discussions. Prerequisite: senior standing in computer science and a passing score on GWT.

**CS 475 Computers and Society**

Social, ethical, legal, political and economic issues associated with computing. Analysis of issues in written essays; discussion of case studies. Exposure to issues through a skills acquisition exercise. 4 seminars. Prerequisite: ENG 104. Computer experience recommended.

**CS 480, 481 Software Engineering (4)(4)**

Software engineering process including requirements engineering, specification techniques, design concepts and methods, software testing and integration concepts, verification and validation, quality assurance and configuration management, post-development software evolution and documentation. 4 lectures/problem-solving. Prerequisite: CS 241 with a grade of C or better, or consent of instructor.

**CS 490 Honors (4)**

In-depth study of a topic of current interest to computer science. Students will be expected to perform individual research and projects and present their results in class. Enrollment is limited. 4 lectures/problem-solving. Prerequisite: consent of instructor.

**CS 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: consent of instructor.

## GEOLOGICAL SCIENCES

John A. Klasik, Chair

David R. Berry  
David R. Jessey  
Jonathan A. Nourse  
Donald W. Tarman

The Geological Sciences Department offers two programs leading to either a Bachelor of Science or a Bachelor of Arts degree. The Bachelor of Science program prepares students for graduate school or direct employment in industry or government as professional geoscientists. The curriculum stresses a background in the physical sciences and mathematics as well as geology itself.

The Bachelor of Arts program offers a flexible curriculum which can be tailored to each student's specific academic goal. Anchored on a minimal number of core and support courses, the student's program can be directed into any Earth Science-related career field. The degree is aimed at those individuals who either have a general interest in geology or who have very specific career objectives in fields requiring general geologic knowledge. Examples of related careers are as museum curators, environmental technicians, Forest Service and National Park Service staff and Earth Science elementary and secondary school teachers.

In 1998/99 the Department will replace the Bachelor of Arts degree with a Bachelor of Science degree option titled EarthStudies. For information about this new option contact the department chair or refer to the Cal Poly Pomona Web version of the Catalog which will contain updated information <<http://www.sci.csupomona.edu/geology/>>

The Minor in Geology provides an opportunity for students majoring in disciplines other than Geology to receive credit for having completed at least 30 quarter units of concentrated study in Geology. This may improve employment opportunities with Federal agencies, private companies and teaching institutions.

For those planning careers as secondary school science teachers, a single subject credential in Science is required. This credential is obtained by completing coursework in Education and passing the National Teacher Examination. The latter can be waived by taking the courses listed in the Subject Matter Preparation Program. See the Department Chair of the Director of the Center for Education and Equity in Mathematics, Science and Technology for additional information.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, to receive a degree in the major.

### GEOLOGY (BACHELOR OF SCIENCE)

Principles of Geology	.GSC	111	(4)
Earth, Time and Life	.GSC	112	(3)
Principles of Geology Laboratory	.GSC	141L	(1)
Earth, Time and Life Laboratory	.GSC	151L	(1)
Computer Graphics for Geologists	.GSC	175/175L	(2/2)
Mineralogy	.GSC	215/215L	(3/1)
Hand Specimen Petrology	.GSC	219/219L	(2/2)
Applied Geomorphology	.GSC	323/323L	(3/1)
Optical Mineralogy	.GSC	325/325L	(2/2)
Invertebrate Paleontology	.GSC	331/331L	(3/1)
Structural Geology	.GSC	333/333L	(3/1)
Ground Water Geology	.GSC	360/360L	(3/1)
Engineering Geology	.GSC	415/415L	(3/1)
Sedimentary Petrology	.GSC	423/423L	(3/2)

Igneous and Metamorphic Petrology	.GSC	424L	(3)
Igneous and Metamorphic Petrography	.GSC	425L	(2)
Ore Deposits	.GSC	433/433L	(3/1)
or Geotectonics	.GSC	444/444L	3/1
Field Methods	.GSC	455/455L	(1/3)
Senior Thesis	.GSC	461	(2)
Senior Thesis	.GSC	462	(2)
Senior Seminar	.GSC	463	(2)
Summer Field Geology	.GSC	490	(8)
Total			(81)

### SUPPORT AND ELECTIVE COURSES

(Required of specific options)

### GEOLOGY (BACHELOR OF SCIENCE)

General Chemistry	.CHM	122/122L	(3/1)
General Chemistry	.CHM	123/123L	(3/1)
Geographic Information Systems	.GEO	440	(4)
Analytic Geometry and Calculus	.MAT	115	(4)
Analytic Geometry and Calculus	.MAT	116	(4)
General Physics	.PHY	131	(3)
General Physics	.PHY	132	(3)
General Physics	.PHY	133	(3)
General Physics Laboratory	.PHY	151L	(1)
General Physics Laboratory	.PHY	152L	(1)
General Physics Laboratory	.PHY	153L	(1)
Introduction to Statistics	.STA	120	(4)
Total			(36)
Units to Complete GE			(72-73)
Unrestricted Electives			(9-8)

### CORECOURSEINTEGRATED EARTHSTUDIES

Principals of Geology	.GSC	111	(4)
Earth, Time, and Life	.GSC	112	(3)
Introduction to Astronomy	.GSC	116	(4)
Principals of geology lab	.GSC	141L	(1)
Earth, Time, and Life lab	.GSC	151L	(1)
Computer Graphics for Geologists	.GSC	175/175L	(3/1)
Mineralogy	.GSC	215/215L	(3/1)
Hand Specimen Petrology	.GSC	219/219L	(2/2)
Meteorology	.GSC	304	(4)
Studies of a blue planet	.GSC	320	(4)
Geotechnology	.GSC	321/321L	(3/1)
Applied Geomorphology	.GSC	323/323L	(3/1)
Descriptive Physical Oceanography	.GSC	335	(4)
Groundwater Geology	.GSC	360/360L	(3/1)
Integrated Science	.SCI	495	4 to 8

Total core course units required 57  
or 61

### SUPPORT AND ELECTIVE COURSES INTEGRATED EARTH SCIENCES

Field Archeology	.ANT	394/394A	(2,2)
General Chemistry	.CHM	122/122L	(3/1)
General Chemistry	.CHM	123/123L	(3/1)
Environmental conservation	.BIO	201	(3)
Field Geography	.GEO	309	(4)
Geography of California	.GEO	351	(4)
Geographic Information Systems	.GEO	440	(4)
Geographic Information Systems II	.GEO	442	(4)

Geographic Information Systems III	.GEO	443	(4)
College Algebra	.MAT	105	(4)
College Physics	.PHY	121	(3)
College Physics	.PHY	122	(3)
College Physics	.PHY	123	(3)
College Physics Lab	.PHY	141L	(1)
College Physics Lab	.PHY	142L	(1)
College Physics Lab	.PHY	143L	(1)
Basic Soil Science	.SS	231/231L(3/1)	
Soil Physics	.SS	432/423L(3/1)	
Statistics with apps.	.STA	120	(4)

Total	62
Units to complete GE	(72-73)
Unrestricted Electives	(6 to 5)
if 8 units of SCI 495	(2 to 1)

## GENERAL EDUCATION COURSES (BS)

### TRACK B

#### Area 1:

A. Freshman English I	.ENG	104	(4)
B and C, two additional courses			(8)

#### Area 2:

A. Analytic Geometry and Calculus	.MAT	114	(4)
B. General Chemistry/Laboratory	.CHM	121/121L	(3/1)
C. Basic Biology	.BIO	115/115L	(3/2)
or Life Science	.BIO	110/111L	3/1
D. Elective (upper division math or science from approved list)			(4)

#### Area 3:

Select one course from each area. Minimum total			(28)
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#### Area 4:

United States History	.HST	202	(4)
Introduction to American Government	.PLS	201	(4)

#### Area 5: (Upper Division)

SEE ADVISOR			(8)
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## GENERAL EDUCATION COURSES (Integrated Earth Studies option)

### Track B

#### Area 1:

A. Freshman English I	.ENG	104	(4)
B and C. Two additional courses			(8)

#### Area 2:

A. Trigonometry	.MAT	106	(4)
B. College Chemistry/Laboratory	.CHM	121/121L	(3/1)
C. Basic Biology	.BIO	115/115L	(3/2)
or Life Science	.BIO	110/111L	3/1
D. Geologic Catastrophes	.GSC	350/350A	(4)

#### Area 3:

Select one course from each area. Minimum total			(28)
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#### Area 4:

United States History	.HST	202	(4)
Introduction to American Government	.PLS	201	(4)

#### Area 5: (Upper Division)

SEE ADVISOR			(8)
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## MINOR IN GEOLOGY

Minimum units	33
Minimum lower-division units (excluding GSC 101)	17
Minimum upper-division units	16
Principles in Geology	.GSC 111 (4)
Principles of Geology Laboratory	.GSC 141L (1)
Earth, Time, and Life	.GSC 112 (3)
Earth, Time, and Life Laboratory	.GSC 151L (1)
Hand Specimen Petrology	.GSC 219/219L(2/2)
It is required that the student confer with a minor advisor in the planning and selection of the minor curriculum.	

## Course Description

NOTE: For all courses which have both a lecture component and a laboratory component (e.g., GSC 215/215L), both components are corequisites; that is, they must be taken concurrently.

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course may be offered during the quarter(s) they enclose. Courses approved for CR/NC grading designated by a dagger (+) (non-majors only).

Field Trip Fee is required for various courses to cover transportation costs and varies according to type of transportation used.

### +GSC 101/101A The Earth Revealed (3/1) FWSp(Su)

A broad ranging non-quantitative examination of basic concepts in the physical earth sciences. Subject areas are geology, oceanography, the atmosphere and the Earth's place in the solar system. 3 lectures and 1 recitation per week. Does not satisfy laboratory science requirement.

### +GSC 111 Principles of Geology (4) FWSp(Su)

An introduction to minerals, rocks and geologic features which comprise the Earth; analysis of internal and external processes controlling the features of the planet. 3 lectures per week. Corequisite: GSC 141L and 142L (optional for non-majors).

### +GSC 112 Earth, Time and Life (3) W

Changes in continents and ocean basins, fossil populations during successive geological ages, 3 lectures. May be taken without laboratory by non-majors.

### +GSC 116 Introduction to Astronomy (4) F W Sp

A non-quantitative synthesis of the current knowledge of the cosmos and analysis of the techniques used in its investigation. The class is composed of two major components. The first considers our solar system. Topics include the sun, planets, moons, comets, asteroids and meteors, their place in the universe and discussion of theories of their origin and evolution. The second part of the class looks beyond our solar system to examine such subjects as stars, galaxies, nebulae, black holes, pulsars, and quasars. Additionally, the class will study the broader nature of the universe, how it may have started, its present state, its future evolution and its ultimate destiny. Special emphasis will be given throughout the course to new information revealed by satellite data and unmanned space missions. 4 lecture/discussion hours per week.

### +GSC 120 Introduction to Oceanography (4) FWSp(Su)

An introduction to the marine sciences. Dealing primarily with the properties of water, ocean currents, waves, tides, beaches, marine life, marine resources and the nature and origin of the sea floor. 4 lectures. Field trip fee required.

**+GSC 141L Principles of Geology Laboratory (1) FWSp(Su)**

Classification of minerals and rocks. Reading and interpreting topographic and geologic maps. 1 three-hour laboratory. Must be taken concurrently with +GSC 111 or permission of instructor. Laboratory optional for non-majors.

**GSC 151L Earth, Time and Life Laboratory (1) W**

Classification of fossil invertebrates, studies of paleogeographic maps and geologic maps and problems in structural geology. 1 three-hour laboratory. Must be taken concurrently with GSC 112 or permission of instructor. Optional for non-majors. Field trips required. Field trip fee required.

**GSC 175/175L Computer Graphics for Geologists (2) Sp**

Practice exercises in the utilization of computer software to solve geological problems. Computerized preparation of geologic diagrams, reports and presentations. Fundamental instruction in the C++ programming language to enable the coding and compilation of simple programs to process geologic data. 2 lecture, two 3-hour laboratories. Prerequisites: GSC 111, GSC 141L.

**GSC 200 Special Problems for Lower Division Students (1-2) FWSpSu**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with the maximum of 2 units per quarter.

**GSC 215/215L Mineralogy (3/1) F**

Identification, occurrence, origin and uses of the common rock-forming minerals. Blowpipe and qualitative spectroscopic analysis. Physical and chemical properties of minerals and introductory morphologic crystallography. 3 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: GSC 111 GSC 141L, CHM 121/121L. Field trip fee required.

**GSC 219/219L Hand Specimen Petrology (2/2) W**

Emphasis on rock collecting and field relationships. Rock identification based largely on megascopic properties. Students will be required to make field trips and field collections. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: GSC 111, GSC 141L, and GSC 142L. Field trip fee required.

**+GSC 250 Environmental Geology (4) FW**

Application of geologic principles to selected environmental problems; topics include resources (water, minerals and energy), geologic hazards (floods, earthquakes and landslides) and environmental planning (waste disposal, construction siting and environmental impact statements). 4 lectures. Field trips required. Field trip fee required.

**GSC 299/299A Special Topics for Lower Division Students (1-4/1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture/problem-solving, laboratory or a combination. Prerequisite: Permission of instructor.

**GSC 300/300L Introduction to Geochemistry (3/1)**

An examination of the interrelationship of geology and chemistry in the near surface environment. The course focuses on low temperature groundwater systems and geothermal fluids. Topics of discussion include the chemistry of meteoric and connate waters, application of Eh-pH and log fugacity of O<sub>2</sub> diagrams to the modeling of aqueous fluids, stable isotopic fractionation in the hydrosphere, chemical reactions at

the water-rock interface and dynamics of hydrothermal systems. 3 lectures/problems, one 3-hour laboratory. Prerequisites: 1 year of college-level chemistry.

**GSC 304 Meteorology (4) W**

Framework topics, such as atmospheric structure, composition, global heat budget, pressure and humidity form the base upon which a process-oriented, semiquantitative, descriptive survey of major weather phenomena, including winds, clouds, precipitation and storms, is conducted. 4 lectures/problem-solving. Prerequisites: PHY 121 or consent of instructor.

**GSC320 Studies of a Blue Planet**

Science-based issues related to the ocean-atmosphere system which directly impact Humankind are examined. Global warming, El Nino, ozone depletion, sea level changes, coastal development, energy extraction from the ocean, desalination and satellite monitoring of earth are investigated. Four lecture/discussions per week. Prerequisites: One course each from Track B, Area II, A, B, C.

**GSC 321/321L Geotechnical (3/1) FSp**

Fundamentals of geology applied to engineering problems. Includes rock types, structure, erosion, sedimentation, seismic explorations and rock/soil movements. 3 lectures/problem-solving, 1 three-hour laboratory. For Civil Engineering majors. Prerequisite: ENG 104, CE 134/134L. Field trips required. Field trip fee required.

**GSC 323/323L Applied Geomorphology (3/1) W**

Practical/Empirical Geomorphology of Landforms and Terrain analysis of Surficial Geology. The systematic description and analysis of landscapes and processes that change them - processes of landform development, analysis of modern erosional overprinting; use of remote sensing techniques in landform analysis; quantitative measures of landform evolution. Three lecture/discussions and one three hour lab per week. Required field trips. Field trip fee required. Prerequisite: GSC 111, GSC 141L, GSC 219/219L.

**GSC 325/325L Optical Mineralogy (2/2) W**

The chemistry (primarily phase relationships) of the common rock-forming minerals. The description, composition, texture and origin of the common rock-forming minerals according to their optical properties as determined with the petrographic microscope. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: GSC 215/215L, CHM 122/122L.

**GSC 331/331L Invertebrate Paleontology (3/1) Sp**

Morphology and evolution of fossil invertebrates. Includes discussion of ancient environments and changes in life forms with time. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: GSC 112 and GSC 151L. Field trips required. Field trip fee required.

**GSC 333/333L Structural Geology (3/1) F**

Structural features and deformation of the earth's crust. Solution of geologic field problems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: Mat 106, GSC 175L, GSC 111L, GSC 141L and, GSC 142L. Field trips required. Field trip fee required.

**GSC 334/334L Exploration Geophysics (3/1)**

Geophysical techniques. Gravity, magnetic, electrical and seismic methods applied to the solution of geologic problems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: GSC 111, GSC 141L, GSC 142L, PHY 132 and PHY 152L or PHY 122 and PHY 142L. Field trips required. Field trip fee required.



**GSC 335 Descriptive Physical Oceanography (4) F**

A survey of physical, chemical and geological oceanography. Emphasis centers on the major physical and chemical properties of sea water and such physical processes as ocean circulations, tides and waves. Ocean basin physiography, sedimentation and evolution are also discussed. 4 lectures/problem-solving; cruise. Prerequisites: CHM 106 & PHY 121. Field trips required. Field trip fee required.

**GSC 338 Coastal Processes (4)**

Geologic development of and the hydrologic and geologic processes acting within beach, deltaic and estuarine environments. Field trip required. 4 lectures/problem-solving. Prerequisites: GSC 111, GSC 120 or 335. Upper division standing. Field trips required. Field trip fee required.

**GSC 340 Marine Geology (4)**

The physiography, sedimentology, structure, origin and evolution of the ocean basins and continental margins. Facts, data, speculation derived from a variety of texts, journals, maps. 4 lectures/problem-solving. Prerequisites: GSC 335 or 120, and GSC 111, upper division standing. Field trips required. Field trip fee required.

**GSC 350/350A Geologic Catastrophies (4) FWSp (Su)**

Scientific description, measurement and observation of geologic catastrophes resulting from active plate tectonic phenomena. Emphasis on earthquakes, volcanic eruptions, landslides and glacially-controlled sea level changes. Floods and associated erosion/deposition may also be addressed. Case histories of past geologic catastrophes. 3 hours lecture, 1 hour recitation per week. Field trip fee required.

**GSC 351/351L Petroleum Geology (3/1)**

Origin and occurrence of petroleum and related products. Study of the geologic structure and stratigraphy of major oil and gas fields. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: GSC 141L and GSC 151L. Field trips required. Field trip fee required.

**GSC 360/360L Groundwater Geology (3/1) W**

Groundwater occurrence and movement. Role in hydrologic cycle and geologic processes. Groundwater resource evaluation, geotechnical problems and contamination. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: GSC 111, GSC 141L, MAT 105 or higher, PHY 121 and PHY 141L or PHY 131 and PHY 151L.

**GSC 400 Special Problems for Upper Division Students (1-2) FWSp (Su)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**GSC 415/415L Engineering Geology (3/1)**

Geologic site investigations; field mapping; subsurface investigations. Geologic analysis of slope stability; subsidence; geology of dam and tunnel construction; ground water geology; seismicity and active fault tectonics; urban geology and engineering geologic reports. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: GSC 111, GSC 141L, or GSC 321/321L. Field trips required.

**GSC 423/423L Sedimentary Geology (3/2) Sp**

Stratigraphic procedures, correlation, depositional environments, classification and origin of stratigraphic units, descriptive chemical, mineralogic and textural studies of sedimentary rocks, using petrographic, sieve and sedimentation techniques. Theory of the classification and origin of these rocks. Field trips. 3 lectures, 2 three-

hour laboratories. Prerequisite: GSC 325/325L. Field trips required. Laboratory fee required.

**GSC 424 Igneous and Metamorphic Petrology (3) Sp**

Theory of the origin, classification, chemistry and mineralogy of igneous and metamorphic rocks. 3 lectures. Prerequisites: GSC 325/325L and MAT 115. Corequisite: GSC 425L.

**GSC 425L Igneous and Metamorphic Petrography (2) Sp**

Mineralogy, texture and description of igneous and metamorphic rocks with the petrographic microscope, mineral separation techniques and x-ray diffraction. Field trips. Prerequisite GSC 325. Corequisite GSC 424. 2 three-hour laboratories. Field trips required. Field trip fees required.

**GSC 433/433L Ore Deposits (3/1) W (even years)**

A systematic study of the deposition of metallic ores. Preparation of comprehensive ore deposit models is stressed requiring the integration of mineralogy, petrology and structural geology. Discussions and practical exercises on wall rock alteration, paragenesis, metal zoning and fluid inclusion geothermometry are important components of the course. Laboratory examination of polished sections and thin sections from "classic" mining districts throughout the world and field trips to important mining districts compliment the lecture. 3 lectures and one 3 hour lab. Prerequisites: GSC 215/215L, GSC 219/219L or GSC 424, GSC 333/333L. Required Field trips. Field trip fee required.

**GSC 440/440L Exploration and Mining Geology (3/1) Sp (even years)**

Planning and implementation of mineral exploration programs, resource extraction and ore-processing. Course topics include mineral economics, exploration planning, exploration techniques, ore deposit valuation and mining and processing systems. Special emphasis is placed on the economic theory and practical aspects of development of precious metal properties. Laboratory exercises focus on all aspects of exploration from field exercises involving claim staking, geochemical/geophysical prospecting and underground mine mapping to on-campus work with computer generated ore reserve models and automated data base literature searches. 3 lectures, 1 three-hour laboratory. Prerequisites: GSC 111, GSC 215/215L and GSC 219/219L or consent of instructor.

**GSC 441/441L Micropaleontology (3/1)**

Morphology, classification and evolution of major plant and animal microfossil groups with emphasis on the Foraminiferida. Use of microfossils in petroleum exploration and paleoenvironmental reconstruction. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: GSC 112, GSC 151L and GSC 331/331L or permission of instructor.

**GSC 444/444L Geotectonics (3/1)**

Study of the major tectonic elements of the Earth, their geometry, kinematics and dynamics with special emphasis on the Cordillera of Western North America. All of the tectonic features will be analyzed in the context of plate tectonics. Prerequisites: GSC 219/219L and GSC 333/333L. Field trips required. 3 lectures/problem-solving, 1 three-hour laboratory.

**GSC 455/445L Field Methods (1/3) Sp (even years)**

Techniques of recognizing, mapping, analyzing and interpreting geologic structures and earth features. Surveying with plane table, alidade, Brunton compass and tape. 1 lecture/problem, 3 three-hour laboratories. Prerequisites: GSC 219/219L and GSC 333/333L. Field trips required. Field trip fee required.

**GSC 461, 462 Senior Thesis (2) F W Sp**

Independent research study into a geologic problem of scientific merit following standard scientific methodology. Topic selection, research techniques, data analysis and formal write up are done under close guidance and supervision of a GSC faculty research advisor. Successful completion of GSC 461 and 462 requires submission of a formal, written report in appropriate scientific style. In certain cases, publication of research results in appropriate scientific journal or as an abstract may be accepted in lieu of report.

**GSC 463 Senior Seminar (2) F W Sp**

A formal, oral presentation of senior thesis results. This presentation will be judged on clarity, organization, scientific merit and the presenter's ability to discuss and to respond to faculty and student questioning in an effective and persuasive manner. Students should not enroll in GSC 463 until senior thesis is near completion.

**GSC 490L Summer Field Geology (8) Su (even years)**

A six-week course in geological field methods. Preparation of geological maps of metamorphic, igneous and sedimentary rock areas. Geologic report on areas mapped. Prerequisite: GSC 455/455L. Field trip fee required.

**GSC 499/499A/499L Special Topics for Upper Division Students (1-4) FWSpSu**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: permission of instructor.



## MATHEMATICS

Claudia Pinter-Lucke, Chair

Charles Amelin	Kei A. Lee
Bernard Banks	Harriet Lord
Simon Bernau	Daniel A. Marcus
Hasan Celik	Henryka Maslowski
Gregory E. Chamblee	Frank P. Mathur
Yu Chang	Jim McKinney
Tse-yee Chen	Lilian Metlitzky
Hsin Ya Fan	John C. Morgan, II
Carlos Ford-Livene	Martin Nakashima
Dhanwant Singh Gill	Alan Radnitz
Frank Glaser	Kamta Rai
Jack E. Hofer	Richard A. Robertson
Donald Hook	Barbara Shabell
Larry D. Irwin	Carol Smith
Judith Jacobs	V. Merriline Smith
Alan Krinik	Weiqing Xie

The Mathematics Department offers a flexible major program which may be adapted to serve a variety of needs and interests. Students may develop elective patterns which will prepare them for entry into employment in industry and government.

However, each student is urged to develop an elective pattern which will also be preparatory for graduate study either in mathematics or in some quantitative discipline in the sciences, engineering, economics or business. Courses at the 500-level are available as part of a master's degree graduate program.

The Mathematics Department recommends that each student use several free electives to develop depth in some discipline other than mathematics.

Transfer students should complete as much of the calculus sequence as possible before entering Cal Poly Pomona. Chemistry and physics courses to be transferred should be those which require calculus concurrently or as a prerequisite.

A high school student planning a major in mathematics should complete one year of physics, one year of chemistry and four years of mathematics to include thorough preparation in trigonometry and advanced algebra.

Students majoring in mathematics and who have at least a 3.0 GPA may join the honorary society, Kappa Mu Epsilon. Additional information can be obtained from the Department of Mathematics.

### CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Pascal . . . . .	CS	120	(4)
or FORTRAN . . . . .	CS	125	
Applied Probability Theory . . . . .	STA	330	(4)
Applied Statistics . . . . .	STA	331	(4)
Analytic Geometry and Calculus . . . . .	MAT	115	(4)
Analytic Geometry and Calculus . . . . .	MAT	116	(4)
Introduction to Numerical Methods . . . . .	MAT	201	(4)
Introduction to Linear Algebra . . . . .	MAT	208	(4)
Calculus of Several Variables . . . . .	MAT	214	(3)
Calculus of Several Variables . . . . .	MAT	215	(3)
Differential Equations . . . . .	MAT	216	(4)
Basic Set Theory and Logic . . . . .	MAT	310	(4)

Intermediate Analysis . . . . .	MAT	314	(4)
Intermediate Analysis . . . . .	MAT	315	(4)
Modern Algebra . . . . .	MAT	417	(4)
Modern Algebra . . . . .	MAT	418	(4)
Complex Variables . . . . .	MAT	428	(4)

### OPTION COURSES FOR MAJOR

(Required for specific option)

### SECONDARY TEACHERPREPARATION/PURE

Choose six courses from the following list. No more than two courses may be selected from MAT 330, MAT 415, MAT 416, MAT 420. The courses marked with "\*" are suggested for those students that are preparing for a secondary teaching credential (see Subject Matter Preparation - Program for prospective teachers in mathematics on page 387). The courses marked with a "+" are suggested for those students preparing to go on to graduate studies.

History of Mathematics * . . . . .	MAT	306	(4)
Topology+ . . . . .	MAT	321	(4)
Introduction to Number Theory*, + . . . . .	MAT	325	(4)
Modern Euclidean Geometry* . . . . .	MAT	330	(4)
Advanced Calculus+ . . . . .	MAT	413	(4)
Foundations of Geometry* . . . . .	MAT	415	(4)
Projective Geometry* . . . . .	MAT	416	(4)
Abstract Linear Algebra+ . . . . .	MAT	419	(4)
Differential Geometry* . . . . .	MAT	420	(4)
Functions of a Complex Variable+ . . . . .	MAT	429	(4)
Foundations of Mathematics+ . . . . .	MAT	450	(4)

### APPLIED MATHEMATICS

The student must complete two two-quarter sequences from the list below:

Mathematics of Operations Research . . . . .	MAT	380	(4)
Mathematics of Operations Research . . . . .	MAT	381	(4)
Numerical Analysis . . . . .	MAT	401	(4)
Numerical Analysis . . . . .	MAT	402	(4)
Differential Equations . . . . .	MAT	431	(4)
Differential Equations . . . . .	MAT	432	(4)
Mathematical Modeling and Simulation . . . . .	MAT	485	(4)
Mathematical Modeling and Simulation . . . . .	MAT	486	(4)

The student must complete two additional courses from the list above or the list below:

Graph Theory . . . . .	MAT	370	(4)
Combinatorics . . . . .	MAT	470	(4)
Mathematical Programming . . . . .	MAT	480	(4)

### STATISTICS

Choose 16 units from the following:

Nonparametric Statistics . . . . .	STA	340	(4)
Applied Regression . . . . .	STA	432	(4)
Stochastic Processes . . . . .	STA	430	(4)
ANOVA and Design of Experiments . . . . .	STA	435	(4)
Mathematical Statistics I . . . . .	STA	440	(4)
Mathematical Statistics II . . . . .	STA	441	(4)
Special Topics . . . . .	STA	499	(1-4)
Computer Simulation . . . . .	CS	390	(4)

Choose 8 units in consultation with your advisor.



**SUPPORT AND ELECTIVE COURSES**

(Required of all students)

General Chemistry	CHM	122/122L	(4)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Laboratory	PHY	151L	(1)
General Physics Laboratory	PHY	152L	(1)
General Physics Laboratory	PHY	153L	(1)
Unrestricted Electives			(25)

**GENERAL EDUCATION COURSES****Area 1:**

- A. Freshman Composition . . . . .ENG 104 (4)  
 B and C. Choose two courses in consultation with advisor. . . . . (8)

**Area 2:**

- A. Analytical Geometry and Calculus . . . . .MAT 114 (4)  
 B. General Chemistry and Laboratory . . . . .CHM 121/121L (4)  
     General Physics . . . . .PHY 131 (4)  
 C. Life Science . . . . .BIO 110 (3)  
 D. Choose in consultation with advisor (Upper Division). . . . . (4)

**Area 3:**

- Select one course from each area. Minimum total . . . . . (28)

**Area 4:**

- United States History . . . . .HST 202 (4)  
 Introduction to American Government . . . . .PLS 201 (4)

**Area 5:**

- Upper Division—Select two courses . . . . . (8)

**SUBJECT MATTER PREPARATION - Program for Prospective Teachers in Mathematics**

The Mathematics Department offers a program in mathematics approved by the Commission on Teacher Credentialing. Those individuals who wish to become mathematics teachers in California public schools must complete the comprehensive list of courses that follows. The core courses in the mathematics major together with appropriate selected courses in the pure option will satisfy most of the courses on the list. The rest of the required courses can be chosen to satisfy the free elective requirements for the degree.

Analytic Geometry and Calculus I	MAT	114	(4)
Analytic Geometry and Calculus II	MAT	115	(4)
Analytic Geometry and Calculus III	MAT	116	(4)
Introduction to Linear Algebra	MAT	208	(4)
Calculus of Several Variables I	MAT	214	(3)
Calculus of Several Variables II	MAT	215	(3)
History of Math	MAT	306	(4)
Introduction to Logic and Set Theory	MAT	310	(4)
Intermediate Analysis I	MAT	314	(4)
Introduction to Number Theory	MAT	325	(4)
Modern Euclidean Geometry	MAT	330	(4)
Foundations of Geometry	MAT	415	(4)
or Projective Geometry	MAT	416	
Modern Algebra I	MAT	417	(4)
Modern Algebra II	MAT	418	(4)
Topics and Issues in Contemporary			
Secondary School Mathematics	MAT	495	(4)
Topics and Issues in Contemporary			
Secondary School Mathematics	MAT	496	(4)
Topics and Issues in Contemporary			

Secondary School Mathematics	MAT	497	(4)
Applied Probability Theory	STA	330	(4)
Applied Statistics	STA	331	(4)
Pascal	CS	120	(4)
or a college-level course in C			
Select one course from the following:			(4)
MAT 201, 370, 380, 480, 485, CS 390, CHE 415,			
OM 419, STA 432, STA 435			

**MINOR IN MATHEMATICS**

Analytic Geometry and Calculus	MAT	114	(4)
Analytic Geometry and Calculus	MAT	115	(4)
Analytic Geometry and Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
Introduction to Linear Algebra	MAT	208	(4)

In addition to the above courses, choose any four upper division courses (except MAT 391, 392, 400, 461, 462, 463, 491, 492, 493, 495, 496, 497, STA 309, 315). No more than two upper division STA courses can be counted towards the Mathematics Minor (see Statistics Minor). No more than one of MAT 317 or MAT 318 can be counted towards the mathematics minor.

Minimum number of units required: . . . . . (41)

It is recommended that the student confer with a minor advisor in the selection of courses. Since a maximum of flexibility is afforded, the student is cautioned to pay very careful attention to the prerequisites for the courses selected.

**STATISTICS MINOR**

Analytic Geometry and Calculus	MAT	114	(4)
Analytic Geometry and Calculus	MAT	115	(4)
Analytic Geometry and Calculus	MAT	116	(4)
Introduction to Linear Algebra	MAT	208	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Applied Probability Theory	STA	330	(4)
Applied Statistics	STA	331	(4)
Applied Regression	STA	432	(4)

Choose 8 units from the following:

Nonparametric Statistics	STA	340	(4)
Stochastic Processes	STA	430	(4)
ANOVA and design of Experiments	STA	435	(4)
Mathematical Statistics I	STA	440	(4)
Mathematical Statistics II	STA	441	(4)
Special Topics	STA	499	(1-4)

Minimum number of units required: . . . . . 42

For two or more courses with a common course description, each lower-numbered course must be passed with a C or better (or the student must obtain a written consent of the instructor) as a prerequisite for each higher-numbered course.

**MATHEMATICS DIAGNOSTIC PLACEMENT TEST (MDPT)**

There is a MDPT test prerequisite required for all introductory and GE level mathematics and statistics courses. THIS REQUIREMENT MUST BE MET WITHIN THE IMMEDIATE TWO QUARTERS PRIOR TO ENROLLMENT IN MATHEMATICS AND STATISTIC COURSES. There are two tests: Mathematical Analysis (for MAT 12, 105, 106, 125, 137, 191,



STA 120); and Precalculus (for MAT 112, 114, 120, 130). All test results include cutoff scores for lower level courses. Tests are given each quarter, including summer quarter. Students must register in advance at the Mathematics Diagnostic Placement Test desk (Building 8, Room 108).

### PREPARATORY MATHEMATICS PROGRAM

A four-quarter sequence of courses is provided for students needing intensive mathematics review in order to enroll in General Education mathematics or statistics courses. All courses include weekly tutorial-laboratories. Courses receive unit load credit but not baccalaureate credit. Students must have achieved prerequisite scores on ELM or MDPT in order to enroll in MAT 010, 011, 012. A grade of C or better in MAT 010 will waive the MDPT requirement for MAT 011. A grade of C or better in MAT 011 will waive the MDPT requirement for MAT 012. A grade of C or better in MAT 012 will waive the MDPT requirement for MAT 105, 106, 125, 135, 137, 191, STA 120. A waiver of any MDPT requirement is valid for two (2) quarters only and applies only to those courses taken at Cal Poly Pomona.

### COURSE DESCRIPTIONS

F, W, Sp, and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered this year during the indicated quarter(s).

All students must satisfy the CSU system Entry Level Mathematics (ELM) requirement prior to enrolling in any math or statistics course numbered 100 or higher. Any course listed as a prerequisite, or equivalent to a listed prerequisite, must be passed with a C or better grade.

#### MAT 009 Introductory Mathematics (4) FWSp

Review of arithmetic with applications, measurement systems, introductory statistics, operations with integers. 4 lectures/problem-solving. Two-hour tutorial laboratory. Letter grade only. Prerequisite: minimum placement score on ELM or MDPT within two quarters.

#### MAT 010 Prealgebra (4) FWSp

Geometry, measurement geometry, introduction to algebra including variable expressions, linear equations, polynomials, techniques of factoring, integer exponents. 4 lectures/problem-solving. Two-hour tutorial laboratory. Letter grade only. Prerequisite: minimum placement score on ELM or appropriate MDPT or C or better in MAT 009 within two quarters.

#### MAT 011 Basic Algebra (4) FWSpSu

Applications of linear equations, techniques of factoring, rational expressions, linear inequalities, graphs of linear functions, systems of linear equations, rational exponents and radicals, quadratic equations. 4 lectures/problem-solving. Two-hour tutorial laboratory. Letter grade only. Prerequisite: minimum placement score on ELM or appropriate MDPT or C or better in MAT 010 within two (2) quarters.

#### MAT 012 Intermediate Algebra (4) FWSpSu

Complex numbers, advanced quadratic equations with applications, quadratic and rational inequalities, functions, conic sections, logarithms, non-linear systems of equations, sequences and series, binomial expansions. 4 lectures/problem-solving. One-hour tutorial laboratory. Letter grade only. Prerequisite: minimum placement score on ELM or appropriate MDPT or C or better in MAT 011 within two (2) quarters.

#### MAT 105 College Algebra (4) FWSpSu

Real numbers, inequalities, absolute value, coordinate systems, functions, progressions, linear and quadratic systems, polynomials and

mathematical induction. 4 lectures/problem-solving. Prerequisites: Within the last two quarters, must have either achieved a minimum placement score on the appropriate MDPT or C or better in MAT 012; or, within the last 18 months must have earned either 560 or better on the SAT I or 26 or better on the ACT.

#### MAT 106 Trigonometry (4) FWSpSu

The circular functions, general reduction formulas, inverse functions, graphs, exponential and logarithmic functions, Law of Sines, Law of Cosines, identities and complex numbers. 4 lectures/problem-solving. Prerequisites: Within the last two quarters, must have either achieved a minimum placement score on the appropriate MDPT or C or better in MAT 012; or, within the last 18 months must have earned either 560 or better on the SAT I or 26 or better on the ACT.

#### MAT 112 Preparation for Calculus (4) FWSpSu

Function, theory, techniques for graphing functions (polynomials, rational functions, trigonometry functions, exponential functions, log functions, and compositions of these such as trig polynomials), conic sections, solutions of systems of linear and non-linear equations, inequalities, introduction to limits. 4 lectures/problem-solving. Prerequisites: must have either achieved the minimum placement score on the appropriate MDPT or C or better in MAT 105 and MAT 106 or equivalent within two quarters.

#### MAT 114 Analytic Geometry and Calculus I (4) FWSpSu

Functions, limits, continuity, derivatives of all functions including trig, exponential, log, inverse trig and implicit functions. Applications of derivatives including max/min problems. 4 lectures/problem-solving. Prerequisite: must have achieved either the minimum placement score on the appropriate MDPT or B or better in MAT 105 and MAT 106 or equivalent or C or better in MAT 112 within two quarters.

#### MAT 115 Analytic Geometry and Calculus II (4) FWSpSu

Definite and indefinite integrals. The fundamental theorem of Calculus. Applications of the definite integral. Integration techniques including integration by parts, integrals of trig products, partial fractions, substitution, trig substitution. Hyperbolic functions. 4 lectures/problem-solving. Prerequisite: C or better in MAT 114 or consent of the instructor.

#### MAT 116 Analytic Geometry and Calculus III (4) FWSpSu

Sequences and Series L'Hospital's Rule Polar Coordinates, Parametric equations and Conic Sections. 4 lectures/problem-solving. Prerequisites: C or better in MAT 115 or consent of the instructor.

#### MAT 120 Calculus for the Life Sciences (4) FWSp

Study of the calculus of algebraic, exponential and logarithmic functions. Graphing, limits, derivatives, differentials and integrals of single variable functions listed above. Brief introduction to partial derivatives and double integrals or multivariable functions. Special emphasis is given to applications in life sciences. 4 lecture-problems. Prerequisites: must have achieved either the minimum placement score on appropriate MDPT or C or better in MAT 105 or equivalent within two quarters.

#### MAT 125 Introductory Calculus for Business (4) FWSpSu

Graphing, differentiation, integration of rational and exponential functions, with special emphasis on applications to business. Not open to any student whose major requires the MAT 114 sequence. 4 lectures/problem-solving. Prerequisite: Have achieved the minimum placement score on the appropriate MDPT or C or better in MAT 012 within two quarters.

**MAT 130 Technical Calculus I (4) FWSpSu**

Differential calculus of rational functions and applications of the derivative. Integral calculus and applications of the integral. 4 lectures/problem-solving. Prerequisite: must have satisfied ELM and have achieved the minimum placement score on the appropriate MDPT or B or better in MAT 105 and MAT 106 or equivalent or C or better in MAT 112 within two quarters.

**MAT 131 Technical Calculus II (4) FWSpSu**

Analytic geometry. Derivatives and integrals of trigonometric, logarithmic, and exponential functions and applications. Infinite Series. 4 lectures/problem-solving. Prerequisite: C or better in MAT 106 and MAT 130 or consent of instructor.

**MAT 132 Technical Calculus III (4) FWSpSu**

Techniques of multidimensional calculus, introduction to ordinary differential equations and Laplace transforms. 4 lectures/problem-solving. Prerequisite: C or better in MAT 131 or consent of instructor.

**MAT 137 Survey of Geometry (4) Check with Department**

Logical systems; Euclidean Geometry, Coordinate Geometry; Geometry in Space, lines, planes, volumes and surface areas; Applications. 4 lectures/problem-solving. Prerequisites: must have achieved the minimum placement score on the appropriate MDPT or C or better in MAT 012 within two quarters.

**MAT 191 Survey of Mathematics (4) FWSpSu**

Emphasis on modern applications of selected topics from sets, logic, probability, statistics and mathematical modeling. 4 lecture-problems. Prerequisites: Within the last two quarters, must have either achieved a minimum placement score on the appropriate MDPT or C or better in MAT 012; or, within last 3 quarters must have earned 550 or better on the ELM; or, within the last 18 months must have earned either 560 or better on the SAT I or SAT II or 26 or better on the ACT.

**MAT 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**MAT 201 Introduction to Numerical Methods (4) FSp**

Numerical methods of topics from algebra and calculus. Topics will include function evaluation and graphing, limits, summation, solving nonlinear equations, systems of equations, numerical integration and differentiation and an introduction to numerical error. 4 lectures/problem-solving. Prerequisite: C or better in MAT 116 and CS 120 or CS 125 or consent of instructor.

**MAT 208 Introduction to Linear Algebra (4) FWSpSu**

Introduction to linear transformations of the plane, vector space of  $n$ -tuples, matrix algebra, determinants, systems of linear equations. 4 lectures/problem-solving. Prerequisite: C or better in MAT 214, or consent of instructor.

**MAT 214 Calculus of Several Variables I (3) FWSpSu**

Introduction to vectors, dot products, cross products, equations of lines and planes. Calculus of Vector Valued Functions including unit tangents, unit normals and curvature. Introduction to multivariable functions, the Differential Calculus of Multivariable Functions, the chain rule, applications including extreme problems and Lagrange multipliers. 3 lectures/problem-solving. Prerequisite: C or better in MAT 116 or consent of instructor.

**MAT 215 Calculus of Several Variables II (3) FWSpSu**

Integral Calculus of Multivariable functions, double and triple Integrals, applications of double and triple integrals, line and surface integrals, Green's Theorem, Divergence Theorem, Stokes Theorem. 3 lectures/problem-solving. Prerequisite: C or better in MAT 214 or consent of instructor.

**MAT 216 Differential Equations (4) FWSpSu**

The theory of ordinary differential equations with emphasis on the linear case. 4 lectures/problem-solving. Prerequisite: C or better in MAT 116, or consent of instructor.

**MAT 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Lecture/Activity/Laboratory or a combination. Prerequisite: Consent of instructor.

**MAT 306 History of Mathematics (4) F**

Development of mathematics over four millennia. Recommended for students preparing to teach mathematics. 4 lectures. Prerequisite: C or better in MAT 215, or consent of instructor.

**MAT 310 Basic Set Theory and Logic (4) FSp**

Basic set theory and logic, relations, functions, mathematical induction, countable and uncountable sets. Emphasis on how to present and understand mathematical proof. 4 lectures/problem-solving. Prerequisite: C or better in MAT 116, or consent of instructor.

**MAT 314, 315 Intermediate Analysis (4) (4) FW/WSu**

Metric spaces and continuity. Analysis of functions of a single variable. Sequences, limits, continuity, differentiation, integration, introduction to function spaces. 4 lectures/problem-solving. Prerequisite for MAT 314: C or better in MAT 215 and MAT 310 or consent of instructor. Prerequisite for MAT 315: C or better in MAT 314, or consent of instructor.

**MAT 317 Laplace Transforms and Fourier Series (3) FWSpSu**

Introduction to Fourier Series and Integrals with applications. Elementary theory of Laplace transformation with applications including the solution of differential equations. 3 lectures/problem-solving. Prerequisite: C or better in MAT 216, or consent of instructor.

**MAT 318 Mathematical Analysis of Engineering Problems (3) FSpSu**

Introduction to the algebra and calculus of vectors including the divergence and Stokes' theorem. Introduction to analytic functions of a complex variable. Not open to mathematics majors for math elective credit. 3 lectures/problem-solving. Prerequisite: C or better in MAT 215, or consent of instructor.

**MAT 321 Introduction to Topology (4) F (Odd years)**

Topology of the line and plane, topological spaces, continuity and topological equivalence and topics selected from the following: bases and sub-bases, metric and normed spaces, countability axioms, separation axioms, compactness, connectedness, product spaces, completeness and function spaces. 4 lectures/problem-solving. Prerequisite: C or better in MAT 310, or consent of instructor.

**MAT 325 Introduction to the Theory of Numbers (4) Sp**

Fundamentals of the system of integers, divisibility, congruences, theorems of Fermat and Wilson, power residues and indices, quadratic reciprocity, factorization techniques, diophantine equations, theorems of

Euler, Gauss and Lagrange. Elementary results concerning the distribution of primes. 4 lectures/problem-solving. Prerequisite: junior standing or consent of instructor.

### **MAT 330 Modern Euclidean Geometry (4) W**

Euclidean geometry using modern techniques of transformations, inversions. Extension of elementary geometry to elegant results on triangles, circles, polygons, famous theorems of geometry, unsolved problems. Introduction to deductive reasoning and techniques of proof. 4 lectures/problem-solving. Prerequisite: consent of instructor.

### **MAT 370 Graph Theory (4) FSp**

The study of graphs, trees, Eulerian, Hamiltonian, planar graphs, connectivity, coloring, independence and covering numbers, directed graphs, theorems of Menger, Ramsey with applications. 4 lectures/problem-solving. Prerequisite: consent of instructor.

### **MAT 380 Mathematics of Operations Research (4) F (even years)**

Introduction to mathematics of linear programming (LP): algebra and geometry of simplex method, solution of LP problems by Gauss-Jordan elimination method. Duality theory and sensitivity analysis. Development of revised and dual simplex algorithms. Introduction to parametric and separable convex programming. Applications of LP: computational considerations, case studies. 4 lectures/problem-solving. Prerequisites: C or better in MAT 208 and 215, or consent of instructor.

### **MAT 381 Mathematics of Operations Research (4) W (odd years)**

Solution of transportation, transshipment and assignment problems. Formulation and solution of network problems: maximal flow, minimal spanning tree, shortest route problems; PERT-CPM techniques. Introduction to dynamic and integer programming. Elements of game theory, solution of games by linear programming. Introduction to non-linear programming; Kuhn-Tucker conditions, quadratic and convex programming; SUMP solution procedure. 4 lectures/problem-solving. Prerequisite: C or better in MAT 380, or consent of instructor.

### **MAT 391 Elementary Mathematics from an Advanced Viewpoint (4) FWSp**

Development of the real number system through the reals; development of numeration systems; elementary concepts of algebra; introduction to number theory; elementary group and field theory. Development of problem-solving strategies and application of technology to these topics. 4 lectures/problem-solving. Prerequisite: C or better in MAT 191. Not open to mathematics majors for math elective credit.

### **MAT 392 Elementary Geometry from an Advanced Viewpoint I (4) FWSp**

Introduction to Metric and non-Metric geometry; development of inductive and deductive geometric proofs; congruence and similarity; and basic concepts of topology. 4 lecture-problems. Prerequisites: C or better in MAT 391.

### **MAT 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### **MAT 401 Numerical Analysis (4) F (odd years)**

Theoretical error and machine error associated with algorithms. Solutions of non-linear equations, systems of linear equations and systems of non-linear equations. 4 lectures/problem-solving. Prerequisite: C or better in MAT 201, MAT 208, MAT 215 and CS 120 or CS 125 or consent of instructor.

### **MAT 402 Numerical Methods in Differential Equations (4) W (even years)**

Polynomial interpolation, cubic splines, numerical differentiation and integration, numerical solutions of differential equations including Runge-Kutta methods and predictor-corrector methods for solving initial value problems and the shooting method for solving boundary value problems. 4 lectures/problem-solving. Prerequisites: C or better in MAT 216 and MAT 401 or CS 301 or consent of instructor.

### **MAT 413 Advanced Calculus (4) Sp (odd years)**

Differential and integral calculus of functions and transformations in several real variables. 4 lectures/problem-solving. Prerequisite: C or better in MAT 315, or consent of instructor.

### **MAT 415 Foundations of Geometry (4) Sp (even years)**

Axiomatic development of selected topics from euclidean and neutral geometries; introduction to non-euclidean geometry with emphasis on the hyperbolic case. 4 lectures/problem-solving. Prerequisite: C or better in MAT 208 and 215, or consent of instructor.

### **MAT 416 Projective Geometry (4) Sp (odd years)**

Synthetic and analytic treatment of selected topics from projective geometry; classical theorems, conics, polarities; quadratic and bilinear forms. 4 lectures/problem-solving. Prerequisite: C or better in MAT 208 and 215, or consent of instructor.

### **MAT 417, 418 Modern Algebra (4) (4) FW/Sp**

Introduction to algebraic structures; groups, rings, integral domains, fields; mappings with emphasis on morphisms. 4 lectures/problem-solving. Prerequisite for MAT 417: C or better in MAT 310 or consent of instructor. Prerequisite for MAT 418: C or better in MAT 417 or consent of instructor.

### **MAT 419 Abstract Linear Algebra (4) Sp (even years)**

Vector spaces and dimension, linear transformations, dual spaces, adjoints of transformations, multilinear forms, eigen vectors, the Cayley-Hamilton theorem, inner product spaces, orthogonality, similarity transformations, the spectral theorem, jordan form. 4 lectures/problem-solving. Prerequisite: C or better in MAT 208, or consent of instructor.

### **MAT 420 Differential Geometry (4) W (even years)**

The Frenet formulas, covariant derivatives, frame fields, the structure equations, differential forms on a surface, normal curvature, Gaussian curvatures; intrinsic geometry of surfaces in  $E^3$ , the Gauss and Bonnet theorem. 4 lectures/problem-solving. Prerequisite: C or better in MAT 314 and MAT 216, or consent of instructor.

### **MAT 428, 429 Functions of a Complex Variable (4) (4) F (every year)/ W (odd years)**

Algebra and geometry of complex numbers; analyticity, mappings of elementary functions; Cauchy integral formula, Taylor and Laurent series, the residue theorem; conformal mapping with applications. 4 lectures/problems. Prerequisites for MAT 428: C or better in MAT 314 or consent of instructor. Prerequisite for MAT 429: C or better in MAT 428 or consent of instructor.

### **MAT 431, 432 Differential Equations (4) (4) W/Sp (odd years)**

Partial differential equations with applications to wave actions, heat transfer and fluid flow. Ordinary differential equations; linear with variable coefficients, linear systems; stability and qualitative behavior of solutions. 4 lectures/problem-solving. Prerequisite: C or better in MAT 216 and 208 or consent of instructor.

**MAT 444 Vector and Tensor Analysis (4) W (odd years)**

An integrated course in the algebra and calculus of vectors and tensors; topics in differential geometry; applications to mechanics of deformable media, hydrodynamics, general relativity. 4 lectures/problem-solving. Prerequisite: C or better in MAT 208 and 216. PHY 321 is recommended, or consent of instructor.

**MAT 450 Foundations of Mathematics (4) Sp (odd years)**

Introduction to axiom systems including consistency, independence, satisfiability and completeness; transfinite arithmetic; the continuum hypothesis; well-ordering and its equivalents. 4 lectures/problem-solving. Prerequisite: C or better in MAT 310 or consent of the instructor.

**MAT 461, 462 Senior Project (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time.

**MAT 463 Undergraduate Seminar (2)**

Discussions through seminar methods of new developments in the fields of student's particular interests. 2 lecture/discussions. Prerequisite: senior standing in mathematics.

**MAT 470 Combinatorics (4) FW**

Study of enumeration techniques, permutations, combinations, principle of inclusion and exclusion, finite fields, combinatorial designs, error-correcting codes. 4 lectures/problem-solving. Prerequisite: C or better in Mat 208 or consent of instructor.

**MAT 480 Mathematical Programming (4) Sp (odd years)**

Treatment of linear inequalities, duality, general algorithms, application of linear programming. Introduction to discrete and nonlinear programming. 4 lectures/problem-solving. Prerequisite: C or better in MAT 208 and CS 125, or 120, or consent of instructor.

**MAT 485, 486 Mathematical Modeling and Simulation (4) (4) W/Sp (even years)**

Introduction to the general principles of modeling. Models will be selected from the areas such as physics, biology, political science, chemistry, engineering and business. Analytical, numerical and simulation methods will be used to solve the models. 4 lectures/problem-solving. Prerequisites: C or better in the following courses: CS 120 or CS 125, MAT 201, MAT 208, MAT 216 and STA 330 or consent of instructor.

**MAT 491 Elementary Geometry from an Advanced Viewpoint II (4) FWSp**

Introduction to congruence and similarity through constructions and deductive proofs; motion geometry involving translations, rotations and flips; tessellations; topology; coordinate geometry programming in LOGO. 4 lectures/problem-solving. Prerequisite: C or better in MAT 392. Not open to math majors for upper division mathematics elective credit.

**MAT 492 Technological Applications in Mathematics (4) W**

Use of computers, microcomputers, calculators and other technologies in doing mathematics. Evaluation and utilization of instructional software in mathematics; use of application software including databases and spreadsheets; social issues related to microcomputer use. 4 lectures/problem-solving. Prerequisite: C or better in MAT 491 or consent of instructor. Not open to math majors for upper division mathematics elective credit.

**MAT 493 Algebraic Structures and Computing for Elementary and Middle School Teachers (4) Check with Department**

Development of algebraic structures from groups to fields. Study of modular arithmetic, relationships and functions. Use of the computer, including programming in BASIC, to investigate algebraic relationships and algorithms. 4 lectures/problem-solving. Prerequisite: C or better in MAT 491 or permission of the instructor. Not open to math majors for upper division mathematics elective credit.

**MAT 495/495A, 496/496A, 497/497A Topics in Contemporary Secondary Mathematics I, II, III (3/1) (3/1) (3/1) F/W/Sp**

Examination of the high school mathematics curriculum from an advanced viewpoint. Analysis of current issues and trends in secondary school mathematics. Use of technology in learning mathematics. Assessment of students' competency in mathematics. Field experiences in educational and non-educational settings. The first two quarters of the sequence are graded on a CR/NC basis and do not count as upper division math elective credit. 3 hours lecture, 1 two-hour activity. Prerequisites: Completion of 28 units of 300 and 400-level mathematics courses, including MAT 417, 325, 306 and a course in Geometry selected from MAT 330, 415, or 416 or the equivalent of these three courses.

**MAT 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: consent of instructor. Lecture/activity/laboratory or combination of these.



## STATISTICS

D. Singh Gill, Coordinator

### STA 120 Statistics with Applications (4) FWSpSu

Collection and summarization of data; measures of central tendency and dispersion; probability; binomial and normal distributions, confidence intervals and hypothesis-testing. Not open to mathematics or engineering majors. 4 lectures/problem-solving. Prerequisites: Within the last two quarters, must have either achieved a minimum placement score on the appropriate MDPT or C or better in MAT 012; or, within last 3 quarters must have earned 550 or better on the ELM; or, within the last 18 months must have earned either 560 or better on the SAT I or SAT II or 26 or better on the ACT.

### STA 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### STA 210 Statistical Computing (4) Sp (odd years)

Use of computer packages, inferences about means of two populations, dependent and independent samples, small and large samples, inferences about proportions and variances, correlation and regression. 4 lectures/problem-solving. Prerequisite: C or better in STA 120 or consent of instructor.

### STA 220 Discrete Probability Models (4) W (odd years)

Set-theoretic approach to probability in finite sample spaces. Conditional probability, independence, binomial, hypergeometric and related distributions. 4 lectures/problem-solving. Prerequisite: C or better in MAT 105, or consent of instructor.

### STA 309 Statistical Methods in Engineering and the Physical Sciences (3) FWSp

The uses of statistics in testing, inspection and production, measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory, hypothesis-testing and estimation, comparison of two populations. Not open to students required to take STA 315 or ECE 315. Not open to math majors for upper division math elective credit. 3 lectures/problem-solving. Prerequisite: C or better in MAT 214 or MAT 131 or consent of instructor.

### STA 310 Sampling Survey Methods (4) Sp

Simple random sampling, stratified, cluster, systematic, multistage, multiphase and probability sampling methods, source of errors, sample size estimation. Not open to math majors for upper division math elective credit. 4 lectures/problem-solving. Prerequisite: C or better in STA 120 or equivalent or consent of instructor.

### STA 315 Probability and Statistics for Engineers (4) (Check with Department)

Statistical and probabilistic concepts for the analysis of electrical and electronic systems associated with random phenomena. Application to communication, control, instrumentation and logic systems. Not open to math majors for upper division math elective credit. 4 lectures/problem-solving. Prerequisite: C or better in MAT 215, or consent of instructor. Not open to students with credit in ECE 315, STA 309 or students required to take STA 330.

### STA 340 Nonparametric Statistics (4) W (even years)

Common nonparametric tests such as permutation tests, sign tests, Wilcoxon test, chi-square test and rank correlation tests. Null distributions and their approximations. 4 lectures/problem-solving. Prerequisite: C or better in STA 210 or STA 326 or STA 331, or consent of instructor.

### STA 326 Statistical Methods for Computer Scientists (4) FWSp

Rules of Probability. Discrete and continuous distributions including the multinomial distribution. Sampling distributions. Point and interval estimation. Hypothesis-testing. Large and small sample inferences for means, proportions and variances. Introduction to queueing theory and regression. 4 lectures/problem-solving. Prerequisites: C or better in MAT 214 or consent of instructor. Not open to students required to take STA 330.

### STA 330 Applied Probability Theory (4) FW

Rules of probability, random variables, expected values of random variables, moment generating functions. Discrete and continuous probability distributions, including bivariate distributions, with applications. 4 lectures/problem-solving. Prerequisite: C or better in MAT 215. Not open to students with credit in STA 315 or ECE 315.

### STA 331 Applied Statistics (4) WSp

Central limit theorem, maximum likelihood estimation. Point and interval estimation and hypothesis-testing. Small and large sample inferences. Contingency table analysis and Chi-square tests. 4 lectures/problem-solving. Prerequisite: C or better in STA 330 or consent of instructor.

### STA 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### STA 430 Introduction to Random Processes (4) Sp (even years)

General types of stochastic processes. Random walks, Poisson processes, counting processes, Markov chains and topics from other areas, such as Markov jump processes, Birth-death processes, Gaussian processes. 4 lectures/problem-solving. Prerequisite: C or better in STA 326 or STA 330 or consent of instructor.

### STA 432 Applied Regression Analysis (4) F (odd years)

Matrix approach to regression models, least square estimation, correlation, multiple regression, transformation of variables, analysis of residuals, multicollinearity and auto-correlation. Use of computer packages for applied problems. 4 lectures/problem-solving. Prerequisites: C or better in STA 326 or STA 331 and MAT 208 or consent of instructor.

### STA 435 Analysis of Variance and Design of Experiments (4) F (even years)

ANOVA techniques, computer solutions, randomized groups and blocks designs, interactions, analysis of covariance. Latin square, split-plot, simple and confounded factorial designs; treatment of missing data, incomplete block designs. 4 lectures/problem-solving. Prerequisite: C or better in STA 326 or STA 331 or STA 441 or consent of instructor.

### STA 440 Mathematical Statistics I (4) W (even years)

Discrete and continuous probability distributions; moments, moment generating functions, special distributions, distributions of functions of

random variables. 4 lectures/problem-solving. Prerequisite: C or better in MAT 215, or consent of instructor.

#### **STA 441 Mathematical Statistics II (4) Sp (even years)**

Asymptotic distributions; central limit theorem; point and interval estimation; completeness and sufficient statistics; Neyman-Pearson theory of testing hypotheses. 4 lectures/problem-solving. Prerequisite: C or better in STA 440, or consent of instructor.

#### **STA 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Lecture/activity/laboratory or combination of these. Prerequisite: consent of instructor.

Graduate courses are listed in the "Graduate Studies" section of the catalog.



## PHYSICS

Steven W. McCauley, Chair

Antonio Aurilia  
Robert T. Bush  
Soumya Chakravarti  
Barry H. Dorfman  
Robert D. Eagleton  
John Fang  
John W. Jewett  
Kai-Shue Lam

Harvey S. Leff  
John Mallinckrodt  
Mary E. Mogge  
Roger L. Morehouse  
Barton Palatnick  
George W. Rainey  
Peter B. Siegel

The major in physics prepares students for careers as physicists with industry, government, university laboratories, and in teaching. Through suitably chosen electives, students may emphasize the interdisciplinary areas of biophysics, astrophysics, computational physics, health physics, geophysics, physical chemistry, engineering or mathematics.

Physics majors enjoy relatively small upper division classes spanning experimental and theoretical aspects of classical and modern physics. They each complete a senior project under faculty supervision. Additionally, they are encouraged to participate in other independent or group study/research activities sponsored by individual faculty.

Students majoring in physics have the opportunity to join the honorary society, Sigma Pi Sigma. Additional information concerning membership can be obtained from the Physics Department.

For those planning a career as a secondary school teacher, a single subject credential in Science is required. This credential is obtained by completing coursework in Education and passing the National Teacher Examination. The latter can be waived by taking the courses listed in the Waiver Program. See the Director of the Education and Equity in Mathematics, Science and Technology.

### CORE COURSES FOR MAJOR

(Required of all students) A minimum 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Laboratory	PHY	151L	(1)
General Physics Laboratory	PHY	152L	(1)
General Physics Laboratory	PHY	153L	(1)
General Physics	PHY	234	(3)
Elementary Modern Physics	PHY	235	(3)
General Physics Laboratory	PHY	254L	(1)
Elementary Modern Physics Laboratory	PHY	255L	(1)
Fundamentals of Mathematical Physics	PHY	308	(4)
Fundamentals of Mathematical Physics	PHY	309	(4)
Physics of Electric and Magnetic Phenomena	PHY	314	(4)
Physics of Electric and Magnetic Phenomena	PHY	315	(4)
Mechanics	PHY	321	(4)
Mechanics	PHY	322	(4)
Thermal Physics	PHY	333	(4)
Quantum Mechanics	PHY	401	(4)
Quantum Mechanics	PHY	402	(4)
Optics	PHY	417	(3)
Optics Laboratory	PHY	418L	(1)
Advanced Physics Laboratory	PHY	430L	(1)
Solid State Physics Laboratory	PHY	431L	(1)
Nuclear Physics Laboratory	PHY	432L	(1)

Senior Project	PHY	461	(2)
Senior Project	PHY	462	(2)
Undergraduate Seminar	PHY	463	(2)

### SUPPORT AND ELECTIVE COURSES

(Required of all students)

General Chemistry	CHM	122/122L	(4)
General Chemistry	CHM	123/123L	(4)
Pascal	CS	120	(4)
or FORTRAN	CS	125	(4)
Analytic Geometry and Calculus II	MAT	115	(4)
Analytic Geometry and Calculus III	MAT	116	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
Advanced Electives			(12)
(To be chosen from upper division courses in Physics or related fields in consultation with advisor; at least 4 units of these must be in Physics.)			

Unrestricted Electives (15)

### GENERAL EDUCATION COURSES

#### Area 1:

A. Freshman English I	ENG	104	(4)
B. Select one course from this area.			(4)
C. Select one course from this area.			(4)

#### Area 2:

A. Analytic Geometry and Calculus	MAT	114	(4)
B. General Chemistry	CHM	121/121L	(4)
C. Life Science	BIO	110	(3)
and Life Science Laboratory	BIO	111L	(1)
or Basic Biology	BIO	115/115L	(5)
D. Select one course in consultation with advisor.			(4)

#### Area 3:

A. Select one course from this area.			(4)
B. Select one course from this area.			(4)
C. Select one course from this area.			(4)
D. Select one course from this area.			(4)
E. Select one course from this area.			(4)
F. Select one course from this area.			(4)
G. Select one course from this area.			(4)

#### Area 4:

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

#### Area 5:

Select 8 units from the approved list. Recommended courses: HST 421, CHM 306 and MAT 306.

### PHYSICS MINOR

College Physics	PHY	121/141L	(4)
and College Physics	PHY	122/142L	(4)
and College Physics	PHY	123/143L	(4)
or			
General Physics	PHY	131/151L	(4)
and General Physics	PHY	132/152L	(4)
and General Physics	PHY	133/153L	(4)
and General Physics	PHY	234	(3)
and Elementary Modern Physics	PHY	235	(3)

A minimum of 30 units in physics, including the above, must be taken, of which at least 12 units must be chosen from upper division courses and no more than 12 units may be at the 100-level. (30)



**COURSE DESCRIPTIONS**

The quarters in which particular courses are offered are indicated by the F, W, Sp, Su notations. If a course is not given each year, then the year in which it will next be offered is also given.

**PHY 102 Fundamentals of Physics (4) FWSpSu**

Various theories of matter and energy and the principles and laws that describe their behavior and applications. Some special knowledge of modern science that will function in a socially desirable manner in the lives of students. 4 lectures. Prerequisite: A college math course. PHY 102 is not open to students who have credit for PHY 121 or 131. May be graded on CR/NC basis.

**PHY 104L Conceptual Physics Lab (1) F W Sp Su**

Introductory experiments in physics covering mechanics, thermodynamics, waves, sound, light, electricity, magnetism and modern physics. One three-hour laboratory period. Prerequisite: A college math course. No corequisites; may be taken concurrently with Phys 102. PHY 104L is not open to students who have credit for PHY 141L or 151L.

**PHY 105/105L Physics of Musical Sound (4) Sp**

The fundamentals of acoustics and its application to music—vibrations, wave, hearing, pure tones, complex tones, resonance, scales, consonance, and the physics of musical instruments. 3 lecture/problems, 1 three-hour laboratory.

**PHY 115 Physics Concepts: A Hands-on Approach (4) Sp**

Introduction to physics concepts covering waves, sound, and light. Hands on inquiry and laboratory activities appropriate for elementary school teachers are emphasized. Two three-hour periods integrating inquiry, discussion, lecture and laboratory activities. Prerequisite: A college math course. Phy 115 is not open to students who have credit for PHY 121 or 131 or SCI 210.

**PHY 121 College Physics (3) FWSpSu**

A study of vectors, motion, forces, gravity, work and energy, momentum, angular motion and mechanical properties of matter. 3 lectures/problem-solving. Not for students majoring in physics or engineering. Prerequisite: MAT 106 or equivalent. Corequisite: PHY 141L.

**PHY 122 College Physics (3) FWSpSu**

Heat, wave motion, sound, light and optical devices. 3 lectures/problem-solving. Prerequisite: PHY 121 and PHY 141L. Corequisite: PHY 142L.

**PHY 123 College Physics (3) FWSpSu**

Electricity and magnetism, DC and AC circuits, electronics, atomic and nuclear physics. 3 lectures/problem-solving. Prerequisite: PHY 122 and PHY 142L. Corequisite: PHY 143L.

**PHY 131 General Physics (3) FWSpSu**

Fundamental principles of mechanics, vectors, statics, uniform motion, accelerated motion, work and energy, rotational motion and fluid mechanics. 3 lectures/problem-solving. Prerequisites: MAT 114. Corequisite: MAT 115 and PHY 151L.

**PHY 132 General Physics (3) FWSpSu**

Fundamental principles of harmonic motion, waves, rotational dynamics, thermodynamics, kinetic theory and optics. 3 lecture/problems. Prerequisites: PHY 151L and C- or better in PHY 131. Corequisites: MAT 116 and PHY 152L.

**PHY 133 General Physics (3) FWSpSu**

Fundamental principles of electricity and magnetism. Coulomb's law, electric fields, potential, properties of dielectrics, capacitance, Ohm's law, magnetism and magnetic fields, measuring instruments, magnetic field of moving charges, induced emf, AC circuits. 3 lectures/problem-solving. Prerequisites: PHY 151L and C- or better in PHY 131. Corequisite: PHY 153L and MAT 116.

**PHY 141L, 142L, 143L College Physics Laboratory (1) (1) (1) FWSpSu**

Laboratory to accompany College Physics lecture series. Experiments in mechanics, hydrostatics, wave motion, thermodynamics, optics, electricity and magnetism, and atomic and nuclear physics. 1 three-hour laboratory. To be taken in sequence concurrently with PHY 121, 122, 123, respectively.

**PHY 151L, 152L, 153L General Physics Laboratory (1) (1) (1) FWSpSu**

Laboratory to accompany General Physics lecture series. Experiments in mechanics, hydrostatics, wave motion, thermodynamics, optics, and electricity and magnetism. 1 three-hour laboratory. To be taken concurrently with PHY 131, 132, 133, respectively.

**PHY 200 Special Problems for Lower Division Students (1-2) FWSpSu**

Individual or group investigation, research, study or survey of selected problems. Approval of problem must be obtained in the Physics Department office prior to enrollment. Total credit limited to 4 units with a maximum of 2 units per quarter.

**PHY 234 General Physics (3) W**

Electromagnetic oscillations, Maxwell's equations and electromagnetic waves, geometric optics, physical optics, special theory of relativity. 3 lectures/problem-solving. Prerequisite: PHY 132, 133. Corequisite for physics majors: PHY 254L.

**PHY 235 Elementary Modern Physics (3) Sp**

Origin of the quantum theory; Bohr theory; wave mechanics and atomic structure; introduction to nuclear physics. 3 lectures/problem-solving. Prerequisite: PHY 234. Corequisite for physics majors: PHY 255L.

**PHY 254L General Physics Laboratory (1) W**

Experiments on optics and electromagnetism. 1 three-hour laboratory. Must be taken concurrently with PHY 234.

**PHY 255L Elementary Modern Physics Laboratory (1) Sp**

Experiments illustrative of modern physics. 1 three-hour laboratory. Must be taken concurrently with PHY 235.

**PHY 299, 299A, 299L Special Topics for Lower Division Students (1-4) FWSpSu**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: Consent of instructor.

**PHY 301 Energy and Society (4) Sp**

Study of how humans use energy, including solar, nuclear, and other sources, to generate electricity, power vehicles, manufacture products, and the like. Emphasis is on elementary physics principles. Coverage includes a historical overview of societal energy use, the study of how energy is stored and transferred, advantages and disadvantages of renewable and nonrenewable resources, how fuels can be conserved,



and how energy processes affect the environment. 4 lectures. Prerequisite: one college level physics lecture course.

### **PHY 302 Physics of Everyday Experience (4) W**

Investigation into the physics associated with experiences in everyday life. Areas of physics covered include energy, waves, electromagnetism and optics. Applications of principles to common phenomena - weather, sound, aurorae, rainbows, halos, glories and the like. Applications of the principles to relevant social issues - thermodynamics of global warming; propagation of earthquake waves and effects on building vibrations; principles involved in electromagnetic transportation, such as electric cars and magnetic levitation vehicles, optical principles associated with optical communication. 4 lectures. Prerequisite: one college level physics lecture course.

### **PHY303 The Universe in Ten Weeks (4)**

This course investigates answers to questions such as: What is the nature of the cosmos? How did the universe begin? What are the smallest constituents of the universe and what are their properties?, etc., through a historical-sociological-scientific overview of our present understanding of the universe. The emphasis is on the modern description of the beginning of the universe, its constitution, and its evolution, as discovered and interpreted by astronomers and chemists, mathematicians and physicists. 4 lectures. Prerequisite: Areas 2A, 2B, and 2C.

### **PHY 304, 304L Electronics for Scientists (3) (1) F**

For students majoring in biological sciences, chemistry, geology and other scientific areas, as well as for physics majors. Basic concepts of electrical circuits and solid state devices. Circuit analysis and operation of instruments commonly encountered in science laboratory. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: PHY 123 or 133.

### **PHY 305, 305L Computer Interfacing for Scientific Data Logging (3) (1) W (even years)**

The electronic technology needed to connect scientific equipment to digital computers, including field effect transistors as temporary storage elements, elementary digital logic, ADC circuits, DAC circuits and signal reconstruction compared to signal amplification. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: PHY 304.

### **PHY 306 History of Physics (4) F**

History of physics from Thales of Miletus to the present with special emphasis on 19th and 20th century developments. 4 lectures. Prerequisite: PHY 235 or CHM 301, or equivalent.

### **PHY 308 Fundamentals of Mathematical Physics (4) F**

Applications of mathematical tools to problems in the study of electromagnetism, mechanics and quantum mechanics. Linear algebra, coordinate systems, vector analysis, ordinary differential equations, Fourier series. 4 lectures/problem-solving. Prerequisites: PHY 235, MAT 215, 216.

### **PHY 309 Fundamentals of Mathematical Physics (4) W**

Continuation of PHY 308. Applications of gamma, beta and error functions; functions of a complex variable; partial differential equations and boundary value problems; series solutions of ordinary differential equations in physics problems. 4 lectures/problem-solving. Prerequisite: PHY 308.

### **PHY 310 Fundamentals of Mathematical Physics (4) Sp (even years)**

Continuation of PHY 308 and 309. Applications of calculus of variations, tensor analysis, integral transforms, probability and statistics to physics problems. 4 lectures/problem-solving. Prerequisite: PHY 309.

### **PHY 314, 315 Physics of Electric and Magnetic Phenomena (4) (4) WSp**

Electrostatics, magnetostatics, circuit theory, time-varying fields, Maxwell's equations and electromagnetic waves. 4 lectures/problem-solving. Courses to be taken in sequence. Prerequisite: PHY 308, PHY 309 (latter may be taken concurrently with PHY 314).

### **PHY 321, 322 Mechanics (4) (4) WSp**

Vector algebra, principles of Newtonian mechanics, conservative forces, harmonic motion, central-force motion, the two-body problem, center of mass coordinates, statics and dynamics of rigid bodies, accelerated coordinate systems, normal coordinates and Lagrange's equations. 4 lectures/problem-solving. Courses to be taken in sequence. Prerequisite: PHY 308, PHY 309 (latter may be taken concurrently with PHY 321).

### **PHY 333 Thermal Physics (4) F**

Fundamental principles of thermodynamics and kinetic theory of gases. 4 lectures/problem-solving. Prerequisite: PHY 132 and MAT 215, 216.

### **PHY 340 Energy and the Environment (4) Sp (even years)**

Alternative energy technologies with a critical evaluation of their potential for solving the energy crisis and their impact on the environment. Natural resources, energy storage and transport, pollution, radiation hazards, energy conservation efforts, and outlook. 4 lectures/problem-solving. Prerequisite: PHY 132 or PHY 122 and a calculus course.

### **PHY 344 Applied Optics (4) F**

Geometrical optics and wave optics with an emphasis on technological applications. 4 lectures/problem-solving. Prerequisite: PHY 122 or 132.

### **PHY 346 Solid State Physics for Engineers (4) F**

Survey of modern physics and solid state physics principles and engineering applications. Emphasis on electronic properties of semiconductors. Not open to students in the B.S. physics program (physics/engineering double majors and physics minors excepted). 4 lectures/problem-solving. Prerequisite: PHY 133.

### **PHY 400 Special Problems for Upper Division Students (1-2) FWSpSu**

Individual or group investigation, research, study or survey of selected problems. Approval of problem must be obtained in the Physics Department office prior to enrollment. Total credit limited to 4 units with a maximum of 2 units per quarter.

### **PHY 401, 402 Quantum Mechanics (4) (4) FW**

Introduction to quantum mechanics, including Schrodinger equation, hydrogen atom, degeneracy, perturbation theory, multi-electron atoms, matrix mechanics. 4 lectures/problem-solving. Prerequisites: PHY 235 or CHM 313, and PHY 309.

### **PHY 403 Advanced Quantum Mechanics (4) Sp**

Advanced topics in quantum mechanics, including approximation methods, time-dependent perturbation theory, relativistic theory and frontiers. 4 lectures/problem-solving. Prerequisite: PHY 402.

**PHY 404 Introduction to High Energy Physics (4) Sp (odd years)**

History and concepts of high energy and elementary particle physics; fundamental interactions; quantum numbers, invariance principles and conservation laws; SU(3) quark model and QCD; particle detectors and accelerators. 4 lectures. Prerequisites: PHY 401, 402.

**PHY 406 Solid State Physics (4) W**

Crystallography, crystal imperfections, diffusion. Metals, ionic crystals, covalent crystals, molecular crystals. Transport properties and specific heat of metals. Electronic states in solids, physical properties of semiconductors, theory of semiconductor devices. Behavior of dielectrics, magnetism and superconductors. 4 lectures/problem-solving. Prerequisite: PHY 235 and PHY 309.

**PHY 407 Statistical Physics (4) W (odd years)**

Study of the statistical behavior of physical systems composed of large numbers of similar particles. Derivation and application of the distribution functions for the cases of Maxwell-Boltzmann statistics. Bose-Einstein statistics and Fermi-Dirac statistics. 4 lectures/problem-solving. Prerequisite: PHY 235, 333 and MAT 215.

**PHY 409 Computational Physics (4) F**

Computational methods, which include numerical integration, the solution of differential and transcendental equations, and statistical analysis, are applied to problems in mechanics, electromagnetism, quantum mechanics and non-linear dynamics. 4 lectures/problem-solving. Prerequisites: PHY 235, 309 and CS 120 or 125.

**PHY 410 Biophysics (4) W (odd years)**

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. (See also BIO 410) 4 lectures/problem-solving. Prerequisite: PHY 123, or PHY 132 and 133.

**PHY 417 Optics (3) Sp**

Mirrors, lenses and optical instruments; interference, diffraction, polarization and elements of spectroscopy; lasers and holography. 3 lectures/problem-solving. Prerequisite: PHY 234. Corequisite for physics majors: PHY 418L.

**PHY 418L Optics Laboratory (1) Sp**

Laboratory to be taken concurrently with PHY 417. One 3-hour laboratory.

**PHY 420 Acoustics (4) Sp (odd years)**

The fundamentals of acoustical vibrations, baffle effects, resonance and filters, and transmission phenomena will be presented using differential equations and complex variables. 4 lectures/problem-solving. Prerequisites: PHY 132 and MAT 215, 216.

**PHY 422 Plasma Physics (4) F (even years)**

Fundamental concepts and ideas in the study of ionized gases, including orbit theory, the "two-fluid" equations, magnetohydrodynamics and the Vlasov theory. Plasma phenomena, such as waves, diffusion, equilibrium, stability and others. 4 lectures/problem-solving. Prerequisite: PHY 314.

**PHY 424 Astrophysics (4) F (odd years)**

Basic astrophysical data, stellar atmospheres and spectra, stellar structure and evolution, galactic structure and interstellar matter, galaxies and cosmology. 4 lectures/problem-solving. Prerequisite: PHY 235.

**PHY 425 Space Physics (4) W (even years)**

Planetary motions, gravitation, celestial mechanics, interplanetary space missions, techniques of space borne planetary observation, planetary physics. 4 lectures/problem-solving. Prerequisites: PHY 235, 321 (may be taken concurrently).

**PHY 426 Relativity, Gravity and Black Holes (4) Sp (even years)**

Review of special relativity, principle of equivalence, tensors, the metric tensor, general theory of relativity, cosmological models, gravitational waves, black holes, Hawking radiation, quantum gravity, connection with elementary particle theories. 4 lectures/problem-solving. Prerequisite: PHY 235, 315 (may be taken concurrently), 322 (may be taken concurrently).

**PHY 430L Advanced Physics Laboratory (1) W**

Topics in advanced experimental physics with emphasis on electromagnetism and mechanics. One 3-hour laboratory. Prerequisites: PHY 235, 255L, 315, 322. (PHY 430L, 431L and 432L may be taken in any order.)

**PHY 431L Solid State Physics Laboratory (1) W**

Topics in experimental solid state physics. One 3-hour laboratory. Prerequisites: PHY 235, 255L, 315, 322. (PHY 430L, 431L and 432L may be taken in any order.)

**PHY 432L Nuclear Physics Laboratory (1) F**

Topics in experimental nuclear physics. One 3-hour laboratory. Prerequisites: PHY 235, 255L, 315, 322. (PHY 430L, 431L, and 432L may be taken in any order.)

**PHY 441 Internship in Physics (2) FWSpSu**

Practical, on-the-job training and work experience in physics. Approval of Physics Department Chair required prior to enrollment. Course grade determined by internship coordinator and on-job supervisor. Total credit limited to 6 units.

**PHY 461, 462 Senior Project (2) (2) FWSpSu**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in a formal report. Approval of Physics department chair required prior to enrollment.

**PHY 463 Undergraduate Seminar (2) Sp**

Study of current developments in physics and discussion of periodicals of an appropriate level. 2 lecture discussions. Prerequisite: PHY 234.

**PHY 499/499A/499L Special Topics for Upper Division Students (1-4) FWSpSu**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory or a combination. Prerequisite: consent of instructor.

**PHY 550 Seminar in Physics (1-3)**

Special problems in selected areas of physics. Seminar, 1 to 3 hours. Maximum of 6 units may be earned.

## INSTITUTE FOR ADVANCED SYSTEMS STUDIES

One of the Minors offered in the College of Science is Comparative Systems Analysis. It is also offered as a Certificate Program through the Kellogg-West Continuing Education Program.

Len Troncale, Coordinator, Minor; Director, Institute

Fellows of the Institute:

Chuck Amelin (Math)	Jim Manley (Philosophy)
Bernard Banks (Math)	Frank Mathur (Math)
David Berry (Geology)	Walter Maya (Chemistry)
Soumya Chakravarti (Physics)	Steve McCauley (Physics)
Richard DeNouvellis (Educ.)	Ron Quinn (Biology)
Carlos Ford-Livene (Math)	Carl Rathman (Engineering)
Dhanwant Gill (Math)	Harold Schleifer (Library)
Larry Herber (Geology)	Len Troncale (Biology)
Chung Lee (Computer Sci.)	Mark vonWodtke (Land. Arch.)
John Lyle (Land. Arch.)	

With Associate Fellows: Mike Hamilton (Ecology); Albert Wilson (Astronomy & Math); and Donna Wilson (Psychology & Math)

The Institute offers interdisciplinary courses for general purposes as well as leading to the Minor and Certificate in Comparative Systems Analysis. The Minor is designed to complement a wide variety of major fields from the various schools in the University. The diverse specialties of Systems Analysis in Business, Management, Information Systems, Computer Systems, Environmental Design fields and Engineering constitute the fastest growing job category in the United States over the next decade according to government statistics. Students completing this Minor in conjunction with a major in their specialty fields will have developed skills in high demand for analyzing complex modern societal problems. Coursework in this Minor emphasizes the pure science aspects of systems; it focuses on what might be called the special theoretical knowledge of systems fundamental to the many practical applications mentioned above. Laboratory and field experiences in the Minor focus on application of transdisciplinary techniques and methodology and expose the student to ideas and faculty from a broad spectrum of specialties unified by general systems analytic approaches. The Minor and Certificate in Comparative Systems Analysis requires the completion of a minimum of 32 units. Admission to the Minor and Certificate Programs is required previous to enrollment in these courses. Interested students should contact Dr. Troncale.

### COURSE DESCRIPTIONS

NOTE: For all courses which have both a lecture component and a laboratory component (e.g. CSA 201/201A), both components are corequisites; that is, they must be taken concurrently. All the following are taught by interdisciplinary teams of Institute Fellows.

#### CSA 201/201A Humans and the Environment—Resources (2/2)

The dynamic relationship between people and the earth's resources: a transdisciplinary approach to theory with problem-oriented activities emphasizing general systems concepts for synthesis and comparison. Uses the case study approach for depth.

#### CSA 202/202A Humans and the Environment—Organization (2/2)

How political, economic and cultural organizations and human values impact people, the uses of technology and people's relationship with the

environment. A transdisciplinary approach to theory with problem-oriented activities emphasizing general systems concepts for synthesis and comparison. Uses the case study approach for depth.

#### CSA 300 History and Philosophy of Systems Science (4)

History and context of general systems theory from classical philosophy to the present; its tenets, strengths, weaknesses and relationship to conventional and design disciplines; the relevance of systems science to complex human problems. Survey of its literature, investigators, institutions and organizations. 4 lecture discussions.

#### CSA 305 General Morphology (4)

General principles of morphology and their application to various fields. Dimensionless morphology in mathematics and the natural sciences. Mathematical structures and concepts developed morphologically to illustrate the method. 4 lectures. Prerequisite: approval of instructor.

#### CSA 309 Comparative Science of Origins (4)

Cross-disciplinary survey of the mechanisms of origin of most levels of living and nonliving systems using synthetic concepts to integrate the scientific evidence. Emergence of sub-atomic particles to clusters of galaxies; from the origins of consciousness to civilization. Impact of scientific findings on centuries-old philosophical debates and human values. 4 lecture discussions.

#### CSA 310 Natural Systems Science: A Synthesis (4)

Strengths and limits of the scientific method and its differences between disciplines. Use of seven transdisciplinary processes to unify the learning, understanding and comparison of fundamental facts and theories in case studies of astronomy, physics, chemistry, biology, geology, computer science and mathematics and their impact on values. 4 lecture discussions.

#### CSA 340/340A Systems Law as an Active Force (2/2)

Law applied to optimizing and correcting systems; survey of legislation and case law dealing with environmental problems. Emphasis on the special difficulties in writing laws of a multidisciplinary nature. 2 lectures, 2 two-hour activities including internship.

#### CSA 350/350A Multimetrics (2/2)

Techniques and methods of measurement systems; comparative uses of metrics; design and application of metrics to human and environmental problems. Emphasis on exploration of the application of metric principles to the evaluation of qualitative differences. 3 lectures, 1 two-hour activity. Prerequisite: Any statistics course.

#### CSA 411/411A General Systems Theory: Hierarchies (3/1)

Introduction to hypotheses of natural systems evaluation and optimization. Origins of hierarchical structure underlying established sciences on the astronomical, physical, chemical, biological, social and artificial levels. 3 lectures, 1 two-hour activity. Prerequisite: For students selecting mathematical approach BIO 115/115L, for others only BIO 110/111L.

#### CSA 412/412L General Systems Theory: Testing Hypotheses (3/1)

Identification of trends observable in level-to-level evolution of natural hierarchies; emphasizes rigorous testing of the validity of the general systems field axioms abstracted from these trends. 3 lectures, 1 two-hour activity. Prerequisite: CSA 411/411A.

**CSA 413/413A General Systems Theory: Man-Made Systems (3/1)**

Applications of systems field axioms to the study of man-made systems malfunctions. Use of axioms to engineer optimal societal systems. 3 lectures, 1 two-hour activity. Prerequisite: CSA 412/412A.

**CSA 440 General Systems Modeling and Simulation (4)**

Using isomorphies and systems-level computer simulation tools in modeling complex dynamical systems and their problems. Survey, comparison and training in use of STELLA, EXTEND, CAST and GENSY with testing of their use of systems concepts. Evaluating global system models and their effects on decision makers. 4 lecture discussions. Prerequisite: CSA 303 or 304.

**CSA 450 Introduction to Systems Theory (4)**

Evolution of systems approach to problem solving; comparative overview of systems methodology. Case studies illustrating successful versus unsuccessful applications of the systems approach to governmental, biological, social, economic and technological problems. 4 lectures. Prerequisite: STA 236.

**CSA 451/451L Techniques of Systems Analysis (3/1)**

Modeling of complex systems; analog and digital simulation; critical path methods; optimization methods; case studies illustrating applications of systems analysis techniques and design of new techniques. 3 lectures, 1 three-hour laboratory. Prerequisite: CSA 450.

**CSA 470 Applied Ecosystems Engineering (4)**

History, potential and critical analysis of applications of natural systems concepts to environmental systems engineering. Linked systems isomorphies, allometry, modeling and techniques applied to systems taxonomies of current large-scale environmental, energy and societal problems. 4 lecture discussions. Prerequisites: BIO 325/325L; CSA 413/413A.

**CSA 490 Seminar in Comparative Systems Analysis (1-4)**

Special problems in selected areas of comparative systems analysis. Each seminar will have a subtitle describing its nature and content. Seminar, 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: consent of instructor.





# CENTER FOR REGENERATIVE STUDIES

Linda Sanders, Dean

David Adams, Philosophy  
Ed Bassett, Management and Human Resources  
Brooks Cavin, Architecture  
Ed Cogger, Animal & Veterinary Science  
Dorothy Wills, Geography & Anthropology  
Jerry Mitchell, Urban and Regional Planning  
Ronald D. Quinn, Biological Sciences  
Joan Safford, Landscape Architecture

The major purposes of the Center for Regenerative Studies (CRS) are to develop and teach the interdisciplinary ways of thinking and acting needed to lead society into a sustainable future. As citizens of a changing, environmentally-interdependent planet, today's students face new social and technological challenges. Environmental and economic pressures are bringing increased demands for professionals knowledgeable in the means for reducing consumption and environmental impacts. The Center for Regenerative Studies addresses these needs by providing a university-based setting for education, demonstration and research in regenerative practices and technologies. These are based in processes that are inherently self-renewing and therefore conserving of energy and materials. Matters of particular concern are means for conserving and generating energy, providing shelter, managing water, producing food and limiting waste.

In the polytechnic tradition, students learn by doing in the Center's courses, which are conducted on the site. The curriculum emphasizes exploration and complex problem-solving in the application and development of regenerative means and study of their far-reaching social, ethical and economic implications. Courses and research programs include faculty members and students from a range of disciplines and professions.

At the core of the Center's programs is a community where 20 students reside and apply regenerative principles and practices in their daily activities. Among their activities are regulating the thermal environment of solar heated and cooled buildings, operating solar electrical generators, growing food, and recycling water and other waste materials. The facility includes offices, classrooms, research areas, and housing for 20 people.

The Center offers courses for all Cal Poly Pomona students. A sequence of upper division General Education courses provides a basic introduction to regenerative studies for students from a wide range of majors. A minor in Regenerative Studies, requires 30 units of course work.

Regenerative Studies programs do not have the distinct boundaries of traditional disciplines and professions. The Center is a hub of activity linking a diverse range of fields of knowledge and expertise, focusing them on issues of ecological sustainability. The faculty is interdisciplinary, with present faculty representing all the colleges and schools at Cal Poly Pomona. Faculty members from at least two disciplines team-teach classes.

## COURSES IN MINOR

The Minor in Regenerative Studies requires a total of 30 units. In consultation with the program advisor, each student will select from the following courses a total of at least 30 units:

Introduction to Regenerative Studies . . . . .	RS	111	(4)
Life Support Processes . . . . .	RS	301	(4)
Global Regenerative Systems . . . . .	RS	302/302L	(3/1)
Shaping A Sustainable Future . . . . .	RS	303/303L	(2/2)

Regenerative Principles and Processes . . . . .	RS	311/311L	(3/2)
Regenerative Practices and Technologies . . . . .	RS	312/312L	(3/2)
Regenerative Practices and Technologies . . . . .	RS	313/313L	(3/2)
Organization for Regenerative Practices . . . . .	RS	421/421L	(3/2)
Invention, Development and Implementation . . . . .			
of Regenerative Systems . . . . .	RS	422/422L	(3/2)
Invention, Development and Implementation . . . . .			
of Regenerative Systems . . . . .	RS	423/423L	(3/2)
Directed Study in Regenerative Practices . . . . .	RS	400	(2-4)
Special Topics in Regenerative Studies . . . . .	RS	499	(1-4)

## COURSE DESCRIPTIONS

### RS 111 Introduction to Regenerative Studies (4)

A survey of the global physical, biological, and social systems used to provide for basic human needs, including food, water, shelter, energy and waste management. Emphasis will be on systems that will sustain humans into the long term future without resource depletion or permanent environmental damage. 2 two-hour lecture discussions.

### RS 301 Life Support Processes (4)

Understanding the complex physical and biological systems which provide resources to meet basic human needs. Such systems provide food, water, energy, shelter, and manage wastes. 4 lecture discussions. Prerequisites: junior standing, ENG 104, ENG 105, BIO 110 or permission of instructor(s).

### RS 302/302L Global Regenerative Systems (3/1)

Study of the institutional factors affecting implementation of the regenerative practices needed to meet the challenges of limited resources. Investigations of the global effects of human activities in the pursuit of food, water, energy, shelter and waste sinks. 3 lecture/discussions, 1 three-hour laboratory. Prerequisite: RS 301 or permission of instructor(s). Concurrent enrollment in RS 302/302L required.

### RS 303/303L Shaping a Sustainable Future (2/2)

How to use interdisciplinary problem-solving processes for improving situations in the environment, and in natural resource management, and meeting basic human needs. 2 lecture discussions, 2 three-hour laboratories. Prerequisites: RS 301, 302 or permission of instructor(s). Concurrent enrollment in RS 303/303L required.

### RS 311/311L Regenerative Principles and Processes (3/2)

Introduction to regenerative principles and practices to support daily life: providing food, energy, shelter and water and managing wastes. Concepts of recycling and self-renewal applied to the human environment and their ethical and social implications. Practical application of regenerative practices within the residential setting. 1 three-hour lecture/problem-solving, 2 three-hour laboratories. Prerequisites: junior standing and fulfillment of General Education Track B Area 2a, 2b, and 2c requirements.

### RS 312/312L, 313/313L Regenerative Practices and Technologies (3/2), (3/2)

Learning through experience the tasks involved in applying regenerative practices and technologies: produce and prepare food and manage energy, water, wastes and shelter. Exploration and discussion of scientific and social concepts underlying these activities. 1 three-hour lecture/problem-solving, 2 three-hour laboratories. Prerequisite: RS 311 or RS 303 and instructor's permission.

**RS 421/421L Organization for Regenerative Practices (3/2)**

Development of leadership skills related to the organization and direction of group regenerative practices. These include food production planning, waste and water management, energy systems development and shelter operations: 1 three-hour lecture/problem-solving, 2 three-hour laboratories. Prerequisite: RS 313 or instructor's permission.

**RS 422, 422L, 423, 423L Invention, Development and Implementation of Regenerative Systems (3/2), (3/2)**

Application of creative and systematic thinking to conception and development of life support technologies. Testing and monitoring of innovative practices and presentation and dissemination of results. Economics, social and political institutions and their roles in implementation. 1 three-hour lecture/problem-solving, 2 three-hour laboratories.

**RS 400 Directed Study in Regenerative Practices (2-4)**

Individual study by the student on a subject agreed upon by student and advisor. Prerequisites: RS 111, 301 and 302 or RS 311.

**RS 499 Special Topics in Regenerative Studies (1-4)**

Explorations of topics of current interest related to regenerative practices or technologies or their roles in society. May include lectures, seminars and/or laboratories on a schedule to be determined by the instructor. Prerequisites: RS 111 and 301 or RS 311 or permission of instructor.









## GRADUATE STUDIES

This section of the catalog provides information to prospective, continuing graduate, and postbaccalaureate students. Included in this section is information regarding admission criteria, graduate and postbaccalaureate academic requirements, and the programs leading to master's degrees offered by the academic colleges and the School of Education and Integrative Studies. It includes descriptions of all graduate-level courses offered by the university in those departments and colleges with master's degree programs.

### MASTER'S DEGREES AND CREDENTIALS OFFERED BY THE UNIVERSITY

All graduate study in the university is under the general direction of the Associate Vice President for Academic Programs. The advanced programs are the product of the facilities of the academic colleges and the School of Education and Integrative Studies. The graduate and postbaccalaureate programs offered at the university are as follows:

#### MASTER'S DEGREE PROGRAMS

Master of Science in Agriculture  
 Agricultural Science  
 Animal Science  
 Nutrition and Food Science  
 Plant Science  
 Sports Nutrition  
 Master of Architecture  
 Master of Science in Biological Sciences  
 Master of Business Administration  
 Master of Science in Business Administration  
 Information Systems Auditing  
 Entrepreneurship  
 Master of Science in Chemistry  
 Master of Science in Computer Science  
 Master of Science in Economics  
 Master of Arts in Education  
 Master of Science in Electrical Engineering  
 Master of Science in Engineering  
 Master of Arts in English  
 Rhetoric/Composition  
 Literature  
 Teaching English as a Second Language  
 Master of Landscape Architecture  
 Master of Science in Mathematics  
 Master of Science in Kinesiology  
 Master of Science in Kinesiology/Agriculture  
 Sports Nutrition  
 Master of Science in Psychology  
 Master of Urban and Regional Planning

### SCHOOL OF EDUCATION AND INTEGRATIVE STUDIES

#### Credentials and Certificates

##### Multiple Subjects

- Multiple Subjects with a Cross-cultural, Language and Academic Development (CLAD) Emphasis
- Multiple Subjects with a Bilingual (Spanish) Cross-cultural, Language and Academic Development (BCLAD) Emphasis

##### Single Subject:

Agricultural Education  
 Art

Business Education  
 English  
 Home Economics  
 Science  
 Mathematics  
 Music  
 Physical Education  
 Social Sciences

- Single Subject with a Cross-cultural, Language and Academic Development (CLAD) Emphasis
- Single Subject with a Bilingual (Spanish) Cross-cultural, Language and Academic Development (BCLAD) Emphasis
- Special Education—Learning Handicapped (LH)
- Special Education—Severely Handicapped (SH)
- Resource Specialist Certificate
- Agricultural Specialist
- Adapted Physical Education Specialist
- CLAD Certificate
- Designated Subjects Adult Education Teaching Credential
- Computers in Education Certificate
- Educational Multimedia Certificate

### THE GRADUATE COUNCIL

The Graduate Council consists of a representative of the faculty from each of the academic colleges and the School of Education and ex-officio members from appropriate areas of the university. The Council is advisory to the Associate Vice President for Academic Programs in matters dealing with curriculum, graduate student affairs, graduate studies policy, and other areas related to the university's graduate and postbaccalaureate programs.

College of Agriculture . . . . .Melinda Burrill  
 College of Letters, Arts, and Social Sciences . . . . .Don Kraemer  
 College of Business Administration . . . . .Eric McLaughlin  
 College of Engineering . . . . .Elhami T. Ibrahim  
 College of Environmental Design . . . . .Joan Safford  
 College of Science . . . . .H. Norton Riley  
 School of Education and Integrative Studies . . . . .Jane S. McGraw  
 Associated Students . . . . .  
 University Library . . . . .Erik Ennerberg  
 Office of Academic Programs  
 Patricia M. Hopkins, Acting Chair, Graduate Council  
 \_\_\_\_\_, Graduate Studies Analyst

### GRADUATE AND POSTBACCALAUREATE ADMISSIONS

#### GRADUATE AND POSTBACCALAUREATE APPLICATION PROCEDURES

All graduate and postbaccalaureate applicants (e.g., master's degree applicants, those seeking credentials, and those interested in taking graduate level courses for personal or professional growth) must file a complete graduate application as described in the graduate and postbaccalaureate admission booklet. Applicants who complete undergraduate degree requirements and graduate the preceding term are also required to complete and submit an application and the \$55 nonrefundable application fee. Since applicants for postbaccalaureate programs may be limited to the choice of a single campus on each application, redirection to alternative campuses or later changes of campus choice will be minimal. To be assured of initial consideration by more than one campus, it will be necessary for an applicant to submit separate applications (including fees) to each. Applications may be obtained from the Graduate Studies Office of any California State University campus in addition to the sources noted for undergraduate applicants.

**POSTBACCALAUREATE STANDING**

For admission to postbaccalaureate standing, a student must:

- (a) hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association or have completed equivalent academic preparation as determined by an appropriate campus authority;
- (b) have attained a grade point average of at least 2.5 (4.0 A) in the last 90 quarter units (60 semester units) attempted; and
- (c) have been in good standing at the last college attended.

All applicants seeking admission to postbaccalaureate study at this university must apply and be accepted in one of the following categories:

**SECOND BACHELOR'S DEGREE**

Admission to seek an additional bachelor's degree for holders of such degrees is processed by the Admissions Office in the same way as other undergraduate admissions. The cumulative grade point average of 2.0 (C) or above must be maintained.

**GRADUATE STANDING. NON-CREDENTIAL. UNDECLARED**

Students who are eligible for admission to a California State University campus in undeclared, non-certificate/credential graduate standing must state in their application that they do have graduate intentions in either a master's degree program or a credential program, though they have not entered such yet. A cumulative grade point average of 3.0 (B) must be maintained in upper-division and graduate courses. Admission to this status does not constitute admission to a graduate degree curriculum. A maximum of 13 units, 300 level or above, can be taken while in this classification.

**GRADUATE STANDING. CREDENTIAL-CERTIFICATE. CONDITIONAL/UNCONDITIONAL**

Students who are eligible for admission to a California State University campus in undeclared graduate standing may be admitted to a particular postbaccalaureate credential or certificate program, provided that such professional, personal, scholastic and other standards, including qualifying examinations, as may be required for the particular program, are satisfied. Until the application for classification is approved by the appropriate campus authority, the student's standing will be as a conditional certificate/credential student. A student who has been accepted in a certificate/credential program while an undergraduate at this university must apply for admission as a graduate student upon his/her attainment of an undergraduate degree with an overall GPA of 2.75. A cumulative grade point average of at least 3.0 (B) must be maintained in upper-division and graduate courses.

**MASTER'S DEGREE CANDIDATES  
CONDITIONAL STATUS**

Students eligible for admission to a California State University campus in the undeclared, non-certificate/credential graduate status above, but who have deficiencies in prerequisite preparation that, in the opinion of the appropriate campus authority, can be remedied by specified additional preparation, including qualifying examinations, may be admitted to an authorized graduate degree curriculum with conditional master's degree standing. A cumulative grade point average of at least 3.0 (B) must be maintained in upper-division and graduate courses. Students in this status must complete deficiencies and file a change of major form to obtain unconditional status. Graduation Writing Test requirements may or may not be satisfied.

**MASTER'S DEGREE CANDIDATES  
UNCONDITIONAL STATUS**

Students eligible for admission to a California State University campus in the undeclared or conditional master's degree standing may be admitted to an authorized master's degree curriculum of the campus as unconditional master's students if they satisfactorily meet the professional, personal, scholastic, or other standards for admission to the master's degree curriculum, including qualifying examinations required by appropriate campus authority. Only those applicants who show promise of success and fitness will be admitted to the master's degree curricula. Only those who continue to demonstrate a satisfactory level of scholastic competence with a 3.0 (B) grade point average or better shall be eligible to proceed in such curricula. Graduation Writing Test requirements may or may not be satisfied.

**LIMITATIONS ON ADMISSIONS**

The admission of postbaccalaureate students lacking degree or credential objectives may be limited or suspended because of limitations in facilities or staff. Master's degree or credential programs may be limited in enrollment whenever the lack of facilities and/or staff warrants.

**RE-ENROLLMENT OF CONTINUING POSTBACCALAUREATE STUDENTS**

Whenever graduate students complete a degree objective and wish to continue taking course work at this university, they must complete a graduate application and pay the admissions fee.

**REAPPLICATION AFTER FAILURE TO ENROLL**

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

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

**FORMER STUDENTS**

Former students returning to the university after an absence of more than two consecutive quarters in a calendar year must file a complete application for admission and pay the application fee. Former students absent for five or more years should request official transcripts from all institutions to be sent to the Admissions Office.

**ADMISSION FROM NON-ACCREDITED SCHOOLS**

Applicants who are graduates of nonaccredited schools but show evidence of unusual promise and superior background may petition the department concerned for conditional graduate student status and if the petition is granted may proceed in the graduate program.

**FOREIGN APPLICANTS**

Applicants from foreign countries should contact the Office of Admissions at least one year in advance of the quarter in which they seek admission so that they can supply all required materials.

**TESTS AND EXAMINATIONS****TOEFL**

Students whose native language is not English must request official results of the Test of English as a Foreign Language (TOEFL) to be mailed directly to the Admissions Office prior to admission. The TOEFL score



**Required Admission Tests**

Program	GRE (General)	GRE (Subject)	GMAT	Program	GRE (General)	GRE (Subject)	GMAT
M.S. in Agriculture	X			Master of Engineering	X <sup>3</sup>	X <sup>3</sup>	
Master of Architecture				Master of Electrical Engineering	X <sup>3</sup>	X <sup>3</sup>	
M.S. in Biological Science		X		M.A. in English			
Master of Business Administration			X	Master in Landscape Architecture			
M.S. in Business Administration				M.S. in Mathematics			
M.S. in Chemistry		X		M.S. in Kinesiology			
M.S. in Computer Science		X <sup>2</sup>		M.S. in Psychology	X	X	
M.S. in Economics				Master of Urban and	X <sup>4</sup>		
M.A. in Education	X			Regional Planning			

<sup>1</sup> GRE only required for Nutrition and Food Science Option; Sports Nutrition Option. \*\*\*\*\*SPACING\*\*\*\*\*

<sup>2</sup> Fifty percentile or better required.

<sup>3</sup> Under 3.0 undergraduate GPA in upper division courses in math, science and engineering; or undergraduate degree from a non-ABET accredited curriculum

<sup>4</sup> Under 3.0 undergraduate GPA.

requirement varies by department. A minimum of 550 is acceptable in certain programs. The essay portion is mandatory in certain programs. Foreign nationals who are not graduates of the university will be accepted as graduate students only if they hold a baccalaureate degree from an accredited institution in the United States or Canada or have comparable academic credentials from a foreign country. The admission of foreign students to graduate status may be limited or suspended because of facility or staff limitations.

### GRE and GMAT Test Requirements

Some departments require new graduate students enrolling at this university with a degree objective to take the General and/or Subject Test of the Graduate Record Examination (GRE) before admission.

The Graduate Management Admission Test (GMAT) is required for those who seek the Master of Business Administration degree or the degree of Master of Science in Business Administration. Some departments also require the Subject Test of the Graduate Record Examination in their subject matter areas. Other departments require a locally developed qualification examination. Admission generally will depend upon test scores. See the respective departmental sections of this catalog and the preceding chart that contains required admission tests.

### Graduation Writing Test (GWT) Requirement

All students subject to degree requirements listed in the 1977-78 and subsequent general catalogs must demonstrate competency in writing skills as a requirement for graduation. Based on action taken by the Academic Senate in 1978, writing competence at Cal Poly Pomona is assessed by means of a written test. All persons who receive undergraduate, graduate, or external degrees from Cal Poly Pomona must pass the Graduation Writing Test (GWT).

A mandatory GWT registration policy requires graduate students to take the test by the quarter following the completion of 8 units. If the GWT is not taken by this time, a hold will be placed on a student's registration materials. While a student's records are on hold, registration may not be allowed, nor will transcripts of credits be released.

Important information about specific exemptions from the test is contained in the GWT Study Guide and Information Bulletin, which is available to all students.

Since the GWT requirements are subject to modifications subsequent to the publication of this catalog, students are advised to check for up-to-date information on these requirements at the Test Center (CLA

Building, Room P2-4).

Students who have passed the GWT in undergraduate status at Cal Poly Pomona will not be required to take the test again when they change to graduate student status.

Students who did not pass the GWT in undergraduate status and had the test waived (either for continuous enrollment or by special consideration) in order to receive their bachelor's degrees will be required to take AND pass the GWT before Advancement to Candidacy and a graduate degree may be awarded. The GWT cannot be waived for a second time. The waiver in undergraduate status applies only for the baccalaureate degree.

## GRADUATE AND POSTBACCALAUREATE SCHOLASTIC REQUIREMENTS

### Graduate Studies Program

#### STANDARDS OF GRADUATE STUDY

Graduate study deals with more complex ideas and demands more sophisticated techniques, searching analysis, creative thinking, and time than undergraduate study. The research required is extensive in both primary and secondary sources and a high quality of writing is expected.

A student seeking a graduate degree enjoys certain privileges not available to other students and is obligated to follow some procedures not required of those pursuing other objectives. Careful and prompt attention to required procedures should be followed in pursuing a master's degree program to prevent unnecessary confusion and delay. Although advisory services are provided to assist students, students alone are responsible for following the procedures and completing the steps required in a program. Failure of an advisor to remind a student of a requirement or deadline date is not acceptable as a basis for waiver of the requirement. Requirements for advanced degrees, both procedural and substantive, may be waived only upon a written request of the student and/or committee concerned and approved by the director of Academic Programs, and by the academic college dean, if required by college policy. Petition forms are available in department offices and in the office of the Graduate Studies analyst.

Students who wish to enroll in postgraduate courses before their transcripts or test scores have been transmitted to the department concerned may receive unofficial advisement by making an appointment with a graduate advisor at the appropriate department or school office. If the students bring their own copies of transcripts with them to the conference, the advisor can make specific suggestions, but the advisor can make no formal decisions on the basis of hand-carried transcripts.

## REQUIREMENTS FOR MASTER'S DEGREES

Graduate programs are based upon adequate preparation at the undergraduate level. Students who plan to become candidates for a master's degree must hold a bachelor's degree substantially equivalent to that of California State Polytechnic University, Pomona in the discipline in which they intend to do their advanced work, or they must be prepared to undertake additional work to make up any deficiency.

Students seeking a master's degree at this university will submit an acceptable thesis, or project, or successfully pass a comprehensive examination after advancement to candidacy. See "Advancement To Candidacy" section in this catalog.

## GENERAL REQUIREMENTS

The requirements for graduation depend upon the master's degree program undertaken and upon the major field. The following requirements apply to all master's degrees offered by the university

1. The program for the one-year master's degree must consist of not fewer than 45 units in courses numbered 300 (400 for Engineering and Business Administration) and above, with a minimum of 24 units of 500- and 600-level courses completed at the university consistent with departmental requirements. Work unacceptable for graduate credit in the institution where it was taken is not acceptable for graduate credit at this university. 300-level coursework may only be used with permission of the department.
2. A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
3. For lower division course work (100-200 level at this university), no graduate credit will be given.
4. All 600-699 courses are open only to graduate students classified as unconditional.
5. At least 32 units of upper-division and graduate-level offerings must be completed in residence at this university.
6. Two-year master's degrees have higher unit requirements than specified above. See detailed information in the appropriate sections of this catalog.
7. A minimum of 3.0 (B) average must be earned in all graduate work taken at this university while in postbaccalaureate standing and in degree programs. No course with a grade lower than "C" (2.0) may apply toward the fulfillment of degree requirements. Once a graduate study contract has been established, courses may be moved to or from the contract by means of a properly approved graduate petition, except for the purpose of improving GPA. Contract courses with a grade of "F" must be repeated with a passing grade.
8. A course may not be used for credit toward both a baccalaureate and a master's degree.
9. A graduation check must be received the quarter before graduation.
10. A thesis, a project, or a comprehensive examination is required in all programs.
11. A favorable vote of the department, school, or center faculty is required before the degree may be conferred.
12. A graduate student who expects to receive a degree at the end of any quarter must complete an application for graduation in the Evaluations Office prior to the deadline listed in the academic calendar. The student must be enrolled in the university the quarter he/she graduates. Degree requirements are outlined in departmental sections of this catalog. Students seeking a master's degree will be

held responsible for meeting requirements applicable to the program of their choice and for fulfilling general master's degree requirements.

13. The Graduation Writing Test requirement must be fulfilled before Advancement to Candidacy.

## DEGREE PROGRAM

At the time students are admitted to a master's degree curriculum, they should arrange with the advisor to prepare an official program. If they are admitted as unconditional graduate students, they should accomplish this step as soon as possible. A program must be prepared and submitted for approval no later than the end of the second quarter of attendance.

Any contracts filed beyond that date will not be accepted without justification by the graduate coordinator. If the contract is accepted, units taken beyond the 13-unit requirement may possibly not be included on the contract.

Students who do not file graduate contracts prior to the completion of the 13-unit requirement may have a hold placed on their fee bill and may face administrative disenrollment from the program if they are not able to show cause for non-compliance with the contract regulation.

When the program has been approved by the Graduate Studies analyst, a copy is sent to the student and to the advisor who has approved it. The original is retained by the Graduate Studies analyst. A copy is sent to the Evaluations Office and is used as the official record of the student's progress toward the degree.

The program must meet the following specifications:

1. It must comply with the general requirements outlined above and with departmental requirements listed in this catalog.
2. The complete program may be chosen from within the offerings of the major department or it may include offerings drawn from other fields acceptable to the major advisor or committee. In developing the program, the student and advisor will seek to plan a meaningful pattern of courses focused upon the objectives of the major and the student. If the student has deficiencies or lacks prerequisites to enroll in certain courses necessary to a program, he/she will be expected to complete them in addition to the minimum requirements of the approved master's degree program. Advisors will permit the use of already completed courses in a master's degree program only if they clearly fit into the requirements of the student's curriculum.
3. No course in teaching methods or directed teaching may be included in a master's degree program.
4. No more than 9 quarter units of credit for thesis or project may be included.
5. The master's degree program must be approved by the student's departmental advisor and verified by the Graduate Studies analyst. The approved program is an official agreement between the institution and the student.
6. Graduate students may not file for "Credit by Examination."
7. Work experience is not acceptable as fulfillment of any requirement

## ELECTION OF REQUIREMENTS

Graduate students remaining in continuous attendance may elect to meet the degree requirements in effect either (1) at the time they take their first course as a conditional or unconditional student in that degree program or (2) at the time they graduate. Substitutions for discontinued courses may be authorized or required by the department offering the degree.

## GRADUATE ENROLLMENT PRIORITIES

Departments with high graduate enrollments may assign priorities to students wishing to enroll in graduate-level courses. Applicants for a master's degree who are in the last quarter of residence have first priority; other unconditional graduate degree or credential students have second priority; conditional and undeclared graduate have third priority. Undeclared postbaccalaureate students are admitted on a space-available basis.

## MAXIMUM UNIT LOAD

The normal maximum load for graduate students is 16 units (Architecture allows 18 units). Exceptions may be made by the advisor. A student must petition for permission to carry over 16 units in one quarter. Maximum program limits will be waived only upon presentation of evidence of the student's ability to complete successfully such a group of courses. Graduate and postbaccalaureate students are considered as full-time for most purposes, such as veteran's benefits, when they are enrolled for 8 units.

## ADVANCEMENT TO CANDIDACY

Some type of culminating experience is required for each master's degree. Acceptable culminating experiences include thesis, project or comprehensive examination. Individual departments permit the experience in one or more forms.

It is only upon the removal of all conditionals, having an approved contract on file, being in good academic standing (at least 3.0 GPA), completing all preparatory courses, and receiving a pass/waive on the GWT that the graduate student will be advanced to candidacy for his/her culminating experience for the master's degree.

## THESIS OR PROJECT

If a thesis or project is included in the degree program, the candidate may register for 695 (project) or 696 (thesis) only with approval of the major professor. Before registration for thesis, the candidate shall confer with the thesis advisor and have selected a thesis committee and a tentative subject. Each candidate registering for thesis or project is required to register each succeeding regular quarter until the work is complete in order to receive university services. However, total registration shall not exceed the number of units of thesis or project in the approved degree program. The candidate who has enrolled for the maximum number of units of thesis or project prior to completing the work, should register for 699 (Master's Degree Continuation) to avoid break in residence. During any break in residence, either non-enrollment or leave of absence, a candidate may not use university facilities or receive faculty assistance. When a candidate has failed to maintain resident status through non-enrollment or leave of absence after commencing a thesis or project, readmission to the program will require departmental approval. Since passing the final oral exam is a part of the completion of thesis in several disciplines, the graduate candidate must be enrolled the quarter the oral is taken.

A thesis or project in the official master's degree program will carry not fewer than 2 nor more than 9 units of credit depending upon departmental policy. When the thesis has been completed, the committee has signed the approval page, and there has been library clearance of the thesis, the credit for course 696 will be submitted by the professor to be recorded on the official transcript. Deadline dates for submission of the thesis to the Graduate Office can be found in the academic calendar and verified with the Graduate Coordinator. Projects (695) must be completed on the same time schedule but may have separate departmental rules for approval and submission.

The candidate must submit the approved original copy and one additional copy of the thesis to be deposited in the library. Arrangements for binding are made through the Graduate Studies analyst. Further information is contained in the thesis instructional manual available from the Graduate Studies analyst and in department offices.

The Cal Poly Pomona Foundation, Inc., offers a loan fund for candidates who find it impossible to finance master's degree thesis and project costs. Up to \$100 may be borrowed on a short-term basis. The loan is limited to direct costs for this purpose including research or other materials and reproduction and binding. Applications may be made through the university Financial Aid Office.

## PLAGIARISM

Students are hereby informed that the university considers plagiarism a serious academic offense which subjects those engaging in the practice to severe disciplinary measures. Moreover, some forms of plagiarism, the uses of purchased term papers, and pirated computer software, have been considered so serious that the state and federal governments have enacted laws providing for criminal penalties for use, sale or other distribution of such materials. Students are, therefore, cautioned against this and all other forms of plagiarism.

## COMPREHENSIVE EXAMINATION

A comprehensive examination may be required in lieu of a thesis or project as a culminating experience for the master's degree. When a comprehensive examination is an element in a candidate's approved degree program, it must be completed satisfactorily before the candidate will be certified to receive a master's degree.

The comprehensive examination is administered by a departmental graduate faculty committee under the leadership of the graduate coordinator or major professor. A candidate for the master's degree at this university shall be permitted to take the comprehensive examination no more than two times. Failure to complete the examination satisfactorily the second time will result in termination of the candidate's master's degree program and of further registration in the department in which the candidate is enrolled.

In some departments credit is given for successful completion of parts of the comprehensive examination. There may then be different criteria than stated here for full compliance. Candidates will be fully informed of any departmental variations in requirements.

## FOREIGN LANGUAGE

A reading knowledge of a foreign language may be required by some departments. A student should consult the advisor or the section of this catalog in which requirements for the degree field are given.

## TIME LIMIT

The graduate degree program of not fewer than 45 units shall be completed within 7 years from the time the first course which applies to the degree requirements is started. This time limit, at the option of the university, may be extended for students who pass a comprehensive examination in the entire subject field or who validate the outdated work by examination. Such certification must be placed in the student's permanent file.

## GRADUATION CHECK FOR THE MASTER'S DEGREE

Before the end of the third week of the quarter preceding that in which a candidate expects to receive the master's degree, an application for graduation check must be completed. Written notification of status will be sent to the student usually about three weeks after application.

## GRADUATION

Candidates must be enrolled in the university during the quarter in which they graduate.

An application for graduation must be filed at the Office of Evaluations no later than the date specified on the campus calendar. The graduation fee is paid at the Cashier's Office at that time. This fee includes the diploma cost. Participation in the annual commencement exercises is not mandatory but is strongly recommended. Commencement ceremonies are held once a year, in June. Diplomas may be obtained from the Records Office.

Verification that the master's degree has been awarded may be secured through an official transcript, ordered from the Registrar. If a letter of verification of completion of requirements is needed prior to the availability of a transcript, it will be provided by the Records Office upon request.

## ACADEMIC POLICIES

### SCHOLARSHIP REQUIREMENTS

Master's degree students, conditional or unconditional (8000/6000), and credential students, conditional or unconditional (1000/7000) will be subject to disqualification and may be disqualified from the university if their cumulative grade point average falls below 3.0 (B) in upper-division and graduate courses after the second quarter of attendance.

Undeclared graduate students, noncertificate/noncredential, who have declared that they will be enrolling in either a master's degree program or a certificate/credential program, but have not entered such yet (3100), will be subject to disqualification and may be disqualified from the university if their cumulative grade point average falls below 3.0 (B) in upper-division and graduate courses after the second quarter of attendance. Maximum of 13 units, 300 level or above, may be taken while in undeclared classification. Graduate students may not use either the campus course repeat policy or academic renewal which apply only to undergraduate students.

Graduate students will be restored to good standing when they are no longer subject to disqualification. Graduate students admitted to a master's degree curriculum may be considered to be maintaining satisfactory progress provided they are fulfilling the conditions of their respective degree programs in a timely manner as determined by the graduate coordinator of the department concerned.

Master's degree students and certificate/credential or 3100 students will be automatically disqualified at the end of any fall or spring quarter if they are 9 or more grade points below a 3.0 GPA. Students may petition through their respective graduate coordinators and/or department chairs to the associate vice president of Academic Programs for a variance under exceptional circumstances.

### MINIMUM GRADE POINT AVERAGE

If a graduate student has attempted all the courses in an approved master's degree program with less than a 3.0 (B) average in contract courses, with less than a 3.0 (B) average in graduate work at Cal Poly Pomona, or with less than a 3.0 average in all upper division and graduate work attempted while on graduate standing, the student's major department may (1) terminate the program, or (2) require the student to take additional courses in an attempt to raise the program grade point average to the minimum 3.0. When the student's major department recommends that he/she be allowed to do the latter, the additional courses selected must:

1. Be at least two courses at the 500-699 level and total not fewer than 6 quarter units.

2. Apply directly to the student's master's degree objective, although they need not be drawn from offerings in the student's major department.
3. Be new courses (courses previously completed but not originally listed in the master's degree program may not be used).

If the student fails to earn the minimum 3.0 (B) grade point average on completion of the revised master's degree program as outlined above, the program may be terminated without award of the master's degree.

Grades earned at another institution may not be used to offset grade point deficiencies in courses taken at this university.

A graduate petition is to be filed in the Office of Graduate Studies. In order to be accepted, such a petition must be reviewed and filed by the appropriate graduate coordinator and/or program director. The associate vice president for Academic Programs will consider each petition on an individual basis and will grant such approvals for deviation only after consultation with and approval by the appropriate graduate coordinator.

### TRANSFER CREDIT

If accepted by the faculty of the discipline involved, graduate credit (up to 13 units) from another accredited institution may be applied toward the master's degree.

Extended University course work (up to 13 units) may be used to satisfy prerequisites or degree requirements when such work is acceptable to the department or school offering the master's degree. See the appropriate sections for special regulations applying to professional master's degrees (more than 45 units). A limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a contract. Correspondence courses may not be used to satisfy degree requirements.

### COURSES TAKEN BY UNDECLARED STUDENTS

Courses taken by a student while in undeclared, postbaccalaureate standing will be accepted in fulfillment of degree requirements only if the department and graduate advisor approve them. Such work taken when the student is not enrolled in a program must average "B" or better with no grades below "C," if the student wishes consideration for unconditional status for an advanced degree. The student must declare his/her chosen program by the time 13 units, 300 or above, have been completed.

Colleges and departments shall deny enrollment in graduate-level courses to undeclared postbaccalaureate students if such enrollment will prevent degree objective students from meeting requirements or may hamper their progress toward the master's degree.

### ENROLLMENT IN A NEW MASTER'S DEGREE PROGRAM

In special instances, a disqualified graduate student may be permitted to enroll in a different graduate program. All cases involving the reinstatement of a disqualified graduate student must have the approval of the graduate committee in the new department and the associate vice president for Academic Programs.

A student in good standing in a master's degree program may transfer to another program with the approval of the new department. The amount of credit transferred from one program to another will be determined by the new department. Credit earned at this university in one master's degree program may be carried from that program to another.

### CONCURRENT DEGREES

A student may not enroll for a bachelor's and a master's degree or for two master's degrees concurrently.



## CHANGES IN OBJECTIVE

Examples of graduate changes are: (1) Changing from one major field to another for the master's degree. (2) Changing from a certificate/credential objective to a master's degree objective. (3) Changing from a master's degree objective to a certificate/credential objective. (4) Changing from no objective to some stated objective listed in this catalog. (5) Changing from conditional to unconditional objective. (6) Changing from certificate objective to credential objective.

The evaluation of credits transferred to the university is based primarily upon the student's objective. Thus, a change in objective may affect the acceptance of transfer credits. A student who wishes to change his/her objective from that indicated on the original application must follow these procedures:

1. Obtain a Petition to Change Graduate Degree Objective from the Graduate Studies Office or department office.
2. Obtain the signature of the graduate coordinator in the department to which he/she plans to transfer.
3. Submit a new graduate program in the new discipline to the Graduate Studies Office.

A student who discontinues working for a master's degree in one department to undertake master's work in another department shall replace the first master's program by one in the new field. Degree credit may be transferred from the original program, but the transfer of credits must be approved by the new department and the Graduate Studies Office.

## GRADING SYSTEM

(see undergraduate catalog section for complete definitions)

The university employs the following grading system for graduate courses:

- A Superior work, representing effective representation, unusual competence, and high skill.
- B Very Good work, meeting full requirements for performance at the graduate level.
- C Adequate, meets minimum requirements of the course; acceptable for graduate credit, (2.0).
- D Minimally Acceptable Work; not acceptable for graduate contract work.
- F Unacceptable, below minimum requirements of graduate courses. CR/NC—Credit/No-Credit, see undergraduate section of catalog for definition.
- I Incomplete.
- AU Audit (no credit).
- SP Satisfactory Progress.
- W Withdrawal.
- RD Report Delayed.

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

A = 4.0	C+ = 2.3	F = 0
A- = 3.7	C = 2.0	I = 0
B+ = 3.3	C- = 1.7	SP = 0
B = 3.0	D+ = 1.3	W = 0
B- = 2.7	D = 1.0	AU = 0
	D- = 0.70	U = 0

Every course included on a graduate contract requires a grade of "C" or

higher to fulfill the requirements of the contract. A "C-" grade or lower would not be acceptable and the course would have to be repeated.

The "SP" grade is approved for all university courses numbered 690-697. All "SP" symbols must be changed to letter grades within a one-year time-limit. The only exceptions are Project 695 and Thesis 696 which have two-year allowances. In any 600 level course, if not completed within the allotted time, the student must re-enroll to receive credit.

Refer to the undergraduate section of the catalog for detailed definitions of grading and administrative symbols.

Students, under the provisions of Executive Order 320, "Assignment of Grades and Grade Appeals," and Cal Poly Pomona University's "Statement of Student Rights, Responsibilities, and Grievance Procedures," may appeal grades that they consider to be unfair. In the appeal process, however, it is a basic presumption that the grades assigned to a student are correct. Thus, the burden of proof rests with the student who is appealing. For specifics of the appeal procedure, students should contact the associate vice president for Academic Programs or the associate vice president for Student Affairs.

## REPETITION OF COURSES

A graduate or postbaccalaureate student may not file a repeated course form, but may repeat a course if a grade of "C-" or less was assigned. Repeated grades will be averaged with other attempts.

## ACADEMIC RENEWAL

Academic renewal is not available to graduate students.

## RETROACTIVE WITHDRAWAL

See catalog section concerning retroactive withdrawal, which is available to graduate students.

## ADMINISTRATION OF GRADUATE PROGRAMS

The associate vice president for Academic Programs is responsible for leadership and coordination of graduate programs. The Graduate Council includes program coordinators from each of the colleges and ex-officio members from appropriate areas of the University. The Council advises the associate vice president for Academic Programs in all matters of the university's graduate and post-baccalaureate programs. It also addresses issues that affect programs and students and serves as an advisory body to the administration in setting policies.

Each college program coordinator or director is responsible for establishing clear policies for individual programs and for administering those policies consistently and fairly in a manner that agrees with the Graduate Council and university policies. Autonomy within programs and colleges is preserved while overall policies and standards of excellence are maintained at a consistent level throughout the university. In addition, the larger programs have graduate committees that set specific program policies and standards, review student selection and academic progress, develop curriculum, and provide general guidance concerning program matters.

Program coordinators regularly provide academic advising, oversee academic standards, and assist students. Program coordinators are responsible for monitoring program quality. They approve student programs and petitions, schedule courses, coordinate faculty assignments, and review curriculum. Graduation procedures include a graduation check.

For more information contact the Office of Academic Programs, Building 98, Graduate Studies Analyst, (909) 869-3331.

## AGRICULTURE

### Master of Science in Agriculture

#### Agricultural Science Option

Flint Freeman, Graduate Coordinator, M.S. in Agriculture, Agricultural Science Option and Agricultural Education Advisor

#### Agricultural Science Concentration

The Master of Science degree in Agriculture, Agricultural Science option provides students the opportunity to enhance knowledge and competence in a selected area of specialization and encourages individual study and research. The curriculum is designed to assist individuals employed in a variety of agricultural occupations to become more proficient in research methodology and design, statistical analysis, utilization of technology, and in an advanced concentration area of their choice. Students desiring additional experience with industry can include as a part of their program as internship with an industry of their choice. This degree has successfully enhanced the careers of individuals employed in public schools, cooperative extension, food processing, marketing and distribution, public and private research organizations, and the agronomic and horticultural industries. Graduates of the program have been successfully employed throughout the world.

#### ADMISSION TO THE PROGRAM

An applicant for admission to the master's degree program in Agricultural Science should have a baccalaureate degree in agriculture. Applicants without a baccalaureate degree in agriculture will be required to take undergraduate level courses in the College of Agriculture prior to being unconditionally admitted into the program. A cumulative undergraduate grade point average of 2.75 overall, or 2.75 in the final 90 units of coursework, is required. In addition, the Department of Food Marketing and Agribusiness Management must receive three letters of recommendation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Foreign students seeking admission into the program must achieve a score of 550 on the TOEFL. An applicant not meeting these standards may be conditionally admitted with the approval of the program's Graduate Admissions Committee. The conditional student must comply with the requirements of admission within three quarters.

The student, along with an appointed advisory committee, will develop a program by the end of the second quarter, based on the student's interests and preparation. This will include the selection of a professor in the major to direct the thesis work. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis or comprehensive examination. The student must have on file an approved program within two quarters of admission to the master's program. Students electing to complete additional coursework and the comprehensive examination in lieu of the thesis must be agricultural education teachers.

#### Advancement to Candidacy

Admission to the program does not admit a student to candidacy for the degree. Advancement to Candidacy is contingent upon the recommendation of the graduate coordinator. A student who has not been admitted to candidacy is not eligible to register for the thesis (AGS 696) or comprehensive examination (AGS 697). In order to advance to candidacy for the Master of Science in Agriculture, Agricultural Science option, a student must: (1) complete at least 12 units of graduate coursework at Cal Poly Pomona with a GPA of 3.0 or better; (2) pass the

Graduate Writing Test; and, (3) with the major professor and Graduate Coordinator, develop and file a program of study. The official program of study must be prepared and submitted for approval no later than the end of the second quarter of attendance.

#### REQUIREMENTS

1. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in graduate level courses. Additional coursework may be required to eliminate subject matter deficiencies.
2. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses. No course with a grade lower than "C" (2.0) may apply toward the fulfillment of degree requirements.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.
4. Graduate students enrolled in the Single Subject Credential program who have completed their undergraduate degree may complete more than 13 units of the master's program prior to admission under the following conditions: (a) The student must meet the requirements for unconditional admission into the master's program; (b) prior permission from the department Graduate Coordinator must have been obtained.
5. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the department Graduate Coordinator and be approved by the Graduate Studies Analyst.
6. Advancement to Candidacy is required.
7. A candidate completing thesis must submit two final copies for binding in accordance with university regulations and successfully complete a final oral examination covering the thesis and the candidate's area of specialization.
8. The candidate must be enrolled in the university during the quarter of graduation.

#### CURRICULUM

##### Required Courses

			Units
Statistics for Agriculture . . . . .	FMA	575	4
Design and Analysis of Experimental Research . . . . .	AVS	545	4
Technological Applications in Agricultural Education . . . . .	AGS 410/410L		2,1
Analysis and Application of Agricultural Education Research . . . . .	AGS	510	3
Research Methodology in Agricultural Education . . . . .	AGS	550	3
Current Issues in Agricultural Education . . . . .	AGS	580	3
Thesis Research . . . . .	AGS	694	1-6
and			
Master's Degree Thesis . . . . .	AGS	696	1-6
or			
*Comprehensive Exam . . . . .	AGS	697	1
			21-32

**Elective Courses**

To be selected with consent of the student's major professor and graduate committee. . . . . 13-24

Total. . . . . 45

\*Students electing this option will include 1-11 additional units of electives in their program in lieu of AGS 694 (1-6) and AGS 696 (1-6). Note qualifications for this option listed under admission to the program.

**GRADUATE COURSE DESCRIPTIONS****AGS 505/505L Young and Adult Programs and Adult Leadership (2/1)**

Organization, history, philosophy, administration and procedures in advising Future Farmers Association (FFA) chapters and conducting classes for out-of-school youth and adults. Surveys and plans for development of rural and urban adult programs, FFA and Young Farmer programs, techniques and methods. 2 lecture discussions; 1 two-hour activity. Concurrent enrollment required.

**AGS 510 Analysis and Application of Agricultural Education Research (3)**

Integrated approach to the scientific approach in agricultural education. Emphasis on the research problem, statistical analysis, fundamentals of measurement, research method and communicating research. This course will explore computer accessibility and offerings at Cal Poly Pomona and expose students to various techniques in computer analysis of data case studies. Independent research. 3 lectures/problem-solving. Prerequisites: ABM 375/375L and AGS 410/410L or equivalent.

**AGS 540 Evaluation of Agricultural Education Programs (3)**

Evaluation of Agricultural Education departments. Emphasis on a well-balanced program providing instruction, supervised occupational experience, and youth activity. 3 lectures/problem-solving.

**AGS 550 Research Methodology in Agricultural Education (3)**

Current findings and research problems in the field of agriculture and their application to the industry. Each seminar to have a subtitle identifying the discipline. AGS 450 may be substituted for AGS 550 by those who have completed the Agricultural Specialist Credential. AGS 450 may not be used to meet the 500-600 course level requirement. 3 seminars. Prerequisite: consent of instructor.

**AGS 560 Internship (1-3)**

On-the-job experience with public and private agencies for graduate students. Professional experience new to the student to enhance the level of competence in agriculture. One unit credit for each 40 hours of experience. Written reports necessary. Approval required before enrolling. Students are permitted to take only 1-3 units per quarter.

**ABM 575 Statistics for Agriculture (4)**

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

**AGS 580 Current Issues in Agricultural Education (3)**

Recent developments in agricultural education including job market, staffing, funding, state and federal legislation. Delivery systems for subject matter programs in agricultural education and their relationship to local educational agencies (LEAs). 3 seminars.

**AGS 591 Directed Study (1-2)**

Individualized study, research, or readings in a specialized area under the direction of a faculty member. May be repeated for a maximum of 4 units. Students are permitted to take only 1-2 units per quarter.

**AGS 599/599A/599L Special Topics for Graduate Students (1-4)**

Group study of selected topics, the title to be specified in advance. Instruction by lecture, activity, laboratory or a combination. Prerequisite: permission of major professor and graduate committee.

**AGS 692 Independent Study (1-2)**

Individualized study, research, or readings in a specialized area proposed by the student and conducted under the direction of a faculty member. May be repeated for a maximum of 4 units. Students are permitted to take only 1-2 units per quarter. Unconditional standing required.

**AGS 694 Thesis Research (1-3)**

Research conducted in area of specialization under the direction of a faculty member as part of the preparation for writing a thesis. May be repeated for a maximum of 6 units. Students are permitted to take only 1-3 units per quarter. Unconditional standing required.

**AGS 696 Master's Degree Thesis (1-3)**

Compilation, evaluation, interpretation, and presentation in thesis form of supervised research. May be repeated for a maximum of 6 units. Students are permitted to take only 1-3 units per quarter. Advancement to Candidacy required.

**AGS 697 Comprehensive Examination (1) (Credit/No credit)**

Preparation for and completion of the written comprehensive examination. The examination may be taken no more than two times. Failure to complete it satisfactorily the second time will result in termination from the program. Advancement to Candidacy required.

**AGS 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence required for any quarter following the final assignment of the "SP" grade until the completion of the thesis or comprehensive examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

## AGRICULTURE

### Master of Science in Agriculture

Animal Science Option in the Department of Animal and Veterinary Sciences, College of Agriculture

Cedric Matsushima, Chair

Melinda Burrill, Graduate Studies Coordinator

The Master of Science degree program in Agriculture with an option in Animal Science will provide students the opportunity to enhance their knowledge and competence in a selected area of specialization as well as to encourage individual study and research. The curriculum is designed to expose students to research techniques and the use of scientific literature, and to prepare them for positions of responsibility in animal production, business, or the related animal industries. The attainment of a master's degree also permits qualified candidates to pursue further specialized training, gain entrance to professional schools, or to pursue a Ph.D. degree. The degree program also allows an internship through which students may complement theoretical and technical studies and assure industrial orientation. Students in this program may pursue one of several areas of animal science: animal nutrition, animal breeding, meat science, or physiology.

### ADMISSION TO THE PROGRAM

An applicant for admission to the Master of Science program in Animal Science must have a baccalaureate degree in animal science or in a related area. An undergraduate grade point average of 2.5 or better with a 3.0 average in all upper division coursework and a minimum of college algebra and trigonometry are required for unconditional admission. In addition, the Department of Animal and Veterinary Sciences must have received three letters of recommendation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Applicants not meeting these standards may be conditionally admitted with the approval of the Department of Animal and Veterinary Sciences. The conditional student must comply with the requirements of the conditional admission within two quarters of that admission to the master's program.

The student along with an appointed advisory committee will develop a program by the end of the second quarter in a selected area of animal science based on the student's interest and preparation. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis.

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is required for registration in AVS 696 and the awarding of the M. S. degree. In order to advance to candidacy for the Master of Science in Agriculture with the Animal Science option, a student must: (1) pass the Graduation Writing Test or have it waived; (2) achieve a GPA of 3.0 (B) or better for at least 35 contract units.

### REQUIREMENTS

- The degree program will include a minimum of 45 quarter units of which at least 24 units shall be in graduate-level courses. Deficiencies in undergraduate preparation must be made up in addition to the 45 quarter units required for the degree.
- The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the graduate advisory committee.
- No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.
- Achieve Advancement to Candidacy.
- A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.
- The candidate must complete a formal thesis and submit at least two final copies for binding in accordance with university regulations.
- A final oral examination covering the thesis and the candidate's area of specialization must be successfully completed.
- The candidate must be enrolled in the university during the quarter of graduation.

### CURRICULUM

#### Required Courses

			Units
Design and Analysis of Experimental Research	..AVS	545	4
Animal Science Seminar	.....AVS	598	3
Thesis Research	.....AVS	694	3-9
Master's Degree Thesis	.....AVS	696	3
			<hr/>
			13-19

#### Animal Science Specialization Courses

To be selected with consent of the student's major professor and thesis committee. .... 22-30

#### Elective Courses

To be selected from graduate level courses with consent of the students major professor and thesis committee ..... 4-7  
Total ..... 45

### GRADUATE COURSE DESCRIPTIONS

#### AVS 512 Nutritional Energetics (4)

The biochemical, physiological, and nutritional functions of energy transformation involved in the formation of animal products. 4 lecture discussions. Prerequisites: non-ruminant or ruminant nutrition, physiology, and biochemistry, or permission of instructor.

#### AVS 513/513L Computer Data Management and Analysis (2/2) Sp

Computer-aided data management and analysis, utilizing spreadsheets, database, and text editors to transfer data between microcomputers and minicomputers. Analysis of data utilizing PC-based spreadsheets, graphics and/or database software, and SAS system on IBM compatible microcomputers and VAX minicomputers. 2 lectures/problem-solving; 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: AVS 428/428L or consent of instructor.

#### AVS 514 Population Genetics (3)

The population concept of genetics. The forces influencing gene frequencies in both equilibrium and dynamic populations; the development of breeding programs. 3 lecture discussions. Prerequisites: AVS 404/404A and BIO 411.



**AVS 520/520L Advanced Topics in Reproductive Physiology (3/1) Sp (Odd Years)**

Advanced study of the reproductive physiology of domestic animals. Study of the physiological processes of reproduction, from gametogenesis to parturition, for food-producing animals. Recent research into male and female reproductive physiology. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: AVS 412 or AVS 414/414L.

**AVS 545 Design and Analysis of Experimental Research (4)**

Experimental statistics. Applications of statistical estimation and inference. Linear regression and correlation; analysis of variance for completely randomized design, randomized blocks, Latin squares, factorials and analysis of covariance; non-parametric statistics. Concepts of design for experimental investigations. 4 lecture discussions. Prerequisite: any course in statistics.

**AVS 547 Advanced Meat Science (3)**

Microstructure and chemistry of skeletal muscle and connective tissue. Chemical and physical changes during the conversion of muscle to meat and their relationship to meat quality and processing. Meat preservation. Analytical methods. 3 lecture discussions. Prerequisites: AVS 427/427L and CHM 321/321L, or consent of instructor.

**AVS 550/550L Advanced Topics in Animal Physiology (2/1) Sp (Even Years)**

An advanced study of the physiology of domestic farm animals. Recent research developments in animal physiology. Topics include in-depth discussion of the nervous, endocrine, digestive, respiratory, circulatory, and excretory systems. 2 lectures, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: AVS 350/350L or equivalent.

**AVS 560 Graduate Internship in Animal Science (1-4)**

On-the-job experiences in areas of animal science that best complement the professional objective of the student. May be repeated for a maximum of 4 units. Prerequisite: consent of internship coordinator.

**AVS 598 Animal Science Seminar (1)**

Study of selected topics in animal science. 1 seminar. Minimum of 3 units required.

**AVS 599/599A/599L Special Topics for Graduate Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Instruction is by lecture, laboratory, activity or a combination. Prerequisite: permission of major professor and graduate committee.

**AVS 691 Directed Study (1)**

Individual research in a specialized area, directed by a faculty member. Work does not pertain directly to the thesis. May be repeated. Maximum credit 4 units. Unconditional standing required.

**AVS 692 Independent Study (1)**

Research proposed by the student, conducted under the supervision of a faculty member. Work does not pertain directly to the thesis. May be repeated. Maximum credit 4 units. Unconditional standing required.

**AVS 694 Thesis Research (1-3)**

Individual research pertaining directly to the thesis, under the supervision of the major professor. May be repeated. Maximum credit 9 units. Unconditional standing required.

**AVS 696 Master's Degree Thesis (1-3)**

Compilation of data culminating in the summarizing and reporting, in approved thesis form, of independent supervised research. Total credit limited to 3 units. Prerequisite or concurrent: AVS 694. Advancement to Candidacy required.

**AVS 699 Master's Degree Continuation (0)**

Enrollment in this course is for the student who has completed all course work but who must be enrolled in the university in the quarter in which he/she graduates. Advancement to Candidacy required.

## AGRICULTURE

### MASTER OF SCIENCE IN AGRICULTURE

Nutrition and Food Science Option in the Department of Food, Nutrition and Consumer Sciences, College of Agriculture.

Anahid T. Crecelius, Department Chair and Graduate Studies Coordinator

The Master of Science in Agriculture with the option in Nutrition and Food Science offers interdisciplinary in-depth study of the principles and application of nutritional and food sciences. The program is structured to meet the objectives of both the generalist and those seeking specialization in one of the following areas: nutritional biochemistry, community nutrition, clinical nutrition, or food science. The successful candidate will acquire skills to pursue careers in teaching, research, community service, or industry or pursue advanced graduate studies. The teaching format includes discussions, laboratory work, field experiences, seminars and independent research.

The Departments of Food, Nutrition and Consumer Sciences and Kinesiology and Health Promotion now offer an option in Sports Nutrition under both the Master of Science in Agriculture and the Master of Science in Kinesiology programs. Refer to Sports Nutrition section in this catalog.

### ADMISSION TO THE PROGRAM

An applicant for admission to the Master of Science program in Nutrition and Food Science must have a baccalaureate degree in Foods and Nutrition or a baccalaureate degree with a minimum of 24 quarter units of courses in foods and nutrition and 12 units in closely related areas such as biochemistry, physiology, or microbiology from an accredited university, to be admitted as an unconditional student. Science classes, physiology, biochemistry, microbiology will include a minimum of 3 hours laboratory experience per week. An undergraduate grade point average of 3.0 and the GRE are required for unconditional admission. Graduates of foreign institutions should have a TOEFL score of 550 or better. In addition, the Department of Food, Nutrition and Consumer Sciences must be in receipt of three letters of recommendation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Applicants not meeting these standards may be conditionally accepted and must meet the requirements for unconditional admission within two quarters of their acceptance into the master's program. Admission to the program does not admit a student to candidacy for a degree.

### ADVISORY COMMITTEE

The student, along with an appointed advisory committee, will develop a program by the end of the second quarter of admission in a selected area of nutrition or food science based on the student's interest and preparation. The student's approved program will include required core courses, a selection of additional courses in a specialization, electives and a thesis.

### REQUIREMENTS

1. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in graduate 500- and 600-level courses. Deficiencies in undergraduate preparation must be made up in addition to the 45 quarter units required for the degree.
2. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No

more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.

4. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses. A grade point of 3.0 (B) or better must be maintained in all core courses.
5. A candidate must achieve Advancement to Candidacy. Advancement to Candidacy is required for registration in FN 696, Thesis, and for awarding of the master's degree. In order to advance to candidacy for the Master of Science in Agriculture, Nutrition and Food Science option, the student must (a) pass the Graduate Writing Test; (b) achieve a GPA of 3.0 or better; (c) satisfactorily complete a written examination in the field studied; (d) successfully complete FN 693 Presentation of Research Proposal.
6. The candidate must complete a formal thesis. The thesis must be presented and defended no later than the third week of the quarter in which the candidate expects to graduate. Two copies must be submitted for binding in accordance with university regulations.
7. The candidate must be enrolled in the university during the quarter of graduation.

### REQUIRED CORE COURSES

Seminar in Nutrition or Food Science	.FN	570	4
Presentation of Research Proposal	.FN	693	1
Thesis Research in Nutrition or Food Science	.FN	694	6
Master's Degree Thesis	.FN	696	3
Total			14

### Courses Strongly Recommended for Nutrition Specialization:

Advanced Nutrition	.FN	533	4
Recent Advances in Nutrient Metabolism*	.FN	535	3

### Courses Strongly Recommended for Food Science Specialization:

Food Chemistry and Toxicology	.FN	520	3
Recent Advances in Nutrient Metabolism#	.FN	535	3

\*Choose at least three of the five different topics; see course descriptions for more information.

#Choose at least one of the five different topics; see course descriptions for more information.

### Nutrition: Suggested Courses

Epidemiology	.MIC	330	3
General Virology	.MIC	430/430L	3,2
Hematology	.MIC	444/444L	3,1
Human Genetics	.BIO	403/403L	3,1
Population Genetics	.BIO	445/445L	3,1
Endocrinology	.BIO	520/520L	3,1
Renal Physiology	.BIO	521	3
Molecular Biology of Development	.BIO	555	4
Cellular Immunity and Disease	.BIO	570/570L	3,1
Advanced Physiology of Exercise	.KIN	683/683L	3,1
Advanced Concepts in Exercise Testing and Counseling	.KIN	684	3

### Food Science: Suggested Courses

Strength of Biological Materials	.AE	330	3
Food Process Engineering	.AE	332/332L	3,1
Meat Utilization	.AVS	327/327L	3,1
Seafood and Poultry Processing Technology	.AVS	328/328A	3,1

Nutritive Analysis	AVS	424	2
Meat Processing and Technology	AVS	427/427L	3,2
Applied Thermodynamics	ETM	306	4
Applied Heat Transfer	ETM	308	3
Machine Elements/Laboratory	ETM	315/325L	3,1
Applied Total Quality Management	ETP	300	3
Industrial Safety	ETP	302	3
Quality Assurance	ETP	375	3
Polymer Chemistry	CHM	409	3
Chemical Thermodynamics	CHM	415	3
Solution Equilibria in Analytical Chemistry	CHM	421	2
Enzymology	CHM	451/451L	3,1
Agribusiness Marketing	FMA	504	4
Commodities and Risk Management	FMA	505	4
Essentials of Marketing Management	GBA	517	4
Production and Operations Management	GBA	531	4
Organizational Management Principles and Behavior	GBA	535	4
Advanced Engineering Thermodynamics	EGR	545	4
Heterogeneous Phase Equilibria	EGR	546	4

These are not all-inclusive courses. The student may choose others in consultation with his/her graduate advisor.

Nutrition and Food Science Specialization courses to be selected with consent of the student's major professor from 300, 400, 500 and 600 level courses with no more than 21 units from 300 and 400 level courses.

## GRADUATE COURSE DESCRIPTIONS

### FN 520 Food Chemistry and Toxicology (3)

Advances in the chemistry of food materials. Toxicological procedures and data relating to food additives. Nutrient-drug interaction. Presentation, evaluation, and discussion of bibliographic assignments. 3 seminars. Prerequisite: FN 420/420L or equivalent or consent of instructor.

### FN 533 Advanced Nutrition (3)

Coordination of structure and function related to metabolic needs of specialized cells and their environmental response. Interrelationship of metabolism, physiological roles and nutrition. Comprehensive study of control of food intake. Oral presentation and evaluation of current studies in nutrition. 3 seminars. Prerequisites: FN 433, 434 or equivalent or consent of instructor.

### FN 535 Recent Advances in Nutrient Metabolism (3)

Recent developments and research in nutrient metabolism. A major nutrient class (proteins, fats, carbohydrates, vitamins and minerals) to be studied during each quarter.

Each course to be subtitled identifying the nutrient class to be discussed. 3 seminars. Maximum of 9 units may be earned. Prerequisites: FN 433, 434, and 435/435L or equivalent or consent of instructor.

### FN 536 Nutrition Through the Life Cycle (3)

Nutrient requirements and food needs as modified by developmental and behavioral changes during pregnancy and lactation, periods of growth, adulthood and old age. Planning diets to promote and maintain health of specific age groups. Oral presentation and discussion of special nutritional problems of the life cycle. 3 seminars. Prerequisite: graduate standing.

### FN 538/538L Research Methods in Nutrition (1/1)

Contemporary research techniques and methods used in the field of nutrition. Interpretation of data in relationship to the nutritional status of humans and experimental animals. 1 lecture discussion, 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: FMA 575 or equivalent.

### FN 540 Field Experience (2)

Supervised experience in various areas determined by graduate advisor. Prerequisite: consent of advisor.

### FN 543 Diet Therapy (3)

Study of the physiological and biochemical changes imposed on the body by certain diseases and dietary modifications used for treatment. Adaptation of dietary patterns of individuals to special needs of disease states and preventative care. 3 lecture discussions. Prerequisite: FN 433, FN 434 or equivalent.

### FN 545 Introduction to Clinical Practice (3)

Current topics in Dietetic Practice. Presentations by professionals on selected topics. Student case presentations. May be repeated to maximum of 9 units. To be taken concurrently with FN 560 Clinical Practice. CR/NC grading. Prerequisite: acceptance into Dietetic Internship. No graduate credit given.

### FN 550 Independent Study (2-6)

Individual investigation and original study to be conducted in a field of interest selected by the student with consent of advisor. Designed to meet individual student needs. Maximum of 6 units may be earned.

### FN 560 Clinical Experience (3-9)

Supervised preprofessional practice in an assigned clinical site. Does not count towards completion of master's degree. Maximum of 9 units. To be taken concurrently with FN 545 Introduction to Clinical Practice. CR/NC grading. Prerequisite: acceptance into Dietetic Internship. No graduate credit given.

### FN 570 Seminar (2-4)

Study of selected topics in foods and nutrition. Each seminar subtitled to describe its emphasis. Total credit limited to 4 units. 2 seminars. Prerequisite: consent of instructor.

### FN 599/599A/599L Special Topics for Graduate Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of major professor and graduate committee.

### FN 691 Directed Study (1-6)

Individualized research in a specialized area under the direction of a faculty member which may or may not lead to a thesis. Maximum credit 6 units. May be taken CR/NC. Unconditional standing required.

### FN 692 Independent Study (1-4)

Individual investigation and original study to be conducted in a field of interest selected by the student under the supervision of a faculty member. Study may not lead to a thesis. Maximum credit 4 units. Unconditional standing required.

**FN 693 Presentation of Research Proposal (1) Credit/No Credit**

A public oral presentation and discussion of a written proposed research plan for the master's thesis. Required for Advancement to Candidacy. Prerequisites: ABM 575 and FN 538/538L or KIN 590 and KIN 591 or equivalent with consent of thesis advisor. Unconditional standing required.

**FN 694 Thesis Research (1-6)**

Individual research in an area of specialization conducted as part of the preparation for writing a thesis under the direction of graduate faculty. Maximum credit 9 units. Unconditional standing required.

**FN 696 Master's Degree Thesis (3)**

Compilation of data culminating in the summarizing and reporting, in thesis form, of independent supervised research. Maximum credit 3 units. Advancement to Candidacy required.

**FN 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.



## AGRICULTURE

### Master of Science in Agriculture

### Master of Science in Kinesiology

#### Sports Nutrition Option

A joint program in the College of Letters, Arts, and Social Sciences, Department of Kinesiology and Health Promotion, and the College of Agriculture, Department of Food, Nutrition and Consumer Sciences.

Dr. Wanda Rainbolt, Graduate Coordinator, Department of Kinesiology and Health Promotion

Dr. Anahid Crecelius, Graduate Coordinator, Department of Food, Nutrition and Consumer Sciences

The Sports Nutrition graduate study option is an interdisciplinary program offered jointly by the Kinesiology and Health Promotion Department and the Food, Nutrition and Consumer Sciences Department. It is designed for students interested in pursuing graduate work which integrates nutrition science and human performance.

The curriculum has been developed to provide an advanced understanding of nutrition science and exercise physiology and to facilitate the pursuit of a variety of careers in clinical and/or applied settings. The curriculum consists of a required core area and a restricted electives area. Students can choose courses from the electives area in accordance with their particular interest and goals. Students are expected to meet all of the prerequisites for the core courses.

#### ADMISSION TO THE PROGRAM

An applicant for admission to the program must have received a baccalaureate degree in kinesiology or foods and nutrition or a related discipline from an accredited institution. A student with a baccalaureate degree in a major other than kinesiology or foods and nutrition may be admitted subject to review of the student's performance and academic background by the graduate coordinators of the respective departments. The student must file complete application forms, three letters of recommendation, a statement of purpose, and official transcripts from all colleges and/or universities attended.

#### CURRICULUM

##### REQUIRED CORE (19- 21 units required)

Research Methods in Nutrition/Laboratory . . . . .	FN	538/538L	1/1
or Research Methods . . . . .	KIN	590	3
Statistics for Agriculture . . . . .	FMA	575	4
or Research Design . . . . .	KIN	591	3
Advanced Nutrition . . . . .	FN	533	3
Physiology of Exercise/Laboratory . . . . .	KIN	683/683L	3/1
Advanced Exercise Testing and Counseling . . . . .	KIN	684	3
Nutrition in Sports and Exercise . . . . .	FN/KIN	685	4

##### RESTRICTED ELECTIVES (15- 23 units required)

Sports Medicine . . . . .	KIN	455	4
Exercise Metabolism and Weight Control . . . . .	KIN	456	3
Advanced Nutrition (cellular nutrient metabolism) .FN		433	4
Nutritional Assessment Methods/Laboratory . . . .FN		435/435L	1/1
Advanced Nutrition (hormonal effects on nutrient metabolism) . . . . .	FN	434	4
Recent Advances in Nutrient Metabolism (may be repeated) . . . . .	FN	535	3
Seminar . . . . .	FN	570	2-4
Immunology-Serology/Laboratory . . . . .	MIC	415/415L	3/2
Hematology/Laboratory . . . . .	MIC	444/444L	3/1

Endocrinology/Laboratory . . . . .	BIO	520/520L	3/1
Cellular Immunity and Disease/Laboratory . . . . .	BIO	570/570L	3/1
Advanced Topics in Biology (as pertinent and with approval) . . . . .	BIO	575	2
Bioethics . . . . .	PHL	433	4
Theories of Counseling . . . . .	PSY	412	4

#### TERMINAL REQUIREMENT

Thesis . . . . .	KIN/FN	696	3-9
(Core courses must be completed and students must be Advanced to Candidacy prior to enrolling in thesis)			
Total units required . . . . .			45

#### GRADUATE COURSE DESCRIPTIONS

See Biological Sciences, Philosophy, and Psychology for other course descriptions.

##### KIN 590 Research Methods (3)

Study the nature of research and the various methods for acquiring information relevant to the profession. 3 lecture discussions.

##### FN 538/538L Research Methods in Nutrition (1,1)

Contemporary research techniques and methods used in the field of nutrition. Interpretation of data in relationship to the nutritional status of humans and experimental animals. 1 lecture discussion; 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: ABM 575 or equivalent.

##### KIN 591 Research Design (3)

Examine the nature and role of applying and interpreting statistical techniques for specific problems related to our professional field. 3 seminars. Prerequisite: KIN 590.

##### FMA 575 Statistics for Agriculture (4)

A summary of statistical tools and techniques used in agriculture. Application of computer to selected statistical techniques. 4 lecture discussions.

##### KIN 683/683L Advanced Physiology of Exercise (3,1)

The physiological and biochemical adjustments made by the body during exercise and changes which result from prolonged periods of intensive physical training. 3 seminars. 1 two-hour laboratory. Prerequisite: KIN 303/303L.

##### KIN 684 Advanced Concepts in Exercise Testing and Counseling (3)

Advanced concepts of graded exercise testing (GXT), interpretation, and counseling. GXT preparation, administration, and evaluation. Modes and purposes of GXT, exercise electrocardiography, energy cost calculation, and principles of exercise prescription. Special considerations for select population groups and case study preparation. 1 three-hour lecture/problem-solving. Prerequisite: KIN 683/683L.

##### KIN 685/FN 685 Nutrition in Sports and Exercise (4)

Knowledge concerning the role of nutrients in optimizing human performance. Assessment of caloric and nutrient requirements associated with exercise. Special consideration is given to gender specific needs of athletes, nutritional ergogenic aids, and eating disorders. 4 seminars. Prerequisites: KIN 683/683L and FN 533.

**KIN 696 Master's Degree Thesis (3)**

Development of a terminal creative research report on a topic selected by the student approved by the department graduate studies committee and submitted to the faculty as evidence of his/her mastery of the principles of the profession. May be scheduled for a maximum of 9 units. Prerequisite: KIN 591, except Sport History. Advancement to Candidacy required.

**FN 696 Master's Degree Thesis (3)**

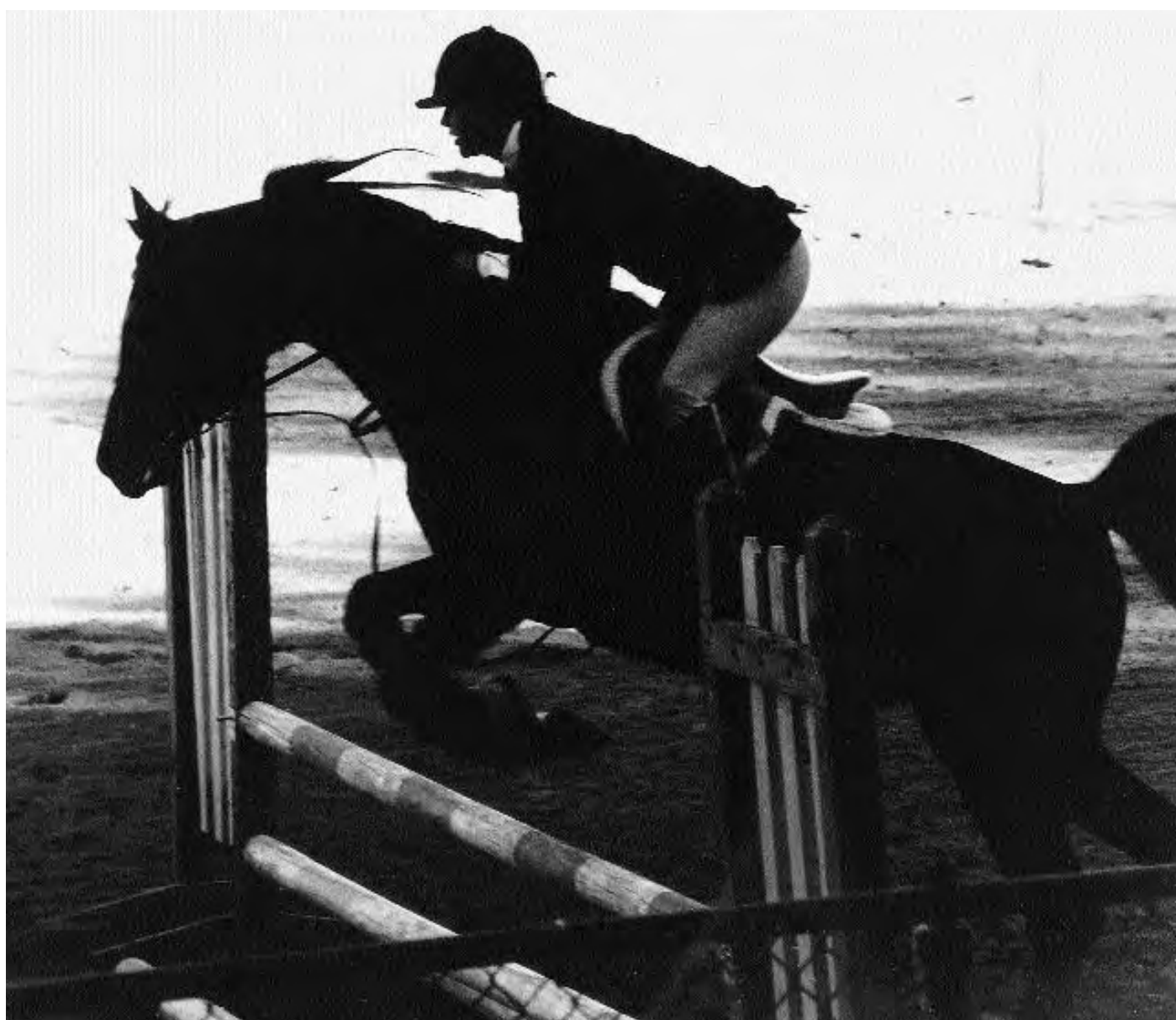
Compilation of data culminating in the summarizing and reporting, in thesis form, of independent supervised research. May be repeated for a maximum of 9 units. Advancement to Candidacy required.

**KIN 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

**FN 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.



## AGRICULTURE

### Master of Science in Agriculture

#### Plant Science Option

In the Department of Horticulture, Plant and Soil Science

Daniel G. Hostetler, Chair

Peggy S. McLaughlin, Graduate Coordinator

The Plant Science Option in the Master of Science in Agriculture allows students to develop knowledge and competence in a specialized area of agricultural biology, agronomy, horticulture or soil science through individualized study and research. The program is designed to build upon a strong background in the physical, natural and agricultural sciences. Graduate students may concentrate on enhancing their skills in research methodology and design and statistical analysis, or they may choose to apply their specialized study in an education, management and/or public policy. The Option in Plant Science allows students to pursue the degree under two different tracks. The Research Track will provide students with the opportunity to gain expertise in biological research methodologies as applied to plant, soil and entomological problems. This degree will prepare students for technical and research positions within the industry and/or with the sound scientific grounding necessary for continuing on to a Ph.D. program. The Professional Track provides an opportunity for students who wish to combine graduate courses in the plant, soil and entomological sciences with interdisciplinary preparation in design, business management, communications, public policy or the social sciences. These students normally do not plan to continue on in a research based Ph.D. program, and would seek employment in the public sector in education, management, or other non-research industry positions.

Students on both the Research Track and the Professional Track will complete a master's thesis.

#### Admission to the Program

An applicant for admission to the Plant Science Option in the M.S. degree program in Agriculture should have a baccalaureate degree in agricultural biology, agronomy, horticulture or soil science, or in a closely related field. Applicants without such a degree will be required to take undergraduate leveling courses in the Colleges of Agriculture and Science prior to being admitted to the program. A cumulative grade point average of 2.75 overall is required, but at least a 3.0 is preferred in agriculture and science courses. In addition, three letters of recommendation are required from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Foreign students seeking admission into the program must present a score of 550 on the TOE FL (writing test) Exam. An applicant not meeting these standards may be conditionally admitted with the approval of the program's Graduate Admission Committee. The conditional student must comply with the requirements of admission within two quarters.

The student, along with an appointed advisory committee, will develop a program by the end of the second quarter based upon the student's interests and preparation. This will include the selection of a major professor to direct the thesis work. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis. The approved program must be on file by the end of the second quarter of unconditional admission to the program.

Please note that the department has established submission deadlines to allow for sufficient time to consider application packages. Contact the department for these dates.

#### Advancement to Candidacy

Admission to the program does not admit a student to candidacy for the degree. Advancement to Candidacy is contingent upon the recommendation of the Graduate Coordinator and the student's advisory committee. A student who has not been admitted to candidacy is not eligible to register for the thesis/project (HPS 696). In order to qualify for Advancement to Candidacy for the Master of Science in Agriculture, Option in Plant Science, a student must: 1) complete at least 24 units of graduate coursework at Cal Poly with a GPA of 3.0 or better, 2) pass the Graduation Writing Test, and 3) with the major professor and Graduate Coordinator, develop and file a program of study.

#### Requirements

1. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in graduate level courses. Additional coursework may be required to eliminate subject matter deficiencies. Courses at the 300 level may apply toward the fulfillment of degree requirements only with permission of the Graduate Coordinator.
2. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses. No course with a grade lower than "C" (2.0) may apply toward the fulfillment of degree requirements.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Continuing Education may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer and/or Continuing Education and/or units petitioned for graduate credit may be included on a master's contract.
4. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the department Graduate Coordinator and be approved by the Graduate Studies Analyst.
5. Advancement to Candidacy is required.
6. The candidate must complete a graduate formal thesis and submit at least two final copies for binding in accordance with University regulations.
7. A final oral examination covering the thesis and the candidate's area of specialization must be successfully completed.
8. The candidate must be enrolled in the University during the quarter of graduation.

#### The Curriculum

##### Required courses units

Design and Analysis of Experimental Research . . . AVS	545	4
Advanced Topics in Plant/Environ. Science . . . . . HPS	510	3
Seminar in Agricultural Biology . . . . . AGB	550	(3)
and/or		
Seminar in Agronomy . . . . . AGR	550	(3)
and/or		
Seminar in Horticulture . . . . . HOR	550	(3)
Student required to take 3 seminars . . . . .		9

Thesis/Project Research . . . . .	HPS	694	1-6
and Masters Degree Thesis/Project . . . . .	HPS	696	1-6
Subtotal . . . . .			18-28

### Elective courses

To be selected with consent of the student's major professor and graduate committee . . . . .			17-27
Total. . . . .			45

### Graduate Course Description

#### HPS 510 Advanced Topics in the Plant and Environmental Sciences (3)

Advanced study of topics related to agronomy, horticulture, soil science and economic entomology. To include perspectives on plant biotechnology, trends in public policy related to environmental regulation, and advances in plant nutrition and soil management. Recent research in the field will be examined. Reading and reports on papers in the literature. 1 three-hour seminar. Prerequisite: unconditional graduate standing or consent of instructor.

#### AGB 550 Seminar in Agricultural Biology (3)

Analysis and discussion of a selected topic in Agricultural Biology based upon examination of the literature, recent research advancements, and exposure to professional issues. May be repeated. 1 three-hour seminar. Prerequisite: consent of instructor.

#### AGR 550 Seminar in Agronomy (3)

Analysis and discussion of a selected topic in Agronomy or Soil Science based upon examination of the literature, recent research advancements, and exposure to professional issues. May be repeated. 1 three-hour seminar. Prerequisite: consent of instructor.

#### HOR 550 Seminar in Horticulture (3)

Analysis and discussion of a selected topic in Horticulture based upon examination of the literature, recent research advancements, and exposure to professional issues. May be repeated. 1 three-hour seminar. Prerequisite: consent of instructor.

#### HPS 591 Directed Study (1-2)

Individualized study, research, or readings in a specialized area under the directed of a faculty member. May be repeated for a maximum of 4 units. Students are permitted to take only 1-2 units per quarter.

#### HPS 692 Graduate Independent Study (1-4)

Independent study and research on a subject chosen by the student with the consultation, approval, and direction of an advisor. Course may be repeated. Maximum credit: 6 units. Unconditional graduate standing required.

#### HPS 694 Thesis/Project Research (1-3)

Research conducted as part of the preparation for writing a thesis or preparing a graduate project. Open only to unconditional graduate students with the approval of the graduate advisor. May be repeated for a maximum of 6 units. Students are permitted to take only 1-3 units per quarter.

#### HPS 696 Master's Degree Thesis/Project (1-3)

Compilation, evaluation, interpretation, and presentation in thesis or project form of supervised research. May be repeated for a maximum of 6 units. Students are permitted to take only 1-3 units per quarter.

#### HPS 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the "S P" grade until the completion of the thesis or project. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.



## AGRICULTURE

### CAREER MBA

#### Agribusiness Emphasis

A joint program in the College of Business Administration and the Food Marketing and Agribusiness Management/Agricultural Education Department.

Marvin L. Klein, Graduate Program Advisor

The Agribusiness emphasis in the Career MBA program is designed to prepare students for careers in the dynamic and rapidly changing agricultural and food system. Graduates of agricultural disciplines, business schools, and the social sciences will benefit from this program. By combining the broad-based skills provided in the MBA program with the more specialized knowledge of the domestic and world agricultural and food system, graduates will be prepared to accept challenging and exciting positions in the food and fiber industries. The program stresses the areas of agribusiness marketing, commodities and risk management, international agribusiness marketing, and the environment of the agribusiness firm.

#### ADMISSION TO THE PROGRAM

An applicant for admission to the agribusiness emphasis in the Career MBA program must meet the requirements for admission to the MBA program. Selection will be on the basis of evidence of ability to perform at a high academic level. The following criteria are considered: the undergraduate grade point average, scores on the Graduate Management Admissions Test, work experience, letters of recommendation, and the applicant's personal statement or interview. (See Business Administration, Admission to the Program and Requirements.)

#### CURRICULUM

##### Agribusiness Emphasis

First year (See Graduate Program Advisor)

##### Career MBA Core

		Units
Managerial Account for Decision-Making/ Directed Study . . . . .	GBA 608/609	3/1
Seminar in Organizational Behavior/ Directed Study . . . . .	GBA 615/616	3/1
Management Science Seminar/Directed Study . . . . .	GBA 628/629	3/1
Financial Decision-Making/Directed Study . . . . .	GBA 645/646	3/1
Management Policies and Strategies Practicum/Directed Study . . . . .	GBA 687/688	3/1

##### Required Courses

Commodities and Risk Management . . . . .	FMA 505	4
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Choose four electives units from the following seminar courses:

Information Systems Seminar/Directed Study . . . . .	GBA 673/674	3/1
or Marketing Seminar/Directed Study . . . . .	GBA 652/653	
or Management Seminar/Directed Study . . . . .	GBA 671/672	

##### Directed elective courses

Environment of Agribusiness Firm . . . . .	FMA 501	4
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Agribusiness Marketing . . . . .	FMA 504	4
International Agribusiness Marketing and Development . . . . .	FMA 530	4

#### Capstone courses

Directed Study . . . . .	GBA 691	4
Business Research Project . . . . .	GBA 695	4
		<hr/> 48

#### GRADUATE COURSE DESCRIPTIONS

(See MBA—College of Business Administration for GBA course descriptions)

##### FMA 501 Environment of the Agribusiness Firm (4)

Overview of macroeconomic and environmental factors influencing agribusiness management. Critical evaluation of U.S. and E.C. domestic and foreign trade policies. Investigate the impacts of social and economic trends on the agribusiness firm. Methodologies for evaluating the external environment will be presented. 4 lecture discussions. Prerequisite: consent of instructor.

##### FMA 504 Agribusiness Marketing (4)

Analysis of agricultural marketing structures and practices. Discussion of managerial approaches to conventional agricultural marketing. Critical examination of revolutionary changes that are moving the system out of atomistic free competition toward monopolistic or oligopolistic competition. 4 lecture discussions. Prerequisite: FMA 501 or consent of instructor.

##### FMA 505 Commodities and Risk Management (4)

Fundamentals of temporal price fluctuations, and risk management strategies through forecasting, futures markets, and options. Econometric and time series modeling of commodity prices will be presented. 4 lecture discussions. Prerequisites: one course from each of the following: GBA 514, FMA 314, OM 314 or FMA 575; FMA 501 or FMA 504; FMA 305 or FRL 432 or consent of instructor.

##### FMA 530 International Agribusiness Marketing and Development (4)

Theoretical and conceptual framework of international agribusiness marketing. Major topics include the basic characteristics of the world market environment, trade regulations in agriculture, and marketing institutions for agricultural products. 4 lecture discussions. Prerequisite: FMA 501 or consent of instructor.

##### FMA 575 Statistics for Agriculture (4)

A summary of statistical tools and techniques used in agriculture. Application of computer to selected statistical techniques. 4 lecture discussions.

## ARCHITECTURE

### MASTER OF ARCHITECTURE

In the Department of Architecture, College of Environmental Design

Sigrid Miller Pollin, Chair

William Adams, Graduate Coordinator

The Department of Architecture offers programs of study which lead to the degree, Master of Architecture.

The Master of Architecture as a first professional degree (M. ARCH I) is accredited by the National Architecture Accrediting board.

The M. ARCH I program accepts students from varied academic backgrounds, including non-design disciplines, for a three years and one quarter long program.

For students with no previous study in architecture, two years of intensive prerequisite course work precedes the final four quarters of the Master of Architecture program. Students are strongly urged to complete courses in college algebra, trigonometry, and physics prior to beginning this program since these courses are prerequisites to the study of structures and environmental controls. Failure to take these courses in advance may lengthen the program by as much as two quarters.

An introductory summer program in design is offered to prospective Master of Architecture students. Courses in this special program are taught by faculty in the departments of Architecture, Landscape Architecture and Urban and Regional Planning. Students accepted into the M. ARCH I program are strongly encouraged to take this introductory sequence. A portion of the credit achieved in this summer program may be applied to the M. ARCH I program. This program is also available to students who have not yet been accepted into the Master's of Architecture program through the College of the Extended University. Further information may be obtained by contacting the Department of Architecture.

Students holding a non-professional bachelor of arts or bachelor of science degree, with a major in architecture, are encouraged to apply for advanced standing within the M. ARCH I graduate program. Normally, two years and one quarter of additional study in this advanced standings program would lead to the Master of Architecture degree.

The final four quarters of the M. ARCH I program require 60 quarter units of academic work. Research in either theory or social responsibility in architecture will culminate in a thesis/project.

Prior to graduation, all students in the M. ARCH I program are required to fulfill 500 hours of work. A minimum of 250 hours of work must be with a registered architect. The remaining 250 hours may be done with a faculty-approved alternative. This work must be verified by the department's Coordinator of Professional Practice and Cooperative Education.

The M. ARCH II program provides advanced study for students already holding the Bachelor of Architecture degree. The program is best suited to students whose undergraduate work in architecture, or whose subsequent professional work demonstrates the intelligence, curiosity, self-discipline and creativity necessary for graduate work. A minimum of 60 quarter units of academic work, including a culmination thesis/project, must be completed in this program before the Master of Architecture degree is granted.

An area of special concentration shall be arranged through the Department of Architecture. The major focus of the program is on sustainable/regenerative design of the built environment, including building preservation and adaptive reuse, utilizing courses from the Department as well as those of the Departments of Landscape

Architecture and Urban and Regional Planning in the College of Environmental Design, the Center for Regenerative Studies, and the College of Engineering. This independent sequence must be arranged with the prior approval of the graduate coordinator. The area of concentration must be selected no later than the end of the first quarter in the program. The M. ARCH II, second professional degree, is considered to be a teaching as well as an advanced degree. Students in this program may be required to assist in the teaching of the undergraduate students and to share the benefits of advanced study with them through both formal and informal means.

Each year, approximately 22 full- and part-time faculty in the Department of Architecture conduct classes for the more than 500 students, including 50 graduate students, enrolled in its various programs. The department is a member of the Association of Collegiate Schools of Architecture. Most of its faculty hold professional degrees in architecture and are registered architects. Many are also members of the American Institute of Architects, or other professional associations.

The Institute for Environmental Design provides the means for interdisciplinary study of environmental design issues. Please refer to the undergraduate section for information on this program.

### ADMISSION TO THE PROGRAM

For admission to the Master of Architecture program, an applicant must have received a baccalaureate degree and have attained an overall undergraduate grade point average of at least 3.0. An applicant who does not meet these criteria may be admitted on a conditional basis if evidence of compensating qualifications can be furnished. Students may enter the Master of Architecture program in the fall quarter only.

In addition to the standard university application forms and official transcripts of all college work which must be submitted to the university Admissions Office, the Department of Architecture requires the following:

- 1) Portfolio (BOUND 8 1/2" X 11") illustrating creative or analytic ability in written, graphic, or mathematical form;
- 2) Statement of purpose or intentions in applying to the program; and
- 3) Three letters of recommendation from those in a position to assess the applicant's potential for either the profession of architecture or a master's level academic program.

Personal interviews are not required. The Graduate Record Examination (GRE) is recommended but is not required.

Applicants should contact the Department of Architecture for the critical dates in the admission process. January 15 is the usual deadline for all application materials. Applicants will be notified of the decision of the departmental admissions committee by April 15 or as soon thereafter as possible.

Upon admission to the Department of Architecture, the student will meet with the coordinator of the graduate program to prepare a reasonable sequence of course work. The curriculum thus specified may be altered only by written request submitted in accordance with university regulations.

### REQUIREMENTS AND CONDITIONS

1. In the Master of Architecture, First Professional Degree program (M. Arch I), as many as 160 quarter units may be required. For the Master of Architecture Second Professional Degree Program (M. Arch II), a minimum of 60 quarter units must be completed. In this program, no more than 24 units of 400-level work will be accepted. No work below 300-level will be accepted in either program.
2. All course work must be completed in residency, unless consent is

granted by the Graduate Studies Committee for each off-campus course. Title 5 of the California Code of Regulations requires a minimum of 32 units of coursework in residence.

3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, or Extended University, or units petitioned for graduate credit may be included on a master's contract.
4. An overall average of "B" (3.0) or better must be maintained in order to receive a graduate degree. The minimum grade in architecture courses which will be accepted for credit toward the degree is "C." Any course in which a lower grade is received must be retaken, but the initial grade will not be removed from the student's record nor from the calculations for the grade point average.
5. A student must be enrolled in a minimum of 6 and a maximum of 18 quarter units of work per quarter. In order to take more than 18 units per quarter, the student must obtain prior approval of the Graduate Coordinator and file a petition in the Records Office.
6. Advancement to Candidacy must be achieved. The Graduation Writing Test (GWT) must be passed prior to advancement.
7. A final project/thesis is required of candidates in both the First (M. ARCH I) and Second (M. ARCH II) Professional Degree programs. A candidate for the M. ARCH I will be required to pursue an interest in theory or social responsibility in architecture. The candidate must submit a written proposal and file a petition outlining the goals, procedures and intentions of his/her independent project, and receive approval for it from the department's Graduate Studies Committee prior to enrolling in the project course. Three faculty members, chosen to serve as the candidate's project advisors, must also receive copies of the proposal.
8. Credit will not be awarded for the same course in both the baccalaureate and master's programs in architecture.
9. All class work becomes the property of the department with superior work retained for display and archival use.
10. The candidate must be enrolled in the university during the quarter of graduation.

### PROGRAM FOR THE MASTER OF ARCHITECTURE I

(First Professional Degree)

#### PREREQUISITE COURSES

Normally already met by students who hold the Bachelor of Architecture Degree

Structures	ARC 321/321A	3,1
Structures	ARC 322/322A	3,1
Structures	ARC 323/323A	3,1
Environmental Controls	ARC 331/331A	3,1
Environmental Controls	ARC 332/332A	3,1
Building Construction	ARC 341/342	4,4
Ancient and Medieval Architecture	ARC 361/361A	3,1
Renaissance and Baroque Architecture	ARC 362/362A	3,1
Nineteenth and Twentieth Century Architecture	ARC 363/363A	3,1
Architectural Practice	ARC 471	4
Architecture and Computers	ARC 474	4
Behavioral Factors in Architecture	ARC 481	4
Introduction to Architectural Design	ARC 501/501L	3,3
Introduction to Architectural Design	ARC 502/502L	3,3

Intermediate Architectural Design	ARC 503/503L	3,3
Architectural Design	ARC 504/504L	3,3
Architectural Design	ARC 505/505L	3,3
Architectural Design	ARC 506/506L	3,3
Approved Electives		12
<b>TOTAL PREREQUISITE UNITS</b>		<b>100</b>

#### FINAL FOUR QUARTER PROGRAM

Seismic Design	ARC 424	4
American Architecture	ARC 464/464A	3,1
Advanced Architectural Design	ARC 601/601L	3,3
Advanced Architectural Design	ARC 602/602L	3,3
Social Responsibility in Architecture	ARC 652	4
or Theory and Literature of Architecture	ARC 653	
Project/Thesis Research	ARC 691	4
Project/Thesis Programming	ARC 694	4
Master's Project	ARC 695	8
or Master's Thesis	ARC 696	
Landscape Architecture Elective	LA	3-4
Urban and Regional Planning Elective	URP	3-4
Professional Electives		12-14

**TOTAL FOUR QUARTER PROGRAM** 60

**TOTAL UNITS OF MASTER OF ARCHITECTURE I** 160  
(First Professional Degree)

#### PROGRAM FOR THE MASTER OF ARCHITECTURE II

(Second Professional Degree)

Project/Thesis Research	ARC 691	4
Project/Thesis Programming	ARC 694	4
Master's Project	ARC 695	8
or Master's Thesis	ARC 696	
Professional Electives (must be arranged with prior approval of Graduate Coordinator)		44

**TOTAL UNITS FOR MASTER OF ARCHITECTURE II** 60  
(Second Professional Degree)

#### PROFESSIONAL ELECTIVE COURSES

Energy Conservation	ARC 333	4
Solar Design	ARC 334	4
Advanced Structures	ARC 425	4
Advanced Structures	ARC 426	4
Contemporary Architecture	ARC 465	4
Japanese Architecture	ARC 466	4
California Architecture	ARC 467	4
Latin American Architecture	ARC 468	4
The Architect and the Development Process	ARC 473	4
Computer Aided Design in Architecture	ARC 475	4
Business Development in Architecture	ARC 476	4
Behavioral Factors in Architecture	ARC 482,483	4,4
Topics in Design History	ARC 567	4
Directed Study	ARC 591	2-4
Directed Study	ARC 592	2-8

Other electives must receive prior approval of the Graduate Coordinator.

#### GRADUATE COURSE DESCRIPTIONS

NOTE: For graduate prerequisite course descriptions, see undergraduate section.

**ARC 501/501L Introduction to Architectural Design (3/3)**

Introduction to the fundamental elements of architectural design explored in the abstract. The principles and techniques equip the student for an exploration of real human problems. Emphasis on basic design, graphic communication skills and model-making. For Master of Architecture students only. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: Matriculation into the Master of Architecture program.

**ARC 502/502L Introduction to Architectural Design (3/3)**

Using a case study process, a study of general aspects of ecological, human, aesthetic and technological factors as architectural design determinants. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: ARC 501/501L.

**ARC 503/503L Intermediate Architectural Design (3/3)**

Procedures and methods related to architectural design application. Emphasis on the thorough design and design development of a program or programs and includes some design detailing. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: ARC 502/502L.

**ARC 504/504L Architectural Design (3/3)**

An investigation of materials as well as methods of structure and construction as they become the determinants of design theory. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: ARC 503/503L, ARC 341.

**ARC 505/505L Architectural Design (3/3)**

Design of complexes of buildings, with an emphasis on conceptual issues and issues of context. (May be repeated as an addition to the course of study). 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: ARC 504/504L.

**ARC 506/506L Architectural Design (3/3)**

The design of complex buildings with an emphasis on the inclusion of structural, mechanical, environmental and energy-conserving systems. 3 lecture discussions; 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: ARC 505/505L.

**ARC 567 Topics in Design History (4)**

Non-chronological investigations of the elements, typologies, methods and context of architecture; comparisons of historic and contemporary designs. 2 two-hour lecture discussions. Prerequisite: ARC 363/363A or ARC 464/464A or permission of instructor.

**ARC 591 Directed Study (2-4)**

Directed study on a subject of interest to the student and important to the understanding of architecture. Prerequisite: prior approval of the proposal by the Graduate Studies Committee. This course may be repeated for credit.

**ARC 592 Directed Study (2-8)**

Directed study on a subject of interest to the student and important to the understanding of architecture. Prerequisite: prior approval of the proposal by the Graduate Studies Committee. This course may be repeated for credit.

**ARC 601/601L Advanced Architectural Design (3/3)**

Advanced study of interaction of design methods, user needs, and site constraints explored in design projects. 3 lecture discussions; 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: Matriculation into the Master of Architecture Program II or ARC 506/506L and passage of a comprehensive design examination. Unconditional standing required.

**ARC 602/602L Advanced Architectural Design (3/3)**

An exploration of urban design issues, including research and analysis of the topics associated with mixed use projects. 3 lectures, 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: ARC 601/601L. Unconditional standing required.

**ARC 652 Social Responsibility in Architecture (4)**

Examination of the social context of buildings and architecture, beyond the limited functional and economic needs of clients; the implicit responsibility of buildings and architects to broaden environmental issues, as well as social needs. 2 two-hour seminars. Prerequisite: Admission to the final year of the Master of Architecture program. Unconditional standing required.

**ARC 653 Theory and Literature of Architecture (4)**

Explorations into the polemics, methodologies, and ideals of architecture through a review of its literature; emphasis on texts significant to contemporary practice. 2 two-hour seminars. Prerequisite: Admission to the final year of the Master of Architecture program. Unconditional standing required.

**ARC 691 Project/Thesis Research (4)**

Identification, supporting research, and development of master's project/thesis proposal. 1 four-hour seminar. Prerequisite: Admission to ARC 601/601L. Unconditional standing required.

**ARC 694 Thesis/Project Programming (4)**

Research and programming in support of faculty-approved student's master's project/thesis. 1 four-hour seminar. Prerequisites: ARC 601/601L, ARC 691. Unconditional standing required.

**ARC 695 Master's Degree Project (8)**

Independent and complete design project derived from the work developed in ARC 691 and 694; design development and presentation. Prerequisites: ARC 602/602L, ARC 652 or 653, and ARC 694. Advancement to Candidacy required.

**ARC 696 Master's Degree Thesis (8)**

Independent written thesis project derived from the work of ARC 691 and 694 culminating in a formal presentation and defense. Prerequisites: ARC 602/602L, ARC 652 or 653, and ARC 694. Advancement to Candidacy required.

**ARC 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of project or thesis. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.



## BIOLOGICAL SCIENCES

### MASTER OF SCIENCE IN BIOLOGICAL SCIENCES

In the Department of Biological Sciences, College of Science

Lenard R. Troncale, Chair, Biological Sciences Department

David J. Moriarty, Departmental Graduate Coordinator

The Master of Science degree program in the Biological Sciences enhances the knowledge and competence of the student in the chosen field of specialization and develops potential for continuing self-directed study and research. The curriculum is designed to increase the student's knowledge of the discipline by providing theoretical, technical and practical studies. It also provides students with training in the use of research techniques, as well as familiarity with the critical evaluation of, and the use of scientific literature. Graduate study specializations may be elected in the disciplines of the biological sciences: biology, biotechnology, botany, microbiology and zoology.

### ADMISSION TO THE PROGRAM

An applicant for admission to this program must have a bachelor's degree with a major in one of the disciplines of the biological sciences or a related field. The minimum requirements for admission are: 24 quarter units in upper division biological sciences, 15 quarter units in chemistry and 12 quarter units in physics and/or mathematics. These courses must be comparable to those required for a baccalaureate major at this university.

An undergraduate grade point average of 2.5 or better is required for conditional admission and a 3.0 (B) average in all upper division work is required for unconditional admission to the Master of Science degree program in the Biological Sciences. In addition to the grade requirements, the applicant must submit a personal statement, three letters of recommendation from professionals qualified to judge the applicant, and the score on the Biology Subject Test or the Biochemistry, Cell, and Molecular Biology Subject Test of the Graduate Record Exam. Admission to the program will be determined by the Graduate Committee based on the total record of the applicant.

Completed applications must be received by April 1 for summer and fall quarter admission, by October 1 for winter quarter admission, and by January 10 for spring quarter admission. Applications will not be processed during the summer quarter.

The unconditional graduate student with an advisory committee will develop a program in a selected discipline of biology based upon interests and preparation. The student's approved program will include required core courses, a selection of additional formal courses in a specialization, independent study and an appropriate thesis. It will normally constitute 45 to 50 quarter units of credit.

### REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units; at least 24 units must be in 500-600 level courses.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.

3. The student must complete the program based upon the curriculum outlined below.
4. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate classes.
5. The Graduation Writing Test (GWT) must be passed prior to Advancement to Candidacy.
6. Advancement to Candidacy is required.
7. An acceptable thesis must be completed and submitted for binding in accordance with university regulations.
8. A final oral examination must be successfully completed.
9. The candidate must be enrolled in the university during the quarter of graduation.

### CURRICULUM

#### Required Courses

Seminar in Biology	.....BIO	680	3
Presentation of Research Proposal	.....BIO	693	1
Thesis Research in Biological Sciences	.....BIO	694	6
Master's Degree Thesis	.....BIO	696	3

#### COURSE IN SPECIALIZATION

To be selected with consent of the student's thesis committee from 400, 500 and 600-level courses, 32-37 units including not more than 21 units of approved 400-level courses.

Total ..... 45-50

### GRADUATE COURSE DESCRIPTIONS

NOTE: For all courses which have both a lecture component and a laboratory component (e.g., BIO 510/510L), both components are co-requisites, and must be taken concurrently.

#### BIO 500 Training in Graduate Research (1-3)

Advanced training in laboratory and analytical techniques under the supervision of a faculty member. Students must register through the department office. Open to postbaccalaureate students. Staff.

#### BIO 510/510L Cytogenetics (2/1)

Nuclear and cytoplasmic structures and phenomena as related to inheritance. 2 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: BIO 303. Campbell.

#### BIO 515/515L Plant Biosystematics (3/1)

Theoretical and technical aspects of plant biosystematics; principles and techniques used in the study of relationships within and between plant species; application of experimental techniques to the study of plant diversity. Recommended background courses are: BIO 306, BIO 530 and BOT 343/343L. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: BIO 213, BIO 303 and BIO 325/325L or consent of instructor. Clark.

#### BIO 520/520L Endocrinology (3/1)

Study of the endocrine glands and their role in growth development, metabolic regulation and reproduction in animals. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: CHM 327/327L and ZOO 424/424L and/or consent of instructor. Stiffler.

**BIO 521 Renal Physiology (3)**

Elements of epithelial transport function with special reference to the kidney. Current research on renal function will be stressed. 3 lecture discussions. Prerequisite: ZOO 424/424L. Stiffler.

**BIO 522/522L Structure and Function in Insects (3/2)**

Comparative functional morphology of insects; aspects of insect physiology. 3 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: ZOO 426/426L or the equivalent and junior standing. Edmonds.

**BIO 523/523L Immature Insects (1/2)**

Study of the development, biology and classification of immature insects. 1 lecture/discussion; 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: ZOO 426/426L or the equivalent. Edmonds.

**BIO 524 Insect Ecology (3)**

Principles of ecology as they apply to insects and other invertebrates. 3 lecture discussions. Prerequisites: ZOO 426/426L or the equivalent, and BIO 325/325L.

**BIO 525/525L Ecology of Fungi (2/2)**

Autecology and synecology of fungi in soil, water, atmosphere, living and dead tissues and other environments; saprophytism; commensalism, mutualism and parasitism; methods of collection, isolation and ecological study; some independent study required. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisites: BOT 425/425L and BOT 426/426L; BIO 325/325L or BOT 421/421L recommended; or consent of instructor. Stoner.

**BIO 526/526L Insect Classification (2/2)**

Aspects of taxonomic procedure and study of classifications of the Class Insecta. Collection, identification and recognition of significant insect families. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: ZOO 426/426L or the equivalent. Edmonds.

**BIO 528 Community Ecology (3)**

Patterns in the diversity, relative abundance and manner in which communities of plant and animal species are assembled. Competition, co-existence strategies and their effect on community structure within the framework of natural selection. 3 lecture discussions. Prerequisite: BIO 325/325L. Moriarty.

**BIO 530 Mechanisms of Speciation (3)**

Principles and concepts of evolutionary mechanisms in plants and animals. 3 lecture discussions. Prerequisites: BIO 213, BIO 303 and BIO 325/325L. Clark.

**BIO 532 Tropical Field Biology (2-6)**

A 30-day field trip in Venezuela including study and field problems in tropical ecosystems. Lectures by faculty from Universidad Central de Venezuela, Cal Poly Pomona, and other institutions. Possible visits to institutions and field sites in other tropical countries. Field trip fee required. Recommended: BIO 415/415L and knowledge of Spanish. Prerequisites: Graduate or advanced undergraduate standing, consent of instructors and BIO 485. George, Stewart, Szijj.

**BIO 534/534L Water Pollution Biology (3/2)**

Effects of pollution on aquatic organisms. Emphasis on experimental investigation in laboratory and field. 3 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: consent of instructor. Staff.

**BIO 535 Advanced Cell Biology (4)**

Molecular, ultrastructural and functional approach to cell biology. 4 lecture discussions. Prerequisites: BIO 435/435L and CHM 327/327L, or consent of instructor. Troncale.

**BIO 540 Biogeography (3)**

Principles and concepts of the distribution of plants and animals throughout the world. Origins and dispersal of modern flora and fauna as related to environmental and historical factors. 3 lecture discussions. Prerequisites: BIO 213 and BIO 325/325L. Szijj.

**BIO 542L Graduate Laboratory (1-3)**

Advanced laboratory experience, individually arranged or concurrent with other graduate courses. May be repeated for a maximum of 10 units. Prerequisite: consent of instructor. Staff. (See note at bottom of page at the end of this section.)

**BIO 545/545L Physiology of Plant Disease (3/1)**

Physiology of host-parasite relations, mechanisms of pathogenesis and the bases for resistance and specificity in plant diseases, with special emphasis on diseases caused by fungi and bacteria. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: BOT 223, BOT 422/422L and CHM 227/227L. Stoner.

**BIO 548/548L Advanced Plant Physiology (2/2)**

Selected major aspects of plant water relations, metabolism and growth. Emphasis on experimental investigations. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: BOT 422/422L. Staff.

**BIO 550/550L Plant Growth and Development (2/2)**

Hormonal and environmental control of plant morphogenesis. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: BOT 422/422L.

**BIO 555 Molecular Biology of Development (4)**

Consideration of molecular mechanisms involved in differentiation as they relate to such phenomena as tissue specificity, gene control, morphogenesis, cell specialization. 4 lecture discussions. Prerequisite: consent of instructor. Sperry.

**BIO 560/560L Bacterial Physiology (3/1)**

Physiological characteristics of bacteria with emphasis upon growth, biosynthetic capabilities and regulation of enzyme formation and function. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: MIC 300/300L and CHM 327/327L. Staff.

**BIO 565/565L Animal Tissue Culture (2/2)**

Principles, basic methodology and special applications of animal cell culture. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: MIC 201/201L or similar experience in aseptic technique. Pal.

**BIO 570/570L Cellular Immunity and Disease (3/1)**

T-cell mediated immunity; its protective and pathogenic roles; mechanisms of cellular immunity, its importance in infectious disease, transplant rejection, tumor surveillance and autoimmune phenomena. Laboratory provides experience with lymphocyte tissue cultures, lymphocyte immune response in vitro, skin grafting and passive cellular immunity. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: MIC 415/415L. Adler.

**BIO 575 Advanced Topics in Biology (1-4)**

Discussion of advanced topics in biology. Topics selected to correspond with the changes in the field or needs of advanced students. Total credit limited to 6 units. 2 lecture discussions. Staff.

**BIO 576/576L Advanced Immunology (2/1)**

Principles of immunoglobulin structure and the allotype and other isoantigenic concepts. Laboratory exercises in the fractionation and purification of serum globulins and in their use to study cytoantigens. 2 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: MIC 415/415L. Staff.

**BIO 577/577L Transmission Electron Microscope Techniques (2/3)**

Skills and techniques in transmission electron microscopy, including specimen preparation, operation of the TEM and ancillary equipment and darkroom techniques. Material of interest may be studied by the student. 2 lecture discussions, laboratory, 9 hours by arrangement. Concurrent enrollment required. Prerequisite: BIO 423/423L or consent of instructor. Campbell.

**BIO 578/578L Scanning Electron Microscope Techniques (2/3)**

Skills and techniques in scanning electron microscopy, including specimen preparation, operation of the SEM and ancillary equipment and darkroom techniques. Material of interest to the student may be studied. 2 lecture discussions, laboratory, 9 hours by arrangement. Concurrent enrollment required. Prerequisite: BIO 423/423L or consent of instructor. Campbell.

**BIO 579 Recent Advances in Ultrastructure Research (3)**

Current developments in major fields of ultrastructure research. 3 lecture discussions. Prerequisite: consent of instructor. Campbell.

**BIO 590 Experimental Biology (3)**

Lecture series concerning recent research in selected fields of biology; each series to have a subtitle identifying the field. Total credit limited to 9 units. 3 lecture discussions. Staff.

**BIO 680 Seminar in Biology (1-3)**

Arrangements to be made with faculty. Topics in disciplines of biology offered according to interests and needs of students. Each seminar to have a subtitle identifying the discipline. 1-3 units per quarter, maximum of 9 units. Unconditional standing required. Staff.

**BIO 691 Directed Study (1-3)**

Individual research in a specialized area on an advanced topic under the direction of a graduate faculty member. May or may not lead to a thesis. Students must register through the department office. Unconditional standing required. Graduate faculty.

**BIO 692 Independent Study (1-3)**

Study, research or readings proposed by the student with the consultation and approval and under the supervision of a faculty member, but not leading to a thesis/project. Students must register through the department office. Unconditional standing required. Graduate faculty.

**BIO 693 Presentation of Research Proposal (1)**

A public oral presentation and discussion of a proposed research plan for the master's thesis. Required for Advancement to Candidacy. Unconditional standing required. Graduate Faculty. This course may be taken on a credit/no credit basis.

**BIO 694 Thesis Research in the Biological Sciences (1-3)**

Selection and completion of an experimental research project under the supervision of a graduate faculty member, leading to new knowledge as part of the preparation for writing a thesis. Total credit limited to 6 units, but may be taken for more. Unconditional standing required. Graduate faculty.

**BIO 696 Master's Degree Thesis (1-3)**

Compilation, evaluation, interpretation, and report of research for thesis directed by a committee of graduate faculty members. Completion of approved, bound thesis. Total credit limited to 3 units, but may be taken for more. Advancement to Candidacy required. Prerequisite: BIO 694. Graduate faculty.

**BIO 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

## BUSINESS ADMINISTRATION

### Graduate Business Administration Programs

In the College of Business Administration

Eric J. McLaughlin, Interim Director, Graduate Business Programs

Graduate Business Programs Committee:

Rhonda Rhodes, Chair/Operations Management

Michelle Chu, Finance, Real Estate, and Law

William J. Cosgrove, Operations Management

Robert L. Hurt, Accounting

Daniel P. Manson, Computer Information Systems

Bob Schaffer, Marketing Management

Nirmal K. Sethia, Management and Human Resources

### MASTER OF BUSINESS ADMINISTRATION

The undergraduate and graduate programs of the College of Business Administration are accredited by the American Assembly of Collegiate Schools of Business (AACSB). AACSB accreditation assures quality and promotes excellence and continuous improvement in undergraduate and graduate education for business administration.

The Master of Business Administration curriculum is designed to provide a two-year program of broad professional development. The objectives are to develop a better understanding of the role of the professional manager and the responsibilities within the firm and society; to assist the student in developing a critical approach to decision-making and the ability to speak and write effectively and professionally; to develop skills in interpersonal relations; to develop a sound theoretical understanding of organizations and a management perspective for considering problems and making decisions from the viewpoint of the entire firm, industry and economy; to develop an increased understanding and awareness of the world in which the individual lives; and to develop the capability of acquiring additional education.

### ADMISSION TO THE PROGRAM AND REQUIREMENTS

After a prospective student has submitted the application for admission to the MBA program to the Office of Admissions, the procedure will be as follows:

1. Admission to the MBA program will be granted on recommendation of the College of Business Administration Graduate Programs Committee to the college dean. Selection will be on the basis of evidence of ability to perform at a high academic level. The following criteria are considered: the undergraduate grade-point average, scores on the Graduate Management Admissions Test (GMAT), work experience, letters of recommendation and the applicant's personal statement or interview.
2. A TOEFL score of 580 or better is required for admission of foreign students to the program.
3. The Graduate Programs Director of the College of Business Administration will notify applicants of their admission or denial.
4. The Graduate Business Programs Director will serve as advisor to all selected applicants.
5. First-year program courses may be waived if equivalent courses have been successfully completed by the student. Waiver will be granted on recommendation of the Director and approval of the Graduate Business Programs Committee.

6. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.
7. An advisory program study worksheet for the guidance of the student will be prepared by the Graduate Business Director when the student is admitted to the MBA degree program. An official degree program will be finalized prior to the completion of the second quarter. It will be approved by the Graduate Business Programs Director and verified by the Graduate Studies Analyst.
8. A grade-point average of 3.0 (B) or better must be maintained in all course work taken to satisfy degree requirements and in all graduate-level course work taken at this university.
9. Students will be required to complete all prerequisites before enrolling in 600-level courses.
10. In order to advance to candidacy for the MBA or MSBA degree, a student must: (a) achieve unconditional standing; (b) complete at least 12 units of graduate coursework at Cal Poly Pomona with a GPA of 3.0 or better; (c) pass the Graduation Writing Test; and, (d) have an approved program of study on file.
11. The candidate must be enrolled in the university during the quarter of graduation.
12. Incoming graduate students to the College of Business Administration are required to have unrestricted access to a Windows laptop computer meeting or exceeding specifications set by the College of Business Administration. Such access may be accomplished by purchase, rental, or other alternative agreed upon by the college and the student. Students may lease or purchase the equipment independently, or from the bookstore through the campus lease/purchase agreement. The college will work closely and confidentially with students requiring financial aid to assure laptop computer access to all graduate students.

### MBA PROGRAM

#### CURRICULUM

#### Prerequisite Courses

			Units
*Business Economics	.....EC	521	4
Financial Accounting	.....GBA	510	4
Financial/Managerial Accounting	.....GBA	511	4
Managerial Statistics	.....GBA	514	4
Essentials of Marketing Management	.....GBA	517	4
Legal Environment of Business	.....GBA	530	4
Production and Operations Management	.....GBA	531	4
Organizational Management, Principles and Behavior	.....GBA	535	4
Fundamentals of Financial Management	.....GBA	546	4
Management Information Systems	.....GBA	547	4
Elementary Statistics with Applications	.....STA	120	4
Total, First Year	.....		40

\*EC 521 may be waived if a student has completed EC 201, 202 and 311 with an A or B within the previous five years.



**Second Year****Required Courses**

Managerial Accounting for Decision-Making . . . . .	GBA	608	3
Directed Study in Managerial Accounting . . . . .	GBA	609	1
Seminar in Organizational Behavior . . . . .	GBA	615	3
Directed Study in Organizational Behavior . . . . .	GBA	616	1
Management Science Seminar . . . . .	GBA	628	3
Directed Study in Management Science . . . . .	GBA	629	1
Financial Decision-Making . . . . .	GBA	645	3
Directed Study in Financial Decision-Making . . . . .	GBA	646	1
Marketing Seminar . . . . .	GBA	652	3
Directed Study in Marketing Seminar . . . . .	GBA	653	1
Management Seminar . . . . .	GBA	671	3
Directed Study in Management Seminar . . . . .	GBA	672	1
Information Systems Seminar . . . . .	GBA	673	3
Directed Study in Information Systems Seminar . . . . .	GBA	674	1
Business Research Methods . . . . .	GBA	683	3
Directed Study in Business Research Methods . . . . .	GBA	684	1
Management Policies and Strategies Practicum . . . . .	GBA	687	3
Directed Study in Management Policies and Strategies Practicum . . . . .	GBA	688	1
Sub-total. . . . .			36

**Elective Courses-MBA Program**

Select 8 units:

Information Systems Analysis and Design . . . . .	GBA	522	4
Information Systems Implementation and Programming . . . . .	GBA	524	4
Automated Office Systems for Managers/Professionals . . . . .	GBA	525	3
Directed Study in Automated Office Systems for Managers/Professionals . . . . .	GBA	526	1
Organizational Communications . . . . .	GBA	527	4
Fundamentals of Contracts and Administration . . . . .	GBA	532	4
Analysis of Federal Contracts . . . . .	GBA	552	4
Database Design and Processing . . . . .	GBA	554	4
Computer-Based Data Communications . . . . .	GBA	557	4
Legal Environment of Information Systems . . . . .	GBA	560	4
Personnel Management . . . . .	GBA	562	4
Executive Development . . . . .	GBA	563	4
Creativity and Innovation . . . . .	GBA	564	4
Professional Presentations Using Technology . . . . .	GBA	565	3
Directed Study in Professional Presentations Using Technology . . . . .	GBA	566	1
Venture Creation and Growth . . . . .	GBA	570	4
Corporate Entrepreneurship and Renewal . . . . .	GBA	571	4
Environmental Issues in Entrepreneurship . . . . .	GBA	573	4
Advanced IS Auditing . . . . .	GBA	577	4
Security and Privacy of Information Systems . . . . .	GBA	578	4
Introduction to Real Estate Analysis and Valuation . . . . .	GBA	580	4
Practices and Application of Real Estate Law . . . . .	GBA	583	4
Taxes and Business Strategy . . . . .	GBA	591	3
Directed Study in Taxes and Business Strategy . . . . .	GBA	592	1
Special Topics for Graduate Students . . . . .	GBA	599	4
Rapid Application and Development . . . . .	GBA	606	4
Financial Markets and Institutions . . . . .	GBA	610	3
Directed Studies in Financial Markets and Institutions . . . . .	GBA	611	1
Investment Banking . . . . .	GBA	612	4
Management-Union Relations . . . . .	GBA	617	4
International Business . . . . .	GBA	620	4

Federal Government Contract Cases, Appeals and Jurisdiction . . . . .	GBA	630	4
Promotion Management . . . . .	GBA	633	4
Sales Productivity . . . . .	GBA	634	4
Motivation and Marketing Behavior . . . . .	GBA	635	4
Project Management . . . . .	GBA	636	3
Directed Study in Project Management . . . . .	GBA	637	1
Total Quality Management . . . . .	GBA	640	3
Directed Study in Total Quality Management . . . . .	GBA	641	1
Entrepreneurship Practicum . . . . .	GBA	642	3
Directed Study in Entrepreneurship Practicum . . . . .	GBA	643	1
Security Analysis and Portfolio Management . . . . .	GBA	647	3
Directed Study in Security Analysis and Portfolio Management . . . . .	GBA	648	1
Business Forecasting . . . . .	GBA	654	3
Directed Study in Business Forecasting . . . . .	GBA	655	1
Accounting for Decisions and Control . . . . .	GBA	659	4
Human Interaction Skills Laboratory . . . . .	GBA	665	4
Organizational Development . . . . .	GBA	667	4
Real Estate Finance and Investment . . . . .	GBA	680	4
International Real Estate and Real Estate Research . . . . .	GBA	681	4
Real Estate Acquisition and Development . . . . .	GBA	682	4
Financial Reporting and Communication . . . . .	GBA	689	4
Directed Study . . . . .	GBA	691	1-9
Independent Study . . . . .	GBA	692	1-4
Sub-total. . . . .			8

Sub-total. . . . . 8

With consent of the Graduate Business Programs Director up to 8 units of approved 400-level courses in business or economics may be selected as electives.

**Terminal Option**

Choose I or II (4 units)

Option I			
Business Research Project . . . . .	GBA	695	4

Option II			
Master's Degree Thesis . . . . .	GBA	696	4

Sub-total . . . . . 4

TOTAL UNITS, Second Year . . . . . 48

**THE CAREER MBA PROGRAM**

The Career MBA Program is designed for students who wish to emphasize a particular area of the curriculum. A set of courses appropriate to the career goal is selected by the student and the appropriate Graduate Faculty Advisor with the approval of the Graduate Business Programs Director.

Admission to the program and other requirements are identical to those of the regular MBA. Students may change to the Career MBA or MBA at any time, but are encouraged to decide early in order to avoid taking courses for which credit cannot be given. Students with an undergraduate business major are, generally, advised not to emphasize the same area in the MBA.

The program consists of 48 units of coursework designed to insure broad competence in management, in technical skills and in human relations as well as in the area of specialization. The curriculum for all emphases consists of a common core of 24 units, 20 elective units in the area of emphases; and, a terminal option of 4 units. Current curriculum sheets

for each emphasis as well as names of the Graduate Faculty Advisors are available in the Graduate Business Administration Office.

## EMPHASES

### Accounting

Provides emphasis on public accounting, management accounting, or internal auditing (with the possibility of preparing for certification); or, in the areas of government and not-for-profit accounting or taxation. Intermediate accounting courses may be required for no graduate credit for some of these tracks, and are recommended for all.

### Agribusiness

Designed jointly by the Colleges of Agriculture and Business Administration to offer an emphasis which is designed to prepare students for careers in agribusiness and to learn the essentials of such areas as agribusiness marketing, commodities and risk management, international agribusiness marketing and development, and the environment of the agribusiness firm, while mastering broad business skills. For ABM course descriptions, see the Agricultural Business Management graduate course section, listed under agriculture graduate programs.

### Business Education

For those interested in teaching business subjects at the high school, for those qualifying for community college employment, or for those who are pursuing the California State Supervision and Coordination Credential.

### Contract Management

The newest of the areas of specialization includes coursework which was developed in cooperation with the National Contract Management Association (NCMA). With an emphasis on the defense industry, students explore contract administration, cost/price analysis, federal contract case studies, and procurement in both government (FAR) and private (UCC) sectors.

### Entrepreneurship

For those interested in founding their own business or working effectively in the fast-changing world of growing companies. In addition to the emphasis on start-up companies and small business management, this concentration examines the strategies used in larger corporations to tap the entrepreneurial spirit.

### Finance

Provides specialization in the areas of financial analysis, the management of financial institutions, security analysis, and multinational finance.

### Human Resources Management (Personnel)

Covers such areas as employee selection, training and development, benefits programs, compensation, legal requirements, and personnel problems in diverse organizations. Prepares individuals for a variety of careers in the human resources field.

### Information Management

For the individual who has earned an undergraduate degree in a non-computer field. Provides an understanding of computer systems as well as the systems development process via the tools and skills necessary to be an intelligent user of computer resources and/or to manage a satellite computer installation within a user department. Not designed

for individuals who wish to be programmer/analysts, project leaders, or managers of information systems at the corporate level.

### International Business

Provides knowledge and expertise in international business needed to allow students to work for and/or with multinational firms. Students will be introduced to the global economic environment and the complexities of multinational sources of supply, markets, and funding. Many graduates will apply their business skills to careers in international trade.

### Marketing

Provides for specialization in marketing, the business function that identifies unfulfilled needs and wants, defines and measures their magnitude, determines which target markets the organization can best serve, decides on appropriate products, services, and programs to serve these markets, and calls upon everyone in the organization to "think and serve the customer." Students who complete this emphasis will develop the skills and knowledge needed to become marketing managers and aid their organizations in achieving marketing objectives.

### Operations Management

Provides basic knowledge for students with career interests in the management of manufacturing and service operations. A broad selection of course offerings permits students to tailor their program in one or more of the following areas: manufacturing (JIT/Kanban, FMS, CIM), project management (PERT/CPM), inventory/materials management (MRP I, MRP II), service operations, quality assurance, purchasing, quantitative methods (simulation modeling, managerial statistics), forecasting, and facilities management.

### Real Estate

Analyzes the various economic, legal, institutional and financial factors affecting the ownership of real estate, practices of real estate law, and related areas. Course offerings aid in preparing students to sit for the California Real Estate Brokers license.

### Other Emphases

Students with interests other than the listed career MBA emphases may work with the Graduate Faculty Advisor and the Graduate Business Programs Director to develop an emphasis specifically designed to meet individual needs.

## CURRICULUM

### Prerequisite Courses for the MBA Program

		Units
*Business Economics	.....EC	521 4
Financial Accounting	.....GBA	510 4
Financial/Managerial Accounting	.....GBA	511 4
Managerial Statistics	.....GBA	514 4
Essentials of Marketing Management	.....GBA	517 4
Legal Environment of Business	.....GBA	530 4
Production and Operations Management	.....GBA	531 4
Organizational Management, Principles and Behavior	.....GBA	535 4
Fundamentals of Financial Management	.....GBA	546 4
Management Information Systems	.....GBA	547 4
Elementary Statistics with Applications	.....STA	120 0

Total, First Year. .... 36-40

\* EC 521 may be waived if a student has completed EC 201, 202, and 311 with an A or B within the previous five years.

### Core Courses-Career MBA Program

#### Complete all courses (24 units)

Managerial Accounting for Decision-Making . . . . .	GBA	608	3
Directed Study in Managerial Accounting . . . . .	GBA	609	1
Seminar in Organizational Behavior . . . . .	GBA	615	3
Directed Study in Organizational Behavior . . . . .	GBA	616	1
Management Science Seminar . . . . .	GBA	628	3
Directed Study in Management Science . . . . .	GBA	629	1
Financial Decision Making . . . . .	GBA	645	3
Directed Study in Financial Decision-Making . . . . .	GBA	646	1
Business Research Methods . . . . .	GBA	683	3
Directed Study in Business Research Methods . . . . .	GBA	684	1
Management Policies and Strategies Practicum . . . . .	GBA	687	3
Directed Study in Management Policies and Strategies Practicum . . . . .	GBA	688	1
Sub-total. . . . .			24

#### Elective Courses-Career MBA Program

Select 20 units

Information Systems Analysis and Design . . . . .	GBA	522	4
Information Systems Implementation and Programming . . . . .	GBA	524	4
Automated Office Systems . . . . .	GBA	525	3
Directed Study in Automated Office Systems . . . . .	GBA	526	1
Organizational Communications . . . . .	GBA	527	4
Analysis of Federal Contracts . . . . .	GBA	552	4
Database: Design and Processing . . . . .	GBA	554	4
Computer-Based Data Communications . . . . .	GBA	557	4
Legal Environment of Information Systems . . . . .	GBA	560	4
Personnel Management . . . . .	GBA	562	4
Executive Development . . . . .	GBA	563	4
Creativity and Innovation . . . . .	GBA	564	4
Professional Presentations Using Technology . . . . .	GBA	565	3
Directed Study in Professional Presentations Using Technology . . . . .	GBA	566	1
Venture Creation and Growth . . . . .	GBA	570	4
Environmental Issues in Entrepreneurship . . . . .	GBA	573	4
Advanced IS Auditing . . . . .	GBA	577	4
Security and Privacy of Information Systems . . . . .	GBA	578	4
Introduction to Real Estate Analysis and Valuation . . . . .	GBA	580	4
Practices and Application of Real Estate Law . . . . .	GBA	583	4
Taxes and Business Strategy . . . . .	GBA	591	3
Directed Study in Taxes and Business Strategy . . . . .	GBA	592	1
Special Topics for Graduate Students . . . . .	GBA	599	4
Financial Markets and Institutions . . . . .	GBA	610	3
Directed Study in Financial Markets and Institutions . . . . .	GBA	611	1
Investment Banking . . . . .	GBA	612	4
Management-Union Relations . . . . .	GBA	617	4
International Business . . . . .	GBA	620	4
Business Information Systems . . . . .	GBA	622	3
Directed Study in Business Information Systems . . . . .	GBA	623	1
Management Science Seminar . . . . .	GBA	628	3
Directed Study in Management Science . . . . .	GBA	629	1
Federal Government Contract Cases, Appeals and Jurisdiction . . . . .	GBA	630	4
Promotion Management . . . . .	GBA	633	4
Sales Productivity . . . . .	GBA	634	4

Motivation and Marketing Behavior . . . . .	GBA	635	4
Project Management . . . . .	GBA	636	3
Directed Study in Project Management . . . . .	GBA	637	1
Total Quality Management . . . . .	GBA	640	3
Directed Study in Total Quality Management . . . . .	GBA	641	1
Entrepreneurship Practicum . . . . .	GBA	642	3
Directed Study in Entrepreneurship Practicum . . . . .	GBA	643	1
Security Analysis and Portfolio Management . . . . .	GBA	647	3
Directed Study in Security Analysis and Portfolio Management . . . . .	GBA	648	1
Marketing Seminar . . . . .	GBA	652	3
Directed Study in Marketing Seminar . . . . .	GBA	653	1
Business Forecasting . . . . .	GBA	654	3
Directed Study in Business Forecasting . . . . .	GBA	655	1
Accounting for Decisions and Control . . . . .	GBA	659	4
Management Seminar . . . . .	GBA	671	3
Directed Study in Management Seminar . . . . .	GBA	672	1
Information Systems Seminar . . . . .	GBA	673	3
Directed Study in Information Systems . . . . .	GBA	674	1
Real Estate Finance and Investment . . . . .	GBA	680	4
International Real Estate and Real Estate Research . . . . .	GBA	681	4
Real Estate Acquisition and Development . . . . .	GBA	682	4
Financial Reporting and Communication . . . . .	GBA	689	4
Directed Study . . . . .	GBA	691	1-9
Independent Study . . . . .	GBA	692	1-4
Environment of the Agribusiness Firm . . . . .	ABM	501	4
Agribusiness Marketing . . . . .	ABM	504	4
Commodities and Risk Management . . . . .	ABM	505	4
International Agribusiness Marketing and Development . . . . .	ABM	530	4

With the approval of the Graduate Business Programs Director, up to 12 units may be selected from approved 400-, 500-, and 600-level courses such as business or economics.

#### Terminal Option

Choose Option I or II (4 units)

Option I

Business Research Project . . . . .	GBA	695	4
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Option II

Master's Degree Thesis . . . . .	GBA	696	4
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Subtotal . . . . .			4
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Total Units Second Year. . . . .			48
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### MASTER OF SCIENCE IN BUSINESS ADMINISTRATION

In the College of Business Administration

The College of Business Administration offers a Master of Science in Business Administration for the student with a business degree who wishes to specialize in a concentrated area of coursework. The option in Information Systems Auditing is intended for students who wish to pursue a career in this area. The option in Entrepreneurship, Creativity, and Innovative Management is intended for students who want to start ventures themselves or assist in the ground level development and growth of young firms.

#### ADMISSION TO THE PROGRAM

1. Admission to the MSBA program will be granted on recommendation of the College of Business Administration

Graduate Programs Committee to the college dean. Selection will be on the basis of evidence of ability to perform at a high academic level. An applicant shall have a bachelor's degree in business from an accredited college or university. The following criteria are considered: the undergraduate grade-point average, scores on the Graduate Management Admissions Test, work experience, letters of recommendation, and the applicant's personal statement or interview.

2. A TOEFL score of 580 or better is required for admission of foreign students to the program.
3. The Graduate Director of the College of Business Administration will notify applicants of their selection or rejection.
4. An advisory study worksheet will be prepared by the advisor for the program for the guidance of the student. During the second quarter of attendance and prior to the student's advancement to candidacy, an official degree program will be prepared. It will be approved by the Director of Graduate Business Programs and verified by the Graduate Studies Analyst.

## REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.

2. A grade-point average of B (3.0) or better must be maintained in all course work taken to satisfy degree requirements and in all graduate-level course work taken at this university.
3. Advancement to Candidacy must be achieved.
4. The candidate must fulfill the terminal requirement of a comprehensive examination or a business research project.
5. The candidate must be enrolled in the university during the quarter of graduation.

## MSBA OPTION IN INFORMATION SYSTEMS AUDITING

The MSBA option in Information Systems Auditing is intended primarily for individuals with an interest in pursuing a career in IS auditing. The program is for business decision-makers, information systems technical specialists, information systems managers, and professionals in accounting, IS auditing, and other disciplines who wish to develop a better awareness of this field and how it can assist their organization. The objectives of the program are: to develop the ability to plan and conduct audits of the IS function; to develop the capability of reporting to management the findings reached; to prepare students for careers in the IS auditing profession; and to provide the necessary background for doctoral study and continued, self-directed study.

## CURRICULUM

Due to the technical orientation of the IS Auditing option, a strong background in accounting and information systems is required. Before a student can be advanced to candidacy, deficiencies in any of the subject matter listed below must be removed.

## Required For Admission to the Program

Information Systems Analysis and Design . . . . .	GBA	522	4
Information Systems Development . . . . .	GBA	524	4
Managerial Accounting for Decision-Making . . . . .	GBA	608	3
Directed Study in Managerial Accounting . . . . .	GBA	609	1
Total . . . . .			12

The program of study for the MSBA in IS Auditing will consist of 33-36 required units and 9-12 approved elective units.

## Required Courses MSBA Common Core

Professional Presentations Using Technology . . . . .	GBA	565	3
Directed Study in Professional Presentations . . . . .	GBA	566	1
and Seminar in Organizational Behavior . . . . .	GBA	615	3
or International Business . . . . .	GBA	620	4
Directed Study in Organizational Behavior . . . . .	GBA	616	1
Directed Study . . . . .	GBA	691	4
Sub-total . . . . .			12

## Required Courses in the Option

Computer-Based Data Communications . . . . .	GBA	557	4
Legal Environment of Information Systems . . . . .	GBA	560	4
Advanced IS Auditing . . . . .	GBA	577	4
Security and Privacy of Information Systems . . . . .	GBA	578	4
Information Systems Seminar . . . . .	GBA	673	3
Directed Study in Information Systems Seminar . . . . .	GBA	674	1
Sub-total . . . . .			20

## Elective Courses

With the approval of the IS advisor and Graduate Business Programs Director, a minimum of 9-12 units is to be selected from the following list.

Auditing Theory . . . . .	ACC	419	4
Advanced Auditing . . . . .	ACC	420	4
Internal Auditing . . . . .	ACC	424	4
Government and Not-for-Profit Accounting . . . . .	ACC	426	4
Systems Analysis and Design Methodologies . . . . .	CIS	415	4
Wide Area/Voice Network Business . . . . .	CIS	417	4
IS Auditing . . . . .	CIS	433	4
Network Management . . . . .	CIS	437	4
Internships . . . . .	CIS	441, 447	4
Programming Development Project . . . . .	CIS	466	4
Business Economics . . . . .	EC	521	4
Automated Office Systems for Managers/ Professionals . . . . .	GBA	525	3
Directed Study in Automated Office Systems for Managers/Professionals . . . . .	GBA	526	1
Client/Server Computing . . . . .	GBA	554	4
Executive Development . . . . .	GBA	563	4
Management Science . . . . .	GBA	628	3
Directed Study in Management Science . . . . .	GBA	629	1
Advanced Financial Management . . . . .	GBA	645	3
Directed Study in Advanced Financial Management . . . . .	GBA	646	1
Accounting for Decisions and Control . . . . .	GBA	659	3
Directed Study in Accounting for Decisions and Control . . . . .	GBA	660	1
Independent Study . . . . .	GBA	692	1-4
Sub-total . . . . .			9-12



**Terminal Option**

Choose Option I or II

**Option I**

Master's Degree Project .....GBA 695 4

**Option II**

Comprehensive Exam .....GBA 697 1

Total Units for the Degree ..... 45

**MSBA OPTION IN ENTREPRENEURSHIP, CREATIVITY AND INNOVATIVE MANAGEMENT**

Entrepreneurship is unique in American and international business in that many successful entrepreneurs have no formal education in business. They apply special skills from non-business areas to develop products and services to meet human needs. Moreover, the rate of new business formation increases every year.

This program is designed to attract: (1) individuals with entrepreneurial drives who wish to increase their chances of success as they start a business, (2) practicing entrepreneurs who need help to make their businesses grow, (3) corporate middle managers seeking to act entrepreneurially within their organization, (4) corporate top managers desiring to make their whole organization more receptive to internal innovation, and (5) individuals seeking to increase their personal creativity and innovation.

**ADMISSION REQUIREMENTS**

The MSBA Program in Entrepreneurship, Creativity and Innovative Management (ECIM) at Cal Poly Pomona has different admission criteria from many other programs. Selection will be made on the basis of evidence of ability to perform at a high academic level. Prospective candidates must have earned a bachelor's degree from an accredited college or university, have taken the GMAT test, AND have one or more of the following:

Experience or expertise in an area that has potential for a product/service that will serve as a basis for an entrepreneurial venture, e.g., science, engineering, entertainment, health care, architecture, manufacturing, food industry, retailing, marketing, medicine, electronics, etc.

Management experience in a small business;

A tangible product or service idea;

Management experience in a large organization, with an interest in intrapreneurship as well as business and product development;

Living experience in a country outside the United States with a desire to act as an entrepreneur in that country;

Ownership of one business with a desire to grow it or pursue other ventures.

In applying for admission to the program, prospective candidates must complete an application form, provide official transcripts from all colleges and universities previously attended, GMAT score(s), and three letters of reference.

**CURRICULUM**

Due to the unique characteristics and needs of entrepreneurs, a flexible and individual-centered curriculum is available to students in the MSBA ECIM Program. Part of each student's program will be customized, under faculty guidance, to meet individual needs.

**Prerequisites: Functional Areas of Business**

Select 3 courses from the following, two of which must be from finance or accounting and one from another discipline:

Business Economics .....	EC	521	4
Financial Accounting .....	GBA	510	4
Financial/Managerial Accounting .....	GBA	511	4
Essentials of Marketing Management .....	GBA	517	4
Legal Environment of Business .....	GBA	530	4
Productions and Operations Management .....	GBA	531	4
Fundamentals of Financial Management .....	GBA	546	4
Management Information Systems .....	GBA	547	4

Note: prerequisites may be waived based upon demonstrable experience or equivalent upper-division courses -- see graduate advisor.

**Course Requirements and Electives****A. Entrepreneurship Core Courses (12 units)**

Select 3 courses from the following:

Venture Creation and Growth .....	GBA	570	4
Corporate Entrepreneurship and Renewal .....	GBA	571	4
Environmental Issues in Entrepreneurship .....	GBA	573	4
Entrepreneurship Practicum .....	GBA	642	4

**B. Creativity (4 units)**

Creativity and Innovation .....	GBA	564	4
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Note: See Entrepreneurship graduate advisors for additional course offerings.

**C. Innovative Management (8 units)**

Select 2 courses from the following:

Organizational Management, Principles and Behavior .....	GBA	535	4
Executive Development .....	GBA	563	4
Emerging Issues in Managing in a Global Economy .....	GBA	605	4
Seminar in Organizational Behavior .....	GBA	615	3
Directed Study in Organizational Behavior .....	GBA	616	1
Organizational Development .....	GBA	667	4

**D. Strategic and Futures Studies (8 units)**

Select 2 courses from the following:

Entrepreneurship Practicum .....	GBA	642	4
Management Seminar .....	GBA	671	3
Directed Study in Management Seminar .....	GBA	671	1
Strategic Management .....	GBA	687	4
Forecasting Industry Evolution .....	GBA	599	4

Note: GBA 642 can be taken either as an Entrepreneurship core course or as a Strategic and Futures Studies course

**E. Electives (12 units)**

Students are to select courses that will meet their personal educational objectives in consultation with a graduate entrepreneurship advisor.

**Terminal Option (4 units)**

(Select either course)

Business Research Project .....	GBA	695	4
Master's Degree Thesis .....	GBA	696	4

Total Contract Units ..... 48

**GRADUATE COURSE DESCRIPTIONS****GBA 510 Financial Accounting (4)**

Accounting principles used in the collection, interpretation, and use of financial data from the standpoints of creditors, investors, and management. 4 lecture discussions.

**GBA 511 Financial/Managerial Accounting (4)**

Accounting principles used in the collection, interpretation, and use of financial data from the standpoints of creditors, investors, and management. Study of cost concepts, production cost analysis and cost-volume-profit analysis. 4 lecture discussions. Prerequisite: GBA 510 or equivalent.

**GBA 514 Managerial Statistics (4)**

Decision-making using classical techniques, non-parametric tests, Bayesian analysis, utility theory, index numbers, and time-series analysis. Sampling and sampling distributions, estimation, hypothesis-testing, variance analysis, regression, correlation and multiple regression. 4 lecture discussions. Prerequisite: STA 120, equivalent, or consent of instructor.

**GBA 517 Essentials of Marketing Management (4)**

Development of marketing strategy to identify and serve the needs of an organization's markets and publics. Concepts relating to the analysis, planning, implementation and control of marketing strategy involving product, promotion, pricing and distribution decisions made within an external environmental context. 4 lecture discussions.

**GBA 522 Information Systems Analysis and Design (4)**

Introduction to object-oriented analysis and design of computer information systems. The system life cycle and its business environment. Case studies using event analysis, data dictionary, normalization and data modules. Class hierarchies, structures, and collaboration of objects. User/computer interface design. 4 Lecture/problem solving.

**GBA 524 Information Systems Development**

Introduction to computer programming. Use of event-driven programming language to develop interactive business information systems. 4 Lecture/problem solving.

**GBA 525 Automated Office Systems for Managers/Professionals (3)**

Application of electronic office support systems for increased productivity of manager/professionals. Topics include office automation, information processing, copy processing/reprographics, electronic storage and records management, telecommunications, ergonomics and human factors of implementing change. 3 lectures/problem-solving. Concurrent enrollment in GBA 526 required.

**GBA 526 Directed Study in Automated Office Systems for Managers and Professionals (1)**

Independent use of computer applications software such as word processing, spreadsheet, database, graphics/draw, desktop publishing, desktop presentations, expert systems, and other special projects. Development of computer-generated work for written and oral presentation in the area of automated office systems. 1 seminar. Concurrent enrollment in GBA 525 required.

**GBA 527 Organizational Communications (4)**

Developing communication skills in the transmission and reception of written and oral information; becoming familiar with organizational literature; practicing communication skills in small groups; reviewing writing practices and procedures and the approved style manual. 4 lecture discussions.

**GBA 530 Legal Environment of Business (4)**

Analysis of the essential legal aspects of the business environment dealing with contracts, business-related torts, agency, employment law, and corporations. Function and operation of the courts and administrative agencies. Risk analysis and preventative law approach. 4 lecture discussions.

**GBA 531 Production and Operations Management (4)**

Introduction to fundamental concepts of production and operations management. Use of quantitative methods, forecasting, resource allocation, decision theory, capacity planning, project management, inventory and quality control. 4 lectures/problem-solving. Prerequisite: GBA 514.

**GBA 532 Fundamentals of Contracts and Administration (4)**

A study of the procedures/applications associated with Federal Acquisition Regulations (FAR). In-depth approach at operational level. Sets pace for employment of FAR, concept formation, contract life and program's successful completion. 4 lectures/problem-solving.

**GBA 535 Organizational Management, Principles and Behavior (4)**

Integration of management functions and behavioral processes as they relate to the operation of total enterprise. 4 lecture discussions, case studies, experiential exercises.

**GBA 546 Fundamentals of Financial Management (4)**

Theoretical and conceptual framework for financial decision-making stressing analytical and quantitative techniques. Analysis of controversial and sophisticated methods of allocating resources and raising funds both internally and externally within the corporate context. 4 lecture discussions. Prerequisites: GBA 510, GBA 514, and EC 521 and computer proficiency.

**GBA 547 Management Information Systems (4)**

Management and development of information systems in modern business and the public sector from the customer and the MIS perspective. Information as a strategic asset. Acquisition, analysis, integration, presentation of internal and external information. Information management in international and multinational enterprises. Ethical, social impacts. 4 Lecture/problem solving.

**GBA 552 Analysis of Federal Contracts (4)**

A study of problems related to federal contracts' categories, either price contract or cost contract. Examines policies/procedures of Federal Acquisition Regulations (FAR) price/cost regulations. Includes DOD/DFAS (variations of FAR) applications, influence and advances price/cost policy/theory. 4 lectures/problem-solving.

**GBA 554 Client Server Computing (4)**

Introduction to client/server computing environments. Relational database concepts, data modeling and database design. Distributed database and processing techniques. 4 Lecture/problem solving.

**GBA 557 Computer-Based Data Communications (4)**

Introduction to the use of computers to support data communications. Information systems design issues related to hardware, software, media, networks and protocols. 4 lectures/problem-solving. Prerequisite: GBA 522.

**GBA 560 Legal Environment of Information Systems (4)**

Fundamentals and intermediate knowledge of the legal environment concerning IS. Typical legal problems (private and public sector) arising from the acquisition, use and control of IS. 4 lecture discussions. Prerequisites: CIS 433 and GBA 530, or equivalent experience.

**GBA 562 Personnel Management (4)**

Analytical and descriptive overview of all the main sub-fields within personnel (human resources) management. Typical personnel problems of diverse organizations and their solutions, using contemporary techniques in accordance with legal requirements. 4 lectures/problem-solving. Prerequisite: GBA 535.

**GBA 563 Executive Development (4)**

Analysis of the factors endemic to the successful executive and how these skills and traits can be acquired. 4 seminars.

**GBA 564 Creativity and Innovation (4)**

Understanding and applying creativity to entrepreneurship. Developing individual and group creativity skills. Applying creative thinking to spot venture opportunities, recognize consumer trends and find unique niches, find innovative sources of financing, market new inventions. Technology transfer-emphasis on California. 4 seminars.

**GBA 565 Professional Presentations Using Technology (3)**

Course material demonstrates how proven, effective techniques can blend with new technology of computer-generated graphics to create powerful presentations. 3 lectures/problem-solving. Concurrent enrollment in GBA 566 required.

**GBA 566 Directed Study in Professional Presentations Using Technology (1)**

Independent use of computer application software to design and develop professional presentations, including computer-generated visuals and technology. 1 seminar. Concurrent enrollment in GBA 565 required.

**GBA 570 Venture Creation and Growth (4)**

A study of entrepreneurship as it relates to the founding of new companies, leveraged buyouts, divisional spinoffs, and growth from small to medium size sales volume. Examines managerial strategies and creative corporate structuring that taps the entrepreneurial spirit. 4 lecture discussions.

**GBA 571 Corporate Entrepreneurship and Renewal (4)**

Business plans. Creation of management team. Negotiating and structuring new venture deals. Harvesting or bankruptcy of the new venture. Management problems unique to small and medium-sized firms undergoing rapid growth. 4 lectures/problem-solving.

**GBA 573 Environmental Issues in Entrepreneurship (4)**

The relationship of entrepreneurial organizations, social issues and government regulation. Values, opportunities, goals and personal ethics of the entrepreneur. Government regulatory agencies and their impact on

smaller firms. Regulatory issues pertaining to California ventures. Problems of businesses leaving California. 4 seminars.

**GBA 577 Advanced IS Auditing (4)**

Hands on experience in applying IS Auditing techniques and methods. Fundamentals of advanced concepts in IS Auditing. 4 lecture discussions and projects. Prerequisites: CIS 433, GBA 522 and GBA 524 or equivalent experience.

**GBA 578 Security and Privacy of Information Systems (4)**

Practical case-study approach to solving security problems peculiar to the commercial data systems environment. 4 lecture discussions. Prerequisites: CIS 433 and GBA 557, or equivalent experience.

**GBA 580 Introduction to Real Estate Analysis and Valuation (4)**

Analysis of the economic, financial, institutional, and legal factors affecting the ownership, use, development and valuation of real estate. Qualifies students for the California Real Estate Broker License Examination. 4 lectures/problem-solving.

**GBA 583 Practices and Application of Real Estate Law (4)**

Critical analysis of common and statutory law related to California Real Estate Transactions. Guest lectures by practitioners on responsibilities and liabilities of real estate operations. Qualifies students for Real Estate Brokers License Examination. Not available for credit for students with courses in Real Estate Law and Practices. 4 lectures/problem-solving. Prerequisites: GBA 530 and GBA 580 or equivalents.

**GBA 591 Taxes and Business Strategy (3)**

A practical course on how to integrate regulatory costs (in particular, taxes), into strategic business decisions. Topics include consideration of sources of tax law, communication of tax concepts, tax rule uncertainty, implicit taxes, and international tax issues. 3 lecture discussions. Concurrent enrollment in GBA 592 required.

**GBA 592 Directed Study in Taxes and Business Strategy (1)**

Investigation of the impact of taxes on strategic business decision-making under the supervision of a faculty member. 1 seminar. Concurrent enrollment in GBA 591 required.

**GBA 599/599A/599L Special Topics for Graduate Students (1-4)**

Lecture-discussions of selected topics comprising new or experimental courses not otherwise offered. Each offering identified in the current schedule and on the student's transcript. No limitation on repeats. Prerequisite: consent of instructor.

**GBA 606 Rapid Application Development**

Introduction to techniques used to rapidly develop business information systems. Emphasis on JAD and Evolutionary Prototyping. 4 Lecture/problem solving. Prerequisite GBA 554.

**GBA 608 Managerial Accounting for Decision-Making (3)**

Use of accounting information for planning and control. Special attention to managerial uses of budgeting and cost data for decision-making purposes. 3 lecture discussions. Concurrent enrollment in GBA 609 required. Prerequisite: GBA 511 or equivalent.

**GBA 609 Directed Study in Managerial Accounting (1)**

Independent investigation of selected problems in management

accounting under the supervision of a faculty member. Individual conferences with the instructor to be arranged. 1 seminar. Concurrent enrollment in GBA 608 required.

### **GBA 610 Financial Markets and Institutions (3)**

The structure and role of the financial system, interest rates, security markets, derivative security markets, government influence on financial markets, commercial banking, and nonbank financial institutions. 3 lectures/problem-solving. Concurrent enrollment in GBA 611 required. Prerequisites: GBA 546. Unconditional standing required.

### **GBA 611 Directed Study in Financial Markets and Institutions (1)**

Independent investigation of selected topics in financial markets and institutions, under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 610 required. Unconditional standing required.

### **GBA 615 Seminar in Organizational Behavior (3)**

Human processes employed in accomplishing work tasks and creating employee satisfaction within the organization. Group experiences whereby students test their interpersonal skills in the organizational environment. Group activities; 3 lecture discussions. Concurrent enrollment in GBA 616 required. Prerequisites: Completion of all MBA prerequisite courses and microcomputer proficiency. Unconditional standing required.

### **GBA 616 Directed Study in Organizational Behavior (1)**

Independent investigation of selected problems in organizational behavior under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 615 required. Unconditional standing required.

### **GBA 617 Management-Union Relations (4)**

The evolving interaction of unions and management within organizations. In-depth look at productivity, quality of working life, and components of our rapidly changing work culture. The future of participative management, legislation, collective-bargaining, and arbitration. 4 lecture discussions. Unconditional standing required.

### **GBA 620 International Business (4)**

Survey of social, economic, and political factors governing conduct of business abroad. Analysis of successful and unsuccessful methods of international managers and their staffs. 4 lecture discussions. Unconditional standing required.

### **GBA 622 Business Information Systems (3)**

Conceptual foundations of information systems and their use in organizations. Study of data/information flow between functional subsystems and the interdependencies involved in an integrated system. Information planning and system development strategies. System security and controls. 3 lectures/problem-solving. Concurrent enrollment in GBA 623 required. Prerequisites: GBA 554 and GBA 557. Unconditional standing required.

### **GBA 623 Directed Study in Business Information Systems (1)**

Independent investigation of advanced topics in business information systems. Individual conferences with the instructor to be arranged. 1 seminar. Concurrent enrollment in GBA 622 required. Unconditional standing required.

### **GBA 628 Management Science Seminar (3)**

Quantitative theory and techniques. Linear, integer, non-linear, and dynamic programming, transportation and assignment algorithms, replacement problems, game theory and Markov processes. Introduction to computer solutions. 3 lectures/problem-solving. Concurrent enrollment in GBA 629 required. Prerequisites: Completion of all MBA prerequisite courses and microcomputer proficiency. Unconditional standing required.

### **GBA 629 Directed Study in Management Science (1)**

Independent investigation of advanced topics in management science under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 628 required. Unconditional standing required.

### **GBA 630 Federal Government Contract Cases, Appeals and Jurisdiction (4)**

Study and criticism of federal contracts. Study of important statutes which are framed and directed only at government contracts. 4 lectures/problem-solving. Unconditional standing required.

### **GBA 633 Promotion Management (4)**

Advertising management as related to entire communication effort of the organization. Emphasis on communication theory, advertising, customer analysis, communicative goals, positioning, personal selling, sales promotion, public relations, publicity, media planning, and budgeting. Cases. Design of promotion plan. 4 lectures/problem-solving. Unconditional standing required.

### **GBA 634 Sales Productivity (4)**

Analytical and descriptive overview of successful productivity theory models used in contemporary business to business selling and sales management. 4 lecture discussions. Unconditional standing required.

### **GBA 635 Motivation and Market Behavior (4)**

Theory and application of the fundamentals of human behavior that affect buying decisions: perception, learning, social and cultural factors. Models of consumer behavior. Selected applications including diffusion of innovation, opinion leadership, marketing communications. Applications to industrial markets and institutional markets. 4 lectures/problem-solving. Prerequisite: GBA 517. Unconditional standing required.

### **GBA 636 Project Management (3)**

Planning, scheduling, resource allocation, coordination and control of the activities using bar charts, networks, critical path analysis, resource leveling, and cost-expediting. Computer usage and comparison of microcomputer software for project management. 3 lectures/problem-solving. Concurrent enrollment in GBA 637 required. Prerequisites: Microcomputer proficiency and GBA 531. Unconditional standing required.

### **GBA 637 Directed Study in Project Management (1)**

Independent use of project management methods for planning, scheduling, resource allocation, coordination and control of the activities of a project under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 636 required. Prerequisite: GBA 531. Unconditional standing required.

### **GBA 640 Total Quality Management (3)**

Fundamental concepts of Total Quality Management (TQM). Topics



include quality management philosophies, planning, teamwork, costs, continuous improvement for production and service systems, audits, standards, awards, inspection and metrology, product and process design, reliability, statistical process control, and acceptance sampling. 3 seminar-discussions. Concurrent enrollment in GBA 641 required. Unconditional standing required.

#### **GBA 641 Directed Study in Total Quality Management (1)**

Independent investigations to develop a plan for implementing TQM in business. 1 seminar. Concurrent enrollment in GBA 640 required. Unconditional standing required.

#### **GBA 642 Entrepreneurship Practicum (3)**

Case and field studies of entrepreneurial management. Independent research of selected problems in entrepreneurship under faculty direction. Comparative case studies of entrepreneurship in different cultures. Focus on applying concepts from GBA 570 and 571 to contemporary Southern California. 3 supervision. Concurrent enrollment in GBA 643. Prerequisites: GBA 570 and 571. Unconditional standing required.

#### **GBA 643 Directed Study in Entrepreneurship Practicum (1)**

Independent investigation of advanced topics in entrepreneurship and corporate renewal under the direction of a faculty member. Individual faculty supervision of case study, business plan or feasibility study will provide an integrative and practical learning experience. 1 seminar. Concurrent enrollment in GBA 642. Unconditional standing required.

#### **GBA 645 Financial Decision-Making (3)**

A seminar course in finance, utilizing comprehensive cases to simulate the role of the financial manager. Concurrent enrollment in GBA 646 required. 3 lectures/problem-solving. Prerequisites: Completion of all MBA prerequisite courses and microcomputer proficiency. Unconditional standing required.

#### **GBA 646 Directed Study in Financial Decision Making (1)**

Independent investigation of selected problems in Advanced Financial Management under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 645 required. Unconditional standing required.

#### **GBA 647 Security Analysis and Portfolio Management (3)**

The three major types of investment analysis: fundamental, technical and random walk, with emphasis on the fundamental approach to valuation and stock selection. Portfolio analysis, composition, selection, revision and performance. Two-parameter, risk and return models, such as the capital asset pricing model and the capital market line. 3 seminars. Concurrent enrollment in GBA 648 required. Prerequisites: Completion of all MBA prerequisite courses, microcomputer proficiency, GBA 546 and EC 521. Unconditional standing required.

#### **GBA 648 Directed Study in Security and Portfolio Management (1)**

Independent investigation of investments under the direction of a faculty member. The student is expected to either comprehensively examine and evaluate a company or manage a hypothetical portfolio. 1 seminar. Concurrent enrollment in GBA 647 required. Unconditional standing required.

#### **GBA 652 Marketing Seminar (3)**

Marketing decision-making. Application of marketing concepts and implementation of effective marketing programs. Analysis of marketing

decision-making techniques. Present and future marketing trends. 3 lecture discussions. Concurrent enrollment in GBA 653 required. Prerequisite: completion of all MBA prerequisite courses and microcomputer proficiency. Unconditional standing required.

#### **GBA 653 Directed Study in Marketing Seminar (1)**

Independent investigation of selected problems in marketing under the direction of a graduate member. Unconditional standing required. 1 seminar. Concurrent enrollment in GBA 652 required. Unconditional standing required.

#### **GBA 654 Business Forecasting (3)**

Forecasting techniques. Principles and methods. Evaluation of reliability of existing forecasting techniques. Emphasis on their application and interpretation of results. Numerous computer applications in modeling and forecasting. 3 lectures/problem-solving. Concurrent enrollment in GBA 655 required. Prerequisites: all MBA prerequisite courses and microcomputer proficiency. Unconditional standing required.

#### **GBA 655 Directed Study in Business Forecasting (1)**

Independent investigation of advanced topics in business forecasting under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 654 required. Unconditional standing required.

#### **GBA 659 Accounting for Decisions and Control (4)**

Accounting information systems for management control in business and not-for-profit organizations, in-depth analysis of case problems covering development and use of accounting data and issues of budgeting, performance evaluation and control. 4 lectures/problem-solving. Prerequisite: GBA 608/609 or equivalent. Unconditional standing required.

#### **GBA 665 Human Interaction Skills Laboratory (4)**

Knowledge and skills in interpersonal relations and working groups. Helping skills, understanding group process including unconscious dimensions of leadership, sexism, racism. Sensitivity training and laboratory methods fostering authentic participant involvement. 4 lectures/problem-solving. Prerequisites: GBA 615 and GBA 616. Unconditional standing required.

#### **GBA 667 Organizational Development (4)**

Initiation and management of organizational efforts at planned improvement. Reviews quality of work life, productivity and quality improvement thrusts, behavioral science perspectives on organizational development. Survey of basic methods; review of domestic and global literature. 4 lectures/problem-solving. Prerequisites: GBA 615 and GBA 616. Unconditional standing required.

#### **GBA 671 Management Seminar (3)**

The development and evaluation of alternative corporate strategies drawing upon the functional areas within business and the outside environmental factors which affect business. 3 seminars. Completion of all MBA prerequisite courses and microcomputer proficiency. Concurrent enrollment with GBA 672 required. Prerequisites: GBA 561 and all required 500-level courses. Unconditional standing required.

#### **GBA 672 Directed Study in Management Seminar (1)**

Independent investigation of selected problems in management under the direction of a faculty member. 1 seminar. Concurrent enrollment with GBA 671 is required. Unconditional standing required.

**GBA 673 Information Systems Seminar (3)**

A managerial perspective of the changing issues and problems of computer-based information systems in business organizations. 3 lectures/problem-solving. Concurrent enrollment in GBA 674 required. Prerequisite: completion of all MBA prerequisite courses and microcomputer proficiency. Unconditional standing required.

**GBA 674 Directed Study in Information Systems (1)**

Independent investigation of selected problems in management information systems under the direction of a faculty member. 1 seminar. Concurrent enrollment with GBA 673 required. Unconditional standing required.

**GBA 680 Real Estate Finance and Investment (4)**

Trends in real estate investment opportunities. Current theories and techniques applied to real estate financing, acquisition, real estate mortgage markets, mortgage banking, and brokerage/investment strategies. Partial qualification for the California Real Estate Brokers License Examination. Available for credit for students with FRL 486 only by petition. 4 lectures/problem-solving. Prerequisites: GBA 546 and GBA 580 or equivalents. Unconditional standing required.

**GBA 681 International Real Estate and Real Estate Research (4)**

Problems and methods of acquiring, financing, transferring, and managing real estate in foreign countries, and with foreign owned and operated real estate entities in the United States. Market analysis techniques for foreign and domestic investment properties. 4 lectures/problem-solving. Prerequisites: GBA 546, GBA 580, and GBA 583 or equivalents. Unconditional standing required.

**GBA 682 Real Estate Acquisition and Development (4)**

Review and application of methods and processes for acquisition and development of investment real estate, including search, negotiation, financial analysis, market analysis, building design, construction, property management and marketing. Partial qualification for the California Real Estate Brokers License Examination. Available for credit for students with FRL 490 only by petition. 4 lectures/problem-solving. Unconditional standing required.

**GBA 683 Business Research Methods (3)**

Identification and investigation of business problems. Stating hypotheses, problem statements, defining and collecting data, and selecting appropriate analysis techniques. Examination of types of business research (ex post facto, laboratory, field, delphi or survey) and limitations for inference. 3 lectures/problem-solving. Concurrent enrollment in GBA 601 required. Unconditional standing required. Prerequisites: Completion of all MBA prerequisite courses and microcomputer proficiency.

**GBA 684 Directed Study in Business Research Methods (1)**

Development of hypotheses, problem statement and bibliography for business problems under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 600 required. Unconditional standing required.

**GBA 685 MSBA Option Project (4)**

Synthesis and integration of MSBA Option concepts and techniques to a realistic business problem. Application of technical, managerial communications, and interpersonal skills in a group environment. 4 supervision. Prerequisites: GBA 577, GBA 578, GBA 615, GBA 616, and GBA 622, 623. Unconditional standing required.

**GBA 687 Management Policies and Strategies Practicum (3)**

A capstone course on decision-making at the strategic management level. Cases and assigned readings utilized to focus on the various functional areas of business. Topics include consideration of business ethics and international issues. 3 seminars. Concurrent enrollment in GBA 688 required. Prerequisites: Completion of MBA core courses or consent of instructor and microcomputer proficiency. Unconditional standing required.

**GBA 688 Directed Study in Management Policies and Strategies (1)**

Investigation in the overall operation of a business organization based on a computerized simulation program under the supervision of a faculty member. The program requires participants to make strategic decisions which involve the various functional areas of business. 1 seminar. Concurrent enrollment in GBA 687 required. Unconditional standing required.

**GBA 689 Financial Reporting and Communication (4)**

Alternative accounting principles and their effects on reported results. Analysis of information in the primary financial statements and evaluation of financial position and results of operation. Evaluating the liquidity, stability, profitability and growth potential of business entities. 4 lecture discussions. Prerequisite: GBA 608 or equivalent. Unconditional standing required.

**GBA 691 Directed Study (1-9)**

Independent, directed study of advanced topics in business. Class meetings and individual conferences with the instructor to be arranged. Total credit limited to 9 units. Precedes enrollment in GBA 695, GBA 696, or GBA 697. Prerequisites: For MSBA in IS Auditing candidates, GBA 577 and GBA 578. Unconditional standing required.

**GBA 692 Independent Study (1-4)**

Individual investigation or original study to be conducted in a field of interest selected by the student with approval of the instructor. Intensive personal research under initiative of the student with general guidance and advice from the instructor. Study is not to be part of final research project. Total credit limited to 4 units. Unconditional standing required.

**GBA 695 Business Research Project (2-4)**

A written research project concerning a significant problem in the field of business. Directed by a committee of graduate faculty members. Total credit limited to 4 units. Prerequisites: GBA 683 and GBA 684 for MBA candidates and approved committee form on file in Business Graduate Office; GBA 691 required for MSBA candidates. Advancement to Candidacy required.

**GBA 696 Master's Degree Thesis (2-4)**

A formal thesis concerning a significant problem in the field of business. Directed by a committee of graduate faculty members. Total credit limited to 4 units. Prerequisites: GBA 683 and GBA 684 for MBA candidates and approved committee form on file in Business Graduate Office. Advancement to Candidacy required.

**GBA 697 Comprehensive Examination (1)**

An examination on the subject areas of the candidate's coursework listed on the degree program. May be taken no more than two times. Failure to complete exam satisfactorily the second time will result in termination from the program. Candidates must register through the MSBA in IS Auditing advisor. Advancement to Candidacy required.

**GBA 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis, project or comprehensive examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

## CHEMISTRY

### Master of Science in Chemistry

In the Department of Chemistry, College of Science

Keith A. Howard, Chair

Michael Keith, Graduate Coordinator

The Master of Science degree in Chemistry provides a comprehensive understanding of the principles of chemistry and application in detail to advanced problems. This understanding will be gained through course work, seminar, independent study and research. The program is designed to provide the student with the necessary skills and techniques to reach the applicant's particular objective, whether it be for a successful career in teaching or industry or to pursue further graduate work. The student in this program may pursue one of several fields of specialization which include analytical, inorganic, organic, physical chemistry and biochemistry.

### ADMISSION TO THE PROGRAM

An applicant for admission to the graduate program in chemistry must have received a baccalaureate degree in chemistry or in a related discipline, including at least 36 quarter units of chemistry courses. An applicant lacking these qualifications may be admitted subject to a review of the student's academic background by the departmental graduate program committee. Admission to the program requires an undergraduate grade point average of 2.5 and an average of 3.0 in chemistry courses. A limited number of students not meeting these requirements may be admitted on a conditional basis if facilities permit. Such students must meet requirements stipulated in the statement of conditional admission within the time limit specified, to remain in the university.

Each selected applicant, with an advisory committee, will design a program in the selected area of specialization based upon interests, preparation and performance on a departmental placement examination. The program will include required courses, selection of courses in an area of specialization, independent study and a thesis. It will normally constitute 45 to 50 quarter units of credit.

### REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units. At least 24 units must be taken in 500-600 level courses.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.
3. The student must complete his program based upon the curriculum outlined below.
4. The student must demonstrate a reading knowledge of a modern foreign language or proficiency in a computer programming language acceptable to the chemistry department.
5. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses.
6. Advancement to Candidacy must be achieved. Satisfaction of the Graduation Writing Test (GWT) requirement is necessary before advancement.

7. An acceptable thesis must be completed and the necessary copies submitted in accordance with university regulations.
8. An examination in defense of the thesis must be successfully completed.
9. The candidate must be enrolled in the university during the quarter of graduation.

### CURRICULUM

#### Required Courses

		Units
Seminar in Chemistry . . . . .	CHM 550	3
(Student must enroll for 1 unit of seminar during 3 separate quarters)		
Thesis Research in Chemistry . . . . .	CHM 694	0-6
Master's Degree Thesis . . . . .	CHM 696	3-9
(Total of 9 units with 3 or more from CHM 696 required.)		
Courses in an area of Specialization. . . . .		8
Select 6 units in an area of specialization, to be selected from CHM 522, 523 (theoretical); CHM 541, 542, 543 (organic); CHM 553, 554 (physical); CHM 561, 562 (biochemistry); CHM 571, 572 (inorganic) or CHM 581, 582, 583 (analytical). Each of these courses requires a concurrent enrollment in 1 unit of CHM 513, Independent Study.		
Approved electives . . . . .		25
Total minimum . . . . .		45

### GRADUATE COURSE DESCRIPTIONS

The notations F, W, Sp, Su and even or odd indicate which quarter(s) of even or odd numbered calendar years the course is normally offered. Courses not designated "even" or "odd" are offered each year.

#### CHM 513 Independent Study in Advanced Chemistry (1) F, W, Sp

Reading and reports on papers in the literature, solving of assigned problems. Minimum of 60 hours total time. Concurrent: any of CHM 522, 523, 541, 542, 543, 553, 554, 561, 562, 571, 572, 581, 582, 583. May be repeated for a maximum of 7 units.

#### CHM 522, 523 Advances in Chemical Physics (3)(3) W, Sp, odd years, respectively

Application of quantum chemistry to problems of atomic and molecular structure; molecular orbital and valence bond theories. Theory of transition moments and application to IR, UV, RAMAN and spin resonance spectroscopy. Applications of reaction dynamics. 3 lecture discussions. Concurrent: CHM 513. Prerequisite: CHM 419 or consent of instructor.

#### CHM 531 Solution and Relaxation Kinetics (3) Sp, even years

The main focus will be on the application of relaxation kinetics to the study and analysis of relatively complex multi-step reactions in solution. Treatment will unify practical and theoretical considerations with respect to experimental design, instrumentation, limitations and relationship to conventional kinetic methods. Specific topics will include: spectrophotometric detection of intermediate, reversible and non-reversible systems, introduction to normal mode analysis, amplitude effects and detailed analysis of representative examples from the recent literature and research in progress. 3 lectures/problem-solving. Prerequisite: CHM 305 or 313 or consent of instructor.

#### CHM 541, 542, 543 Selected Topics in Organic Chemistry (3) (3) (3) F, W, Sp, respectively

Recent advances in topics of interest in the area of organic chemistry, for example, reaction mechanism, synthesis, spectroscopy, polymers,



heterocycles, natural products as well as physical organic, organometallic, bio-organic, industrial and photochemistries. Each course may be repeated once for credit. 3 lecture discussions. Concurrent: CHM 513.

**CHM 544 Special Topics in Organic Chemistry (3) Sp, even years**

Selected topics in organic chemistry. Course may be repeated once for credit. 3 lecture discussions. Concurrent: CHM 513.

**CHM 550 Seminar in Chemistry (1) F, W, Sp**

Special problems in selected areas of chemistry. May be repeated for a maximum of 3 units. 1 seminar.

**CHM 553, 554 Advances in Physical Chemistry (3)(3) F, odd years; W, even years, respectively**

Selected topics from advanced physical chemistry such as statistical mechanics, electrochemistry kinetics and solution chemistry. 3 lecture discussions. Concurrent: CHM 513.

**CHM 561, 562 Selected Topics in Biochemistry (3)(3) W, Sp respectively**

Basic principles as applied to topics of biochemical interest, such as: cellular energetics and kinetics, analysis of the structure and function of proteins and other macromolecules, feedback control metabolism, trace nutrients, biochemistry of membranes, marine biochemistry, biochemical genetics and biochemical evolution. Each course may be repeated once for credit. 3 lecture discussions. Concurrent: CHM 513.

**CHM 565 Biochemical Mechanisms (3) F, odd years**

General mechanistic principles of organic and inorganic chemistry as they relate to biochemistry. 3 lecture discussions.

**CHM 567 Advanced Clinical Chemistry (3) Sp, odd years**

Chemical basis of recent advances in analytical methods and techniques, basis of new instrumentation, treatment of data and interpretations of clinical analyses. 3 lecture discussions.

**CHM 571, 572 Advances in Inorganic Chemistry (3)(3) W, Sp, even years, respectively**

Selected topics in advanced inorganic chemistry such as physical methods of inorganic chemistry, reaction mechanisms, organometallic chemistry and applications of group theory. 3 lecture discussions. Concurrent: CHM 513.

**CHM 581, 582, 583 Advances in Analytical Chemistry (3)(3)(3) F, W, Sp, respectively**

Selected topics in modern analytical chemistry. Each course may be repeated once for credit. 3 lecture discussions. Concurrent: CHM 513.

**CHM 691 Directed Study (1-3) F, W, Sp, Su**

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member. Total credit limited to 3 units. Unconditional standing required.

**CHM 694 Thesis Research in Chemistry (1-3) F, W, Sp, Su**

Research in area of specialization conducted as part of the preparation for writing a thesis under the direction of a graduate faculty member. Total credit limited to 6 units. Unconditional standing required.

**CHM 696 Master's Degree Thesis (1-3) F, W, Sp, Su**

Compilation, evaluation, interpretation and report of research for thesis. (3 units minimum.) Total credit limited to 9 units. Advancement to Candidacy requirement.

**CHM 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy requirement.

## COMPUTER SCIENCE

### Master of Science in Computer Science

In the Department of Computer Science, College of Science

Barry I. Soroka, Chair

H. Norton Riley, Coordinator, Graduate Program

The Master of Science program in Computer Science provides an opportunity for students to enhance their understanding of the principal hardware and software themes. Students will also learn how to analyze and formulate solutions for many advanced problems which occur in computer systems. The program stresses technical competence and encourages the student in independent work and judgment.

### ADMISSION TO THE PROGRAM

For admission as an unconditional graduate student, the applicant should have completed, with a 3.0 (B) average or better, coursework equivalent to the following:

- CS 365 Computer Organization
- CS 420 Artificial Intelligence
- CS 431 Operating Systems
- CS 440 Compiler Design
- MAT 208 Linear Algebra
- MAT 214 Calculus of Several Variables I
- STA 326 Statistical Methods for Computer Scientists

Applicants with a deficiency in any of these areas may be admitted with conditional standing and must satisfactorily complete a prescribed set of courses before becoming eligible for unconditional graduate standing.

In addition, unconditional status requires that the student has scored at or above the 50th percentile on the Graduate Record Examination (GRE) Subject Test in Computer Science.

Conditional students are expected to have a computer science background equivalent to that of undergraduate seniors. In particular, conditional admission requires successful completion of courses equivalent to the following:

- CS 210 Computer Logic
- CS 241 Data Structures and Algorithms II
- CS 264 Assembly Language Programming
- CS 310 Automata Theory and Formal Languages
- MAT 214 Calculus of Several Variables I

All foreign students (conditional and unconditional) must have passed the TOEFL exam with a score of 550 or above.

All graduate students must meet with their graduate advisor or committee and prepare a study list which will define all courses and other requirements to be completed for the degree.

### REQUIREMENTS

Students are urged to know the general scholastic requirements described in the "Graduate Studies" section of the catalog.

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted to an unconditional student, having passed the Graduation Writing Test (GWT) and upon the recommendation of his/her faculty advisor, and implies a readiness to attempt thesis. The candidate must be enrolled during the quarter of graduation.

### CURRICULUM

#### Required Courses

		Units
Advanced Algorithm Design and Analysis . . . . .	CS 530	4
Computability and Complexity Theory . . . . .	CS 531	4
Graduate Seminar . . . . .	CS 664	2
Directed Study . . . . .	CS 691	1-3
Master's Degree Thesis . . . . .	CS 696	4

One of the following courses:

Automated Reasoning . . . . .	CS 515	4
Natural Language Processing . . . . .	CS 517	4
Computer Vision . . . . .	CS 519	4
Robotics . . . . .	CS 521	4
Expert Systems . . . . .	CS 523	4

One of the following courses:

Advanced Computer Organization . . . . .	CS 525	4
Computer Networking and Distributed Computing .CS	565	4

#### Electives

Computer Science graduate level offerings or other courses approved by the Computer Science Graduate Committee. . . . . 20

Total Units . . . . . 45

### GRADUATE COURSE DESCRIPTIONS

Graduate courses presume that students have been admitted unconditionally to the program.

#### CS 510 Computer-Assisted Instruction (4)

General techniques for designing computer systems to provide individualized instruction. Program structure, instruction layout, scoring systems and data organization methods. Existing CAI packages and development of new packages. Hardware requirements for audio-visual effects. 4 lectures/problem-solving. Prerequisite: competence in programming and data structures.

#### CS 515 Automated Reasoning (4)

Logical foundations, logical representation of knowledge, unification, theorem proving, deductive databases, logic programming, program verification and synthesis, nonstandard logics, epistemic logic, temporal logic. 4 lectures/problem-solving. Prerequisites: CS 352 and PHL 202 or consent of instructor.

**CS 517 Natural Language Processing (4)**

Grammatical structure and parsing of natural language, representations of meanings (semantics), story understanding and generation, applications. 4 lectures/problem-solving. Prerequisites: CS 352, CS 420 and PHL 202 or consent of instructor.

**CS 519 Computer Vision (4)**

Representation of images, image data acquisition, methods of object recognition, representation of visual knowledge, boundary detection, texture, motion, the problem of occlusion, applications. 4 lectures/problem-solving. Prerequisite: CS 420 or consent of instructor.

**CS 521 Robotics (4)**

Robot programming, languages and simulation. Origins and taxonomy of robots. Case study in robot architecture, hardware and software. Homogeneous transformations. Kinematic equations and their solution. Elementary digital control. 4 lectures/problem-solving. Prerequisite: competence in programming and data structures.

**CS 523 Expert Systems (4)**

Expert systems construction. Knowledge representation, utilization and acquisition. Rule-based systems, fuzzy logic, knowledge engineering. 4 lectures/problem-solving. Prerequisite: CS 420 or consent of instructor.

**CS 525 Advanced Computer Organization (4)**

Principles and concepts of computer architecture and organization. Pipelining and parallelism, multi-processor and distributed processing systems. Historical developments, architectural tradeoffs and innovations. Case studies. 4 lectures/problem-solving. Prerequisite: CS 365 or consent of instructor.

**CS 530 Advanced Algorithm Design and Analysis (4)**

Classic designs: greedy; divide-and-conquer; dynamic programming; branch-and-bound. Complexity analysis: asymptotic notation; average, worst-case and amortized analyses; lower bounds. Classic problems and algorithms. 4 lectures/problem-solving. Prerequisite: competence in algorithms and data structures.

**CS 531 Computability and Complexity Theory (4)**

Formalizing problems and algorithms. Characterizations and properties of computability classes, undecidability. Complexity classes. NP-complete problems, proof of NP-completeness. 4 lectures/problem-solving. Prerequisite: CS 310 or consent of instructor.

**CS 535 Parallel Algorithms (4)**

Design and analysis of algorithms for parallel computers. Basic techniques, classic problems. Models of parallel computation, parallel hardware, software issues involved in parallel programming. Parallel complexity classes. 4 lectures/problem-solving. Prerequisite: CS 530 or consent of instructor.

**CS 540 Code Optimization and Data Flow Analysis (4)**

Code and loop optimization. Data flow analysis. Syntax-directed translation. 4 lectures/problem-solving. Prerequisites: CS 408 and CS 440 or consent of instructor.

**CS 541 Programming Language Semantics (4)**

Operational, denotational and axiomatic semantics of programming languages. Vienna definition language, w-grammars, LISP definition. 4 lectures/problem-solving. Prerequisite: CS 408 or consent of instructor.

**CS 550 Seminar in Advanced Computer Science (1)**

Selected topics in advanced computer science. Offered for CR/NC grading only. No limit on repeats. A specific topic will be selected each time the course is offered. May not be used for degree credit. 1 seminar. Prerequisite: consent of instructor.

**CS 555 Computer Image Processing (4)**

Digital picture processing. Mathematical preliminaries for image processing. Visual perception. Digitization and compression. Image enhancement, restoration and reconstruction. 4 lectures/problem-solving. Prerequisites: MAT 214 and CS 445 or consent of instructor.

**CS 565 Computer Networking and Distributed Computing (4)**

Modeling and quantitative approaches to computer networks, teleprocessing and distributed computing. Statistical multiplexing and packet switching, buffering, front-end processing, network structures and distribution of control hardware, data and software. 4 lectures/problem-solving. Prerequisite: CS 405 or consent of instructor.

**CS 570 Human Computer Interaction (4)**

Principles of human factors, computer technology, and their interactions. Theory and practice of user interface design and evaluation. Special topics such as graphical user interfaces, graphics programming, multi-sensory systems, and computer-supported cooperative work. Prerequisite: Consent of instructor.

**CS 580 Software Engineering Metrics and Models (4)**

The role of metrics and models in software development. Product metrics, process metrics, models and empirical validation. Measurement and analysis, implementation of a metrics program. 4 lectures/problem-solving. Prerequisites: STA 326 and CS 480, or consent of instructor.

**CS 585 Software Verification and Validation (4)**

Techniques for evaluating software quality and integrity. Quality assessment, proof of correctness, testing methods. 4 lectures/problem-solving. Prerequisite: CS 480 or consent of instructor.

**CS 599/599A/599L Special Topics for Graduate Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Instruction by lecture, activity, laboratory or combination. Prerequisite: consent of instructor.

**CS 664 Graduate Seminar (2)**

Topics chosen according to the interests and needs of the students. May be repeated for a maximum of 4 units. Unconditional standing required.

**CS 691 Directed Study (1-3)**

Individual study program under supervision of master's thesis advisor. Presentation of proposal for thesis in acceptable written form. Must be repeated as appropriate. Total credit, 3 units. Credit assigned upon acceptance of proposal by thesis committee. Open only to unconditional students with approval of thesis advisor.

**CS 696 Master's Degree Thesis (1-4)**

Independent investigation intended to be an extension of an existing body of knowledge. Reporting of research results in an oral presentation and acceptable written form. Must be repeated as appropriate. Prerequisite: CS 691. Credit assigned upon successful completion of thesis and oral presentation. Total credit, 4 units. Advancement to Candidacy and approval of thesis committee required.

**CS 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis. The candidate must be enrolled in the university during the quarter in which he/she graduates. Open only to candidates with approval of the thesis committee. Advancement to Candidacy required.



## ECONOMICS

### Master of Science in Economics

In the Department of Economics, College of Letters, Arts, and Social Sciences

Maureen Burton, Chair  
Franklin Y. Ho, Graduate Coordinator

The goals of the Master of Science program in Economics are: (1) the preparation of economists qualified for immediate employment by business and government; (2) the preparation of economists for research positions in fields such as public administration, labor organization, finance, insurance and marketing; (3) the preparation of teachers of economics at the secondary school and community college level; (4) the enhancing of the competence of those students who wish to pursue advanced graduate work in economics. Graduate study specialization may be elected in the following economic areas: financial, environmental and resources, and economic analysis.

### ADMISSION TO THE PROGRAM

An applicant for admission to this program must hold a bachelor's degree from an accredited college or university and satisfy university and departmental requirements for admission to graduate study. An applicant who holds a bachelor's degree in a field other than economics or who does not meet admission criteria may apply for admission as a conditional graduate student. The conditions will be stated in writing at the time of admission and will specify the amount of time allowed to meet entrance conditions. In undergraduate work, the applicant must have maintained a grade point average of 3.0 (B) or better in economics courses and a grade point average of 2.7 overall. Admission to the graduate program in economics requires that the applicant be accepted by the Department of Economics.

### REQUIREMENTS

A minimum of 45 quarter units is required for the Master of Science degree in Economics. Each student must take 16 units of required core courses. Courses for the balance of the 45 quarter units are selected by the individual student in the area of interest or specialization with the advice and consent of appropriate faculty adviser(s).

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.

A maximum of 16 units may be taken in approved upper-division (300- or 400-level) courses. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate work.

The Graduation Writing Test (GWT) must have been passed prior to Advancement to Candidacy.

To attain Advancement to Candidacy for the degree, each student shall indicate in writing the decision as to the manner of fulfilling the terminal requirement. The candidate will satisfy the culminating experience with either a thesis or a comprehensive examination.

The candidate must be enrolled in the university during the quarter of graduation.

## CURRICULUM

The Department of Economics offers the Master of Science degree in Economics with the following options.

- a) Financial Economics
- b) Environmental and Natural Resource Economics
- c) Economic Analysis

The Financial Economics Option provides students with a background that leads to opportunities in the private sector financial and non-financial institutions, government regulatory agencies, and research institutes. This option integrates extensive campus-wide resources and provides an interdisciplinary focus.

The Environmental and Natural Resource Option utilizes campus-wide resources to provide students with a program unique to Cal Poly Pomona and the Southern California Region. Environmental and natural resource economics is a growing research area. In recent years, Cal Poly Pomona started Landlab and has a research agreement with the South Coast Air Quality Management District.

The Economic Analysis Option emphasizes analytic techniques and methods (both quantitative and qualitative) with applications to various specialized areas. This option prepares students to pursue Ph.D. work in economics or to hold research, administrative, and teaching positions in the public and private sectors.

### REQUIRED CORE COURSES FOR ALL OPTIONS

(17-21 units required for all options)

		Units
Microeconomic Analysis	.....EC 550	4
Macroeconomic Analysis	.....EC 551	4
Econometrics	.....EC 552 and EC 553	8
Terminal Requirement	.....	1-5
Thesis	.....EC 696	2-5
or Comprehensive Examination	.....EC 697	1*

\*Students electing this option will include 4 additional units of electives in their programs.

Total ..... 17-21

### FINANCIAL ECONOMICS OPTION

#### Field of Specialization

Money and Capital Markets .....EC 656 and EC 657 8

#### Electives

16-20

(Before taking course, students must meet the prerequisites of the selected courses or obtain permission from instructor of course. Students should consult their advisor before selecting courses.)

International Finance and Open Economy		
Macroeconomics	.....EC 405	4
Introduction to Mathematical Economics	.....EC 406	4
Introductory Econometric Methods	.....EC 421	4
Economics of Capital Markets	.....EC 450	4
Economics of International Finance	.....EC 654	4
Directed Study	.....EC 691	1-4
Fundamentals of Financial Management	.....GBA 546	4
Investment Banking	.....GBA 612	4
Security Analysis and Portfolio Management	.....GBA 647	3
Directed Study in Security and		

Portfolio Management . . . . .	GBA	648	1
(Concurrent enrollment in GBA 647 is required to take GBA 648)			
Legal Implications of Financial Transactions . . . . .	FRL	403	4
Security Options . . . . .	FRL	431	4
Futures Markets: Financial			
Instruments and Commodities . . . . .	FRL	432	4
Multinational Financial Management . . . . .	FRL	453	4
Commercial Banking . . . . .	FRL	460	4
Summary:			
Total Core Courses. . . . .			17-21
Field of Specialization. . . . .			8
Electives . . . . .			16-20
Total Degree Requirement. . . . .			45

## ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS OPTION

### Field of Specialization

Seminar in Environmental Economics . . . . .	EC	530	4
Seminar in Natural Resource Economics . . . . .	EC	531	4
Electives from the list below. . . . .			16-20

(Before taking course students must meet the prerequisites of the selected course or obtain permission from instructor of course. Students should consult their advisor before selecting courses.)

Introduction to Mathematical Economics . . . . .	EC	406	4
Seminar in Land Economics . . . . .	EC	419	4
Introductory Econometric Methods . . . . .	EC	421	4
Seminar in Natural Resource Economics . . . . .	EC	429	4
Seminar in Environmental Economics . . . . .	EC	435	4
Seminar in Air Resource Economics . . . . .	EC	436	4
Seminar in Waste Management Economics . . . . .	EC	438	4
Seminar in Water Resource Economics . . . . .	EC	439	4
Agricultural Water Resource Management . . . . .	ABM	450	4
Air Pollution Control . . . . .	ARO	418	4
Water Pollution Biology . . . . .	BIO	420	3
Air Pollution Problems . . . . .	CHM	460	4
Solid Waste Management . . . . .	CE	457	4
Pollution Abatement and Hazardous			
Materials Management/Laboratory . . . . .	CHE	432/433	3,1
Unit Processes in Waste and			
Waste Water Treatment . . . . .	EGR	567	3
Biological Unit Process in Waste			
Water Treatment . . . . .	EGR	568	4
The Urban Landscape . . . . .	LA	423/423L	2,1
Environmental Factors in Regional Planning . . . . .	URP	487	4
The Economic, Social and Environmental			
Context for Planning . . . . .	URP	505	4
Urban and Regional Planning Theory			
and Practice . . . . .	URP	512/512A	4
Evolution of the Planning Process . . . . .	URP	513	4
Policy Analysis, Implementation and Evaluation . . . . .	URP	523	4
Urban Housing and Community Development . . . . .	URP	534/534A	4
Urban Transportation and Circulation System . . . . .	URP	636/636L	4
Environmental Policy for Planning . . . . .	URP	637	4
Land Use Planning and Design . . . . .	URP	638	4
Social and Political Planning . . . . .	URP	651	4
Sustainable Communities . . . . .	ENV	450	4
Urban Forestry . . . . .	HOR	420/420L	4
Environmentally Sustainable Agriculture . . . . .	AGR	437/437L	4
Environmental Toxicology . . . . .	AGB	411	4
Directed Study . . . . .	EC	691	1-4
Summary:			
Total Core Courses. . . . .			17-21

Field of Specialization . . . . .		8
Electives . . . . .		16-20
Total Degree Requirement. . . . .		45

## ECONOMIC ANALYSIS OPTION

### Field of Specialization

Field of Specialization . . . . .		8
(Fields of specialization should be chosen from the approved list after explicit consultation with advisor.)		

### Electives

(Select from the list below). . . . . 16-20  
Before taking course, students must meet the prerequisites of the selected courses or obtain permission from instructor of course. Students should consult their advisor before selecting courses.

International Trade Theory and Policy . . . . .	EC	404	4
International Finance and Open Economy			
Macroeconomics . . . . .	EC	405	4
Introduction to Mathematical Economics . . . . .	EC	406	4
History of Economic Thought . . . . .	EC	407	4
Economic History of U.S. . . . .	EC	409	4
Public Finance . . . . .	EC	410	4
Economic Development . . . . .	EC	411	4
Comparative Economic Systems . . . . .	EC	412	4
Economic History of Europe . . . . .	EC	413	4
Labor Economics . . . . .	EC	414	4
Seminar in Land Economics . . . . .	EC	419	4
Introductory Econometric Methods . . . . .	EC	421	4
Economic Forecasting . . . . .	EC	422	4
Economic Programming and Optimization Analysis . . . . .	EC	423	4
Economic Planning . . . . .	EC	426	4
Seminar in Natural Resource Economics . . . . .	EC	429	4
Seminar in Urban Economics . . . . .	EC	432	4
Economics of Transportation . . . . .	EC	433	4
Economics of Public Utilities . . . . .	EC	434	4
Seminar in Environmental Economics . . . . .	EC	435	4
Seminar in Air Resource Economics . . . . .	EC	436	4
Economics of Poverty and Discrimination . . . . .	EC	437	4
Seminar in Waste Management Economics . . . . .	EC	438	4
Seminar in Water Resource Economics . . . . .	EC	439	4
Industrial Organization . . . . .	EC	440	4
American Industry . . . . .	EC	441	4
Money and of Capital Markets . . . . .	EC	450	4
Seminar in Environmental Economics . . . . .	EC	530	4
Seminar in Natural Resource Economics . . . . .	EC	531	4
Managerial Economics and Operations Analysis . . . . .	EC	560	4
Economics of International Finance . . . . .	EC	654	4
Economics of International Trade . . . . .	EC	655	4
Economics of Capital Markets . . . . .	EC	656, 657	4, 4
Seminar in Transportation Economics . . . . .	EC	659	4
Public Finance . . . . .	EC	660	4
Economic Development . . . . .	EC	665	4
Economic Planning . . . . .	EC	666	4
Directed Study . . . . .	EC	691	1-4

### Summary:

Total Core Courses . . . . .		17-21
Field of Specialization . . . . .		8

Electives .....	16-20
Total Degree Requirement .....	45

## GRADUATE COURSE DESCRIPTIONS

### EC 521 Business Economics (4)

The role of business firms in the resources allocation process. The behavior and decision-making process of firms in a variety of market structures. New approaches in the theory of the firm. 4 seminars. Prerequisites: Graduate standing and an elementary knowledge of economics. For non-economics students only.

### EC 530 Advanced Seminar in Environmental Economics (4)

Advanced topics in environmental economic analysis. Theory of market failure and externalities in pollution of common property. Benefit-cost, cost effectiveness, impact analysis, and other applied quantitative methods of environmental valuation. Air, water, and hazardous waste policy alternatives. International pollution control and assessment. 4 seminars. Prerequisites: EC 311 and EC 406.

### EC 531 Advanced Seminar in Natural Resource Economics (4)

Advanced topics in resource economic analysis. Theories of renewable vs exhaustible resource usage. Policy efforts to guide optimal utilization of resources. Multiple use, intertemporal consistency issues in resource management. Quantitative models of resource demand, supply and scarcity. International natural resource policies. 4 seminars. Prerequisites: EC 311 and EC 406.

### EC 550 Microeconomic Analysis (4)

Analysis of the resources allocation systems and behavior of producing and consuming units. 4 lecture discussions. Prerequisites: Elementary calculus and linear algebra (equivalent to EC 406) and EC 311 and EC 312 or equivalent.

### EC 551 Macroeconomic Analysis (4)

Analysis of aggregate national economic activities. 4 lecture discussions. Prerequisites: Elementary calculus and linear algebra (equivalent to EC 406) and EC 313 or equivalent.

### EC 552, 553 Econometrics (4)(4)

Specification and statistical inference in econometric models; estimation, verification and prediction of economic variables; recent empirical studies, advanced topics in econometrics. 4 lecture/discussions. Prerequisites: Calculus, matrix algebra, EC 311, EC 312, EC 313, EC 321, and EC 322 or equivalent.

### EC 560 Managerial Economics and Operations Analysis (4)

Advanced topics and new developments in managerial economics and operations research. 4 lecture discussions. Prerequisites: EC 311, MAT 125, EC 321, and EC 322 or equivalent.

### EC 654 Economics of International Finance (4)

Advanced topics in international liquidity and finance theory. Problems of international monetary system. Balance of payments theory and practices; theory of exchange rates and mechanism of international adjustment. 4 lecture discussions. Prerequisites: EC 311, EC 313, EC 308, and EC 405. Unconditional standing required.

### EC 655 Economics of International Trade (4)

Advanced topics in international trade. Theory of exchange; tariffs and other trade barriers. Problems of international competition and

cooperation. 4 lecture discussions. Prerequisites: EC 311, EC 313 and EC 404. Unconditional standing required.

### EC 656, 657 Money and Capital Markets (4)(4)

Topics in monetary and capital theory. Liquidity creation, financial intermediation and capital formation. Development of capital policy. 4 lecture discussions. Unconditional standing required. Prerequisites: EC 308, EC 311 and EC 313.

### EC 659 Seminar in Transportation Economics (4)

Demand and supply of transportation; transport cost and price analysis; transportation regulation--past, present, and proposed. Economic aspects and evaluation of public and private modes of transportation--domestic and international. Economic analysis of future directions for transportation systems. Prerequisites: EC 550 or consent of instructor. Unconditional standing required

### EC 660 Public Finance (4)

Government taxation and expenditure. The fiscal decision process and fiscal choice theory. Government budgeting and cost benefit analysis. 4 lecture discussions. Prerequisite: consent of instructor. Unconditional standing required.

### EC 665 Economic Development (4)

Advanced topics in economic development. Historical analysis of causes and consequences of economic development. Special attention to the problems of developing and underdeveloped nations. 4 lecture discussions. Prerequisite: EC 411 or equivalent. Unconditional standing required.

### EC 666 Economic Planning (4)

Public policies, principals, and standards of taxation and expenditures, budgeting, public goods, income redistribution, regulation, and development. Examine the equity and efficiency of public policy and assess the fiscal impact. Seminar. Prerequisites: PLS 314, PLS 416, or equivalents.

### EC 691 Directed Study (1-4)

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member. Maximum credit, 6 units. Unconditional standing required.

### EC 696 Master's Degree Thesis (1-3)

Independent research and study under the supervision of the faculty. Reporting the research results in the approved form. Maximum credit, 5 units. Advancement to Candidacy required.

### EC 697 Comprehensive Examination (1)

Preparation for and completion of the written comprehensive examination. May be taken no more than two times. Failure to complete the exam satisfactorily the second time will result in termination from the program. Advancement to Candidacy required. CR/NC.

### EC 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the "SP" grade until the completion of the thesis. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

## EDUCATION

### GRADUATE AND PROFESSIONAL STUDIES

#### Master of Arts in Education

Jane S. McGraw, Chair, Graduate and Professional Studies Department

Graduate Faculty  
Richard DeNovellis  
Constance Lim

Shahnaz Lotfipour  
Gerald R. Viers

The mission of the Master of Arts in Education program encompasses the following purposes: (1) development of superior teachers in an area of specialization; (2) enhancement of the competence of those students who desire to pursue advanced graduate study in education; (3) preparation of teachers for leadership and research in an area of specialization; (4) preparation of educators for research and consulting in business and industry; and (5) development of life-long learners with potential for self-directed study and research. Admission to the program is granted to qualified applicants who hold a California teaching credential or its equivalent, and to students who have been admitted to the university's specialist credential program. Study for the master of arts is a continuation at a higher level of the university's undergraduate programs that lead to teaching credentials. Postbaccalaureate students who are working on specialist credentials are encouraged to work concurrently on the master's degree.

#### ADMISSION TO THE PROGRAM

An applicant for this program must have a valid teaching credential or have been admitted to a specialist credential program at this university and hold a bachelor's degree from an accredited institution. Graduates of foreign universities are exempt from credential requirements. No teaching credential is required for students applying to the Educational Multimedia option or the certificate programs in Educational Multimedia and Computers in Education. Students entering the master's program may be admitted with a conditional status with the consent of the Graduate and Professional Studies Chair.

All applicants for admission to the program are required to take the Graduate Record Examination General Test and, optionally, the Subject Education Test. In addition, foreign students are required to take the TOEFL examination.

Applicants who do not meet the minimum grade point average of 3.0 overall grade point average in their undergraduate work or 3.0 for graduate work, but who show compensating strengths, may be admitted conditionally. A student with conditional status is provided a written statement of entrance conditions, including the time within which the conditions are to be met. If the conditions are not satisfied within the specified time, the student will be denied further enrollment in the program.

A student who is pursuing a baccalaureate degree from this university and who plans to continue in graduate study will need to apply for admission to the Master of Arts in Education program during the final quarter of the senior year to be considered for programs that do not require a teaching credential as a prerequisite for admittance. Applications should be submitted to the Office of Admissions.

Each M.A. student will complete a preliminary contract for a formal degree program in consultation with the Chair of the Department of Graduate and Professional Studies at the time of admission.

### REQUIREMENTS

1. A minimum of 45 quarter units of acceptable graduate level work must be completed in the program; at least 24 quarter units must be at the 500 to 600 level (graduate). All 400-level courses credit will be specified by the Department of Graduate and Professional Studies. Methods courses and student teaching shall not be applied to the master's degree. Thirty-two (32) units of coursework must be taken in residency.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.
3. A grade-point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and graduate courses to satisfy the requirements for the Master of Arts in Education.
4. Completion of all requirements for a clear teaching credential, or equivalent is required prior to the granting of the degree of Master of Arts in Education. Certain exceptions can be made at the discretion of the department chair.
5. Advancement to Candidacy must be achieved. The Graduation Writing Test (GWT) requirement must have been satisfied beforehand.
6. A thesis, comprehensive examination, or project must be satisfactorily completed as a terminal requirement.
7. The candidate must be enrolled in the university during the quarter of graduation.

### CURRICULUM

The master's degree curriculum in education is a flexible one requiring a minimum of 45 units, organized as follows: 11-16 units in research and project/thesis; 18-24 units in a specific area, and; 10-16 units of electives. Credit for 13 quarter units of Extended University or transfer courses, or up to 18 quarter units of credit in a single specified area not offered by the School of Education and Integrative Studies, but taken at this university, may become a part of the Master of Arts in Education contract.

The approved program constitutes the student's curriculum for the master's degree. No change will be made in the program without the mutual agreement of the student and advisor and approval of the associate vice president for Academic Programs.

The curriculum consists of three elements. The first element consists of coursework from the graduate offerings in education, selected by the student and advisor to meet the student's academic needs, based upon previous preparation and the requirements of employment. Courses available for this purpose cover such areas as language and literacy, educational multimedia, design and creativity, bilingual/cross-cultural education, special education and computers in education. Additional areas in instructional and educational leadership and management are planned for the future.

The second part of the curriculum is made up of approved upper-division and graduate electives from offerings in education or in other appropriate disciplines to complement the rest of the student's curriculum. Special certificates of competence are issued in Educational



## Multimedia and Computers in Education.

There are program options in (1) Curriculum and Instruction, (2) Special Education, and in (3) Educational Multimedia. The Curriculum and Instruction program prepares teachers for leadership in education, including classroom teaching, staff development, alternative education, and program development. This area of emphasis of the Master of Arts in Education offers a secondary and an elementary strand, as well as an emphasis program in Design and Creativity, Language and Literacy and Bilingual Education.

The Educational Multimedia program reflects the convergence of two powerful technologies, computers and media. It also reflects the increasing importance of the new tools of technology in today's world. The mission of the Educational Multimedia program encompasses the following purposes:

1. Development of superior computer and media teachers;
2. Development of educational multimedia software; designers and producers;
3. Development of educational multimedia training consultants;
4. Development of instructional designers, media producers, technology project managers and evaluators; and,
5. Development of life-long learners and explorers in the fascinating arena of educational technology.

The Special Education program offers emphases in Mild Moderate, Moderat Severe, and Resource Specialist. The program is designed to give students a theoretical and practical background in the educational, social, and environmental aspects of students with special needs.

The third part of the curriculum consists of the basic courses required in all programs for the Master of Arts degree in Education. These courses include:

Tests, Measurements and Evaluations . . . . .	GED	532	4
Seminar in Educational Research . . . . .	GED	690	4
Directed Study . . . . .	GED	691	3
Conducting Educational Research . . . . .	GED	693	4
Master's Degree Project . . . . .	GED	695	6
or Master's Degree Thesis . . . . .	GED	696	6
or Comprehensive Examination . . . . .	GED	697	1
(Not available to Educational Multimedia students)			

**I. OPTION—CURRICULUM AND INSTRUCTION: ELEMENTARY**

The requirements for the elementary strand may include the following:

Education of the Minority . . . . .	GED	504	3
Child and Adolescent Development . . . . .	GED	506	3
Interpersonal Relations in Teaching . . . . .	GED	510	4
Psychology of Literacy . . . . .	GED	525	4
Curriculum and Instruction . . . . .	GED	542	3
Implementation of Early Childhood, Elementary and Secondary Education Programs . . . . .	GED	543	3-9
Advanced Child and Adolescent Development . . . . .	GED	544	3
School, Community and Home Relations . . . . .	GED	546	3
Special Populations . . . . .	GED	582	4
Total Units . . . . .			33 - 39

**OPTION—CURRICULUM AND INSTRUCTION: SECONDARY**

The requirements for the secondary strand may include the following:

Education of the Minority . . . . .	GED	504	3
Child and Adolescent Development . . . . .	GED	506	3
Education of Contemporary Youth . . . . .	GED	509	3

Interpersonal Relations in Teaching . . . . .	GED	510	4
Psychology of Literacy . . . . .	GED	525	4
Curriculum and Instruction . . . . .	GED	542	3
Implementation of Early Childhood, Elementary and Secondary Education Programs . . . . .	GED	543	3-9
Advanced Child and Adolescent Development . . . . .	GED	544	3
School, Community and Home Relations . . . . .	GED	546	3
Special Populations . . . . .	GED	551	4
Total Units . . . . .			33 - 39

**OPTION—CURRICULUM AND INSTRUCTION: DESIGN AND CREATIVITY**

The requirements for the Design and Creativity strand are the following:

Teacher As Designer Part I: The City As Context for Creativity . . . . .	GED	540	4
Teacher As Designer Part II: Creativity As a Process . . . . .	GED	541	4
Making Curriculum Physical . . . . .	GED	547	4
The School, the Classroom and the Curriculum: Organizing Time and Space . . . . .	GED	548	4
The Built Environment, Computers, and the Creative Process . . . . .	GED	549	4

**OPTION—BILINGUAL/CROSS CULTURAL EDUCATION**

The requirements for the Bilingual/Cross-Cultural Education program may include the following:

Bilingual Education: Reading, Language Arts and Content Instruction in the Primary Language (Spanish) . . . . .	TED	415	4
Language Structure and Development for Teaching/Learning in English/Bilingual Classrooms . . . . .	TED	452	4
Education of the Minority . . . . .	GED	504	3
School, Community and Home Relations . . . . .	GED	546	3
Bilingual/Cross-Cultural Instruction: Social Studies and Language Arts . . . . .	GED	560	3
Bilingual/Cross-Cultural Curriculum . . . . .	GED	561	3
Bilingual/Cross-Cultural Instruction: Mathematics and Science . . . . .	GED	562	3
Topic in Bilingual/Cross-Cultural Education . . . . .	GED	563	3
Survey of Patterns in Language for Bilingual Teaching . . . . .	GED	564	3
Advanced ESL Instruction . . . . .	GED	565	3
Total Units . . . . .			45

**OPTION—LANGUAGE AND LITERACY EDUCATION**

The requirements for the Language and Literacy Education program may include the following:

**Core Courses (Language Literacy):**

Diagnosis, Assessment and Evaluation of Literacy . . . . .	GED	520	4
The Psychology of Literacy . . . . .	GED	525	4
Sociolinguistic and Multicultural Aspects of Language and Literacy Acquisition . . . . .	GED	528	4
Leadership and Public Policy in Language and Applied Linguistics in Literacy Acquisition . . . . .	GED	534/534A	3,1
Literacy: Public Policy and Facilitation . . . . .	GED	567/567L	2,2
or Language, Literacy and Human Development . . . . .	GED	596	4

**OPTION—EDUCATIONAL MULTIMEDIA**

The requirements for the Educational Multimedia include the following:

**Prerequisite Courses (0-8 Quarter Units)** (Or equivalent courses, or permission of instructor)

Educational Computer Literacy . . . . .	GED	505/505L	3,1
Media Production and Multimedia Applications . . . . .	GED	573/573L	3,1

**Required Courses (32 Quarter Units)**

Educational Computer Programming	GED	511/511L	3,1
Educational Telecommunications	GED	512/512L	3,1
Educational Computer Systems	GED	514/514L	3,1
Hypermedia in the Classroom	GED	516/516L	3,1
Graphic Design and Digital Photography	GED	571/571L	3,1
Instructional Design for Multimedia	GED	572/572L	3,1
Video Production and Digital Video Editing	GED	575/575L	3,1
Interactive Video Production	GED	577/577L	3,1

**Elective Courses (3-4 units)**

With the approval of the advisor, a minimum of 3 units is to be selected from the following list:

Educational Computer Research	GED	515/515L	3,1
Alternative Learning Environments	GED	578/578L	3,1
Directed Study (Internship)	GED	692	1-4
Motion Graphics: Computer Assisted Design	ART	456	3
Advanced Visual Communication	COM	442/442A	2,2
Professional Presentations Using Technology	GBA	565	3
Computers and Music	MU	408/408A	3,1

**OPTION—SPECIAL EDUCATION**

Mild/Moderate and Moderate/Severe

The requirements for the Special Education option may include the following:

**A. Generic Core**

Introduction to Exceptionality	GED	501	4
Special Population	TED/GED	551/551A4	
Transition to Postsecondary Settings	TED/GED	552	4
Positive Classroom Intervention	TED/GED	581/581A	2,1
Communicating with Parents of Students with Disabilities	TED/GED	586	4
Instruction of Culturally and Linguistically Different Students with Disabilities	GED	590	4

**B. Advanced Specialization****1. Mild/Moderate**

Advanced Assessment and Remediation of the Mildly Handicapped	TED/GED	553	4
Advanced instruction of Students with Mild/Moderate Disabilities	TED/GED	554	4
Integrated Mathematics, Science and Computer Curricula for Students with Mild/Moderate Disabilities	TED/GED	559	4
Introduction to Mild Handicaps	TED/GED	582	4
Introduction to Serious Emotional Disturbance	GED	589	4

**2. Moderate/Severe**

Advanced Study of Moderate and Severe Disabilities	TED/GED	530	4
Introduction to Serious Emotional Disturbance	GED	589	4
Assessment of Students with Disabilities	TED/GED	555/555A	3,1
Curriculum for Students with Moderate/Severe Disabilities	TED/GED	556/556A	3,1
Introduction to Assistive Technology	TED/ GED	588	4

**C. Resource Specialist Certificate of Competency**

Introduction to Resource Specialist Program	TED/GED	583	4
Organization and Management of			

Special Education Programs	TED/GED	584	4
Current Education Issues for the Resource Specialist	TED/GED	585	4
Leadership in Special Education	TED/GED	591	4

**CREDENTIAL PROGRAMS**

The university offers a number of programs leading to certification for elementary and secondary school teaching as well as various specialists' credentials under the auspices of the School of Education and Integrative Studies. These are described in other sections of this catalog.

Field experiences and student teaching courses are not applicable for the Master of Arts Degree in Education.

**GRADUATE CERTIFICATE PROGRAMS IN EDUCATIONAL MULTIMEDIA**

Admission requirements for the special certificates of competencies for the Educational Multimedia and Computers in Education programs are the same as the requirements for admission to the Master of Arts in Education degree program.

The following courses are required to complete these certificate programs, respectively:

**Computers in Education Certificate (20 Units)**

**Prerequisite Courses** (Or equivalent courses, or permission of instructor.)

Educational Computer Literacy	GED	505/505L	3,1
Media Production and Multimedia Applications	GED	573/573L	3,1

**Required Courses**

Educational Computer Programming	GED	511/511L	3,1
Educational Telecommunications	GED	512/512L	3,1
Educational Computer Seminar	GED	514/514L	3,1
Hypermedia in the Classroom	GED	516/516L	3,1
Interactive Video Production	GED	577/577L	3,1

**Educational Multimedia Certificate: (20 Units)****Prerequisite Courses**

*Educational Computer Literacy	GED	505/505L	3,1
*Media Production and Multimedia Applications	GED	573/573L	3,1

\*Or equivalent courses, or permission of instructor.

**Required Courses**

Graphic Design and Digital Photography	GED	571/571L	3,1
Instructional Design for Multimedia	GED	572/572L	3,1
Video Production and Digital Video Editing	GED	575/575L	3,1
Hypermedia in the Classroom	GED	516/516	3,1
Interactive Video Production	GED	577/577L	3,1

**GRADUATE COURSE DESCRIPTIONS****GED 501 Introduction to Exceptionality (4)**

A survey course consisting of an introduction to the understanding of children and youth classified as exceptional for educational purposes. Includes field observations. This course satisfies the California Special Education requirement for the Clear Basic Credentials. 4 lecture discussions.

**GED 504 Education of the Minority (3)**

Foundation study of the ethnic minority cultures as they relate to the teaching-learning process. Research, principles, and practices. Refer to

School of Education class schedule for specific group emphasis each quarter. May be repeated for a total of 9 units. 3 lecture discussions.

### **GED 505/505L Educational Computer Literacy (3,1)**

An investigation into the issues involved in access and control of computer-based technologies. An introduction to the historical framework of the modern-day computer: uses of computers and computer-based technology in the classroom; telecommunications; authoring systems; selection and evaluation of educational software. 3 seminars, 1 three-hour laboratory.

### **GED 506 Child and Adolescent Development (3)**

Overview of the child and adolescent development process, 0-21 years of age and its relationship to the learning process. 3 lecture discussions.

### **GED 509 Education of Contemporary Youth (3)**

The dynamics of contemporary youth in the public secondary school. Values of youth, major problems, struggles, and conflicts as adolescents move toward maturity. Cultural and societal values which have an impact on youth; role of the teacher and school in helping young people achieve identity. 3 seminars. Prerequisite: TED 421/421A or consent of instructor.

### **GED 510 Interpersonal Relations in Teaching (3)**

Examination of personality factors that are obstacles to effective teaching; emphasis upon developing open and authentic interpersonal relationships. Role-playing, demonstrations and other laboratory activities. 3 lecture discussions. Prerequisite: TED 421/421A or consent of instructor.

### **GED 511/511L Educational Computer Programming (3/1)**

Introduction to computer programming on the use of high-level authoring systems; script editors, debuggers, structured programming techniques, top-down design, modularization, messages, message order, variables, values, operators, precedence, writing efficient code, stylistic issues, efficient use of memory, XCMDs, XCFNs, AppleScript, AppleEvents. 3 seminars, 1 three-hour laboratory. Prerequisites: GED 505/505L, 516/516L, or permission of instructor.

### **GED 512/512L Educational Telecommunications (3/1)**

Introduction to telecommunications for teachers on the use of the Internet as an educational tool; the VAX/VMS system, modems, communication software, etiquette, E-mail, Listserves, news-groups, local news, local gopher, Veronica, anonymous ftp, Archie, WAIS, World-Wide Web, Lynx, graphics viewers, Mosaic. 3 seminars, 1 three-hour laboratory. Prerequisite: GED 505/505L or permission of instructor.

### **GED 514/514L Educational Computer Seminar (3/1)**

An advanced study of the Macintosh operating system, including: System 7.1, System 7.5, Resource Editing, Apple Script, Troubleshooting and networking. 3 seminars, 1 three-hour laboratory. Prerequisite: GED 505/505L or permission of instructor.

### **GED 515/515L Educational Computer Research (3/1)**

An intensive study of selected issues and survey and critical analysis of selected research on computers, microcomputers and related technologies. An examination of the social, political, and educational implications of various computer technologies. 3 seminars, 1 three-hour laboratory. Prerequisite: GED 505/505L, 690, or permission of instructor.

### **GED 516/516L Hypermedia in the Classroom (3/1)**

Introduction to hypermedia, use of high-level authoring systems as

hypermedia environments; including authoring system basics, the stack, the page, buttons/button design, fields/field design, instructional design, hypermedia design, messages, handlers, precedence, drawing tools, text tools, icon editing, animation and sound. 3 seminars, 1 three-hour laboratory. Prerequisites: GED 505/505L or permission of instructor.

### **GED 518/518A Teaching Writing: Process and Product (K-8) (3/1)**

An in-depth exploration of writing. An investigation of the writing process and an exploration of strategies for teaching writing across the curriculum for diverse populations. 3 seminars, 1 two-hour activity. Prerequisites: TED 424/424A, 432/432A, 415 or consent of instructor.

### **GED 519/519A Language and Literacy Research: Design and Application (3/1)**

Survey of language and literacy research from a variety of methodological perspectives. Application of findings for the improvement of instruction and literacy. 3 seminars, 1 two-hour activity. Prerequisite: GED 532 or equivalent.

### **GED 520 Diagnosis, Assessment and Evaluation of Literacy (4)**

Introduction to formal and informal, individual and group assessment materials related to language and literacy acquisition in first and second languages; understanding validity; reliability and cultural bias of literacy assessment instruments. Prerequisites: TED 415, 424/424A or 432/432A or consent of instructor. 4 seminars.

### **GED 522/522A Instructional Strategies for Language and Literacy Field Sites (2,2)**

Application of theoretical knowledge and formal and informal assessment leading to the development and implementation of instructional strategies to specific individual and group language/literacy needs in the context of our complex contemporary society. Must include 15 student contact hours. 2 seminars, 2 two-hour activity. Prerequisite: GED 594 or 593.

### **GED 523 Language Acquisition and Emergent Literacy for the Young Child (4)**

The development of literacy in the young child. Classroom and clinical experience in assessment of development in literacy. Criteria for selection of curriculum materials and procedures in the development of emergent literacy. 4 seminars. Prerequisites: TED 421/421A, 424/424A, or 432/432A or consent of instructor.

### **GED 525 The Psychology of Literacy (4)**

Examination of reading as a process of constructing meaning through the dynamic interaction of the reader's existing knowledge, the information suggested by the written language, and the context of the reading situation. 4 seminars. Prerequisites: TED 424/424A, 432/432A, or consent of instructor.

### **GED 527/527A Literacy and Technology (3,1)**

Inquiry into the uses of computer and allied information technologies in literacy instruction; critiques of instructional software; evaluation of programs in light of contemporary literacy and theory practice; opportunity to design new software. 3 seminars, 1 two-hour activity. Prerequisite: GED 505/505L or equivalent or consent of instructor.

### **GED 528 Sociolinguistic and Multicultural Aspects of Language and Literacy Acquisition (4)**

Application of theories and models of second language acquisition: historical, cultural, social, political, and economic factors influencing literacy for the second language learner. Further exploration of the

influence of specific cultural context and convention on the learning environment. 4 seminars. Prerequisites: TED 415, 424/424A, or 432/432A or consent of instructor.

#### **TED 530/GED 530 Advanced Study of Moderate and Severe Disabilities (4)**

Advanced study of moderate and severe developmental disabilities: mental retardation, autism, serious emotional disturbance, physical disabilities, traumatic brain injury, dual diagnosis, and multiple disabilities. Concepts, etiology, characteristics, and educational implications for general and special educators. Twenty student/classroom/activity contacts hours required. 4 seminar/discussion. Prerequisite: Level II status or permission of instructor.

#### **GED 532 Tests, Measurements and Evaluations (4)**

Basic principles of educational measurement and evaluation; teacher constructed instruments and techniques; selection and interpretation of standardized and criterion referenced measurements. Required of Master of Arts degree in Education students. 4 seminars. Prerequisite: TED 421/421A.

#### **GED 534/534A Applied Linguistics in Literacy Acquisition (3,1)**

Exploration of the relationship between literacy and linguistics as effected by pragmatics, syntax, phonology and semantics. 3 seminars, 1 two-hour activity. Prerequisite: GED 525 or 528.

#### **GED 535 The Gifted Individual: Curriculum and Instruction (3)**

Current practice, research, issues and trends of teaching models and curriculum development for the gifted and talented. 3 seminars. Prerequisite: GED 531 or consent of instructor.

#### **GED 536 Seminar in Giftedness and Creativity (3)**

Problems of affective, cognitive, and social development of gifted and talented individuals. Examination of higher cognitive functioning and characteristics of performance of creativity. 3 seminars. Prerequisite: GED 531 or consent of instructor.

#### **GED 537 Curriculum Evaluation (3)**

Theory and practice of instructional program evaluation. Educational evaluation models, alternatives, and guidelines for curriculum evaluation. 3 seminars. Prerequisites: GED 532, 535, or 542 or consent of instructor.

#### **GED 540 Teacher As Designer Part I: The City as Context for Creativity (4)**

Studies processes and transformations that lead to the creation of the physical environment through a teaching method known as City Building Education™. Explored are curriculum uses, practical examples and guidebooks of how to integrate subjects from various State Curriculum Frameworks. This is a course for students of graduate standing in education only. No technical design skills are needed. 4 seminars.

#### **GED 541 Teacher As Designer II: Creativity as a Process (4)**

Continues Part I. Isolating and making explicit transformations associated with intuition and leaps of insight which produce solutions to environmental dilemmas. Topics include non-specific transfer of learning among spatial, visual, aural, and written domains around thinking skills found in design professions. 4 seminars. Prerequisite GED 540.

#### **GED 542 Curriculum and Instruction (3)**

Curriculum models used in childhood adolescent education. Examination of curriculum emphasizing the needs of the student, the environment and teacher. 3 lecture discussions.

#### **GED 543 Implementation of Early Childhood, Elementary and Secondary Education Programs (3)**

Instructional strategies to achieve curriculum goals in language arts, science, motor activities, music, art, and other major curriculum areas. Refer to School of Education class schedule for specific group emphasis each quarter. May be repeated for a total of 9 units. 3 seminars. Prerequisite: GED 542 or permission of instructor.

#### **GED 544 Advanced Child and Adolescent Development (3)**

Experimental and theoretical literature relating to the development of child and adolescent; implications for the student's continuing educational experiences. 3 seminars. Prerequisite: GED 506 or consent of instructor.

#### **GED 546 School, Community, and Home Relations (3)**

Cooperative school, home, and community relations. Professional and community resources for family, health, welfare, and improving child and adolescent development. Implications for school curriculum. 3 seminars. Prerequisite: permission of the instructor.

#### **GED 547 Making Curriculum Physical (4)**

Studies processes, tools, and techniques used to visualize, display, and organize information. Provides practice with a variety of mechanisms and methods for envisioning basic curriculum and linking it to any subject matter. 4 seminars. Prerequisites: GED 540 and GED 541.

#### **GED 548 The School, the Classroom and the Curriculum: Organizing Time and Space (4)**

Design and organization of the classroom and the school facility, as a response to the classroom curriculum. Provides practice in relating the curriculum to physical spaces. 4 seminars. Prerequisites: GED 540, GED 541, and GED 547.

#### **GED 549 The Built Environment, Computers, and the Creative Process (4)**

Combines the physical world and computers to amplify creative thinking and the living environment. Explores the relationship between the environment and advanced computer-based technologies as a basis for development of design and creative thinking in the classroom instruction process. 4 seminars. Prerequisites: GED 540, GED 541, GED 547, and GED 548. Minimum computer literacy, specifically the ability to use HyperCard and the World Wide Web on the Internet.

#### **GED 550 Seminar in Educational Issues (4)**

Intensive study of selected issues, problems, or areas in education, according to the interests of the students enrolled. Each seminar subtitled by its content. May be repeated for a maximum of 12 units. 4 seminars.

#### **TED/GED 551/551A, Special Population (3,1)**

An overview of students with disabilities which includes principles for assessing and instructing mainstreamed students in relation to federal legislation requirements; diverse instructional strategies, IEP implementation, and fieldwork across a variety of special education settings. Minimum 20 hours student/classroom/activity contact hours required. Satisfies the California Special Education requirement for the Clear Credential. Three seminar/discussion; one two-hour activity.

#### **TED 552/GED 552 Transition to Postsecondary Settings (4)**

Examination and application of current legislation, theories, and strategies in transition services for students with mild/moderate/severe disabilities. Assessment procedures, community and agency resources, employment opportunities, transition domains and skills K-12, and joint



program planning across multiple service agencies. Twenty student/classroom/activity contact hours required. 4 seminar/discussion. Prerequisite: Level II status or permission of instructor.

**TED 553 /GED 553 - Advanced Assessment and Remediation of the Mildly Handicapped (4)**

Advanced seminar in the theory and practice of assessment and remediation of mildly handicapped pupils. Experience in relating diagnostic and evaluative data to IEP prescriptive elements. 4 seminars. Prerequisites: TED 554/GED 554, TED 559/GED 559, TED 582/GED 582.

**TED 554/GED 554 Advanced Instruction of Students with Mild/Moderate Disabilities (4)**

Advanced seminar on needs and characteristics of students with mild/moderate disabilities and implementation of specific strategies in various educational settings. Includes cognitive, social and emotional instructional strategies and data-based decision-making. Emphasizes integrated content in literacy and social sciences. Twenty student/classroom/activity contact hours required. Prerequisite: Level II status or permission of instructor.



**TED 555/555A – Assessment of Students with Disabilities (3,1)**

Theory and practice of formal and informal assessment of students with mild/moderate and moderate/severe disabilities, and serious emotional disturbance. Policies/procedures for adapting assessment for English language learners. Using assessment results to plan and implement student goals and objectives and curricula. Twenty student/classroom/activity contact hours required. 3 seminar/discussion; 1 two-hour activity.

**TED/GED 556/556A Curriculum for Students with Moderate/Severe Disabilities (2,1)**

Theory and application of curricula for students with moderate/severe disabilities. Instructional strategies, curricular modification, and practices. Adaptations for English language learners. Theories and practices of inclusion. Strategies for meeting mobility, sensory, and specialized health care needs in the classroom. Twenty student/classroom/activity contact hours required. 2 seminar/discussion; one two-hour activity.

**TED/GED 559 Integrated Mathematics, Science and Computer Curricula for Students with Mild/Moderate Disabilities (4)**

Advanced seminar on the examination, evaluation, and implementation of math, science, computer curricula for students with mild/moderate disabilities. Application of learning principles to curriculum theories and educational considerations for the math, science, and computer technology areas. Twenty student/classroom/activity contact hours required. 4 seminar/discussion. Prerequisite: Level II standing.

**GED 560 Bilingual/Cross-Cultural Instruction: Social Studies and Language Arts (3)**

Implementation of bilingual cross-cultural instruction in social studies and language arts. Effective instructional strategies to achieve curriculum objectives. 3 lectures/problem-solving.

**GED 561 Bilingual/Cross-Cultural Curriculum (3)**

Curriculum development in theory and practice; processes and roles in curricular development; criteria for analysis and evaluation of curricula and instructional materials; analysis and planning of bilingual/cross-cultural programs. 3 seminars. Prerequisites: GED 560; two years of college Spanish or equivalent; possession of a teaching credential or admission to a credential program.

**GED 562 Bilingual/Cross-Cultural Instruction: Mathematics and Science (3)**

Implementation of bilingual/cross-cultural strategies in mathematics and science, classroom individualization and evaluation. 3 lectures/problem-solving.

**GED 563 Topics in Bilingual/Cross-Cultural Education (3)**

Review of critical issues and topics in bilingual/cross cultural education. Refer to School of Education class schedule for specific topic each quarter. May be repeated for a total of 9 units.

**GED 564 Survey of Patterns of Language for Bilingual Teaching (3)**

The nature of language structure; the development of language; Barrio dialects; similarities and differences among languages; linguistic change and reconstruction. Inter-relationships between language and culture in the Chicano community. 3 seminars. Prerequisites: GED 560 and two years of college Spanish or equivalent; possession of a teaching credential or admission to a credential program.

**GED 565 Advanced ESL Instruction (3)**

Advanced ESL instructional strategies for the non-English speaker/student. 3 lectures/problem-solving.

**GED 567/567L Leadership and Public Policy in Language and Literacy: Public Policy and Facilitations (2/2)**

Analysis of local, state, national and international policies, planning and legal issues related to literacy. Examination of the dynamics of interpersonal communication, multiculturalism and leadership in literacy of education. 2 seminars, 2 laboratory field experiences. Prerequisite: GED 596 or consent of instructor.

**GED 568/568A Specially Designed Instruction for the Content Areas (3/1)**

Inquiry into and application of specially designed academic instruction in English for access to core curricula; examination of methodologies for developing literacy and text analysis in content areas; exploration of assessment issues/methods for English-only and transitional English speakers. 3 seminars, 1 two-hour activity. Prerequisite: TED 452.

**GED 569/569A Integrating Literature and the Language Arts (3,1)**

Exploration of classic and contemporary juvenile literature from interdisciplinary and multicultural perspectives; approaches for integrating literature and specific student interests with the writing process and aural-oral traditions. 3 seminars, 1 two-hour activity. Prerequisites: TED 415, 424, 432 or consent of instructor.

**GED 571/571L Graphic Design and Digital Photography (3/1)**

Theory and application of visual concepts to communication theory, semiotics, and its application to technology, learning and pedagogy, visualization techniques, exploring the graphical power of computers, and digital photography tools and techniques for all designers. 3 seminars, 1 three-hour laboratory. Prerequisites: GED 505/505L, 573/573L, or permission of instructor.

**GED 572/572L Instructional Design for Multimedia (3/1)**

Review of instructional design process based on scientific research/theory in field of human learning, applications of current research into development of instructional materials for classroom and non-classroom settings, exploring strategies/techniques for developing multimedia materials for training, educational, or entertainment projects. 3 seminars; 1 three-hour laboratory. Prerequisites: GED 505/505L, 573/573L, or permission of instructor.

**GED 573/573L Media Production and Multimedia Applications (3/1)**

Role of media/interactive media in learning environments; systematic approach; theoretical aspects of impact of media/multimedia on teaching; multimedia applications in education, training, business, industry, art; producing/utilizing media/multimedia; producing digital materials; transparencies, slides, graphics, QuickTime movies; optical technology. 3 seminars, 1 three-hour laboratory. Prerequisite: GED 505/505L or permission of instructor.

**GED 575/575L Video Production and Digital Video Editing (3/1)**

Analysis, planning and preparation of instructional video programs; exploring the convergence of video and computers; technical aspects of QuickTime and digital video, capturing/manipulating video images on computers; research on utilization and effectiveness of television and video programs in educational and non-educational settings. 3 seminars, 1 three-hour laboratory. Prerequisites: GED 505/505L, 573/573L or permission of instructor.

**GED 577/577L Interactive Video Production (3/1)**

Introduction to the interactive video technology; the marriage of computer and video technologies. Designing interactive video disc programs using different authoring systems, re-purposing video discs, and CD-ROMs for use in education, entertainment, business, marketing,

communication. 3 seminars, 1 three-hour laboratory. Prerequisites: GED 505/505L, 573/573L or permission of instructor.

### **GED 578/578L Alternative Learning Environments (3,1)**

The application of media in the design and delivery of academic programs through distance learning and other technology-mediated instruction. The theory and practice, case studies of ongoing programs, and research on the effectiveness of technology-mediated learning will be examined. 3 seminars, 1 three-hour laboratory. Prerequisite: GED 573/573L or permission of instructor.

### **TED/GED 581 Classroom Management for Teachers of Students with Disabilities (4)**

Theory and practice in classroom management techniques: applied behavior analysis, cognitive approaches, classroom organization and management. For regular and special educators. 4 seminars. Prerequisite: TED 301 or KIN 204.

### **TED 581/581A /GED 581/581A Positive Classroom Interventions (2,1)**

Theory and practice of organizing and managing classroom learning environments for diverse learners. Organizing and scheduling, behavior management techniques, relationships between learners, curriculum, and behavior. Developing and implementing learning environments that enable students to reach their full potential. Minimum 20 student/classroom/activity contact hours required. 2 seminar/discussion; one two-hour activity.

### **TED 583/GED 583 - Introduction to Resource Specialist Program (4)**

Functions of the resource specialist; collaborative consultation, inservice training, direct instruction with special education students. Resource specialist program models. 4 seminars. Prerequisites: Admission to Resource Specialist Program and either a Special Education credential or concurrent enrollment in special education credential program.

### **TED 584/GED 584 - Organization and Management of Special Education Programs (4)**

Legal compliance requirements in planning and financing special education programs. Conceptual framework and research in operation of special education procedures and programs. 4 seminars. Prerequisite: TED 583/GED 583.

### **TED 585/GED 585 - Current Education Issues for the Resource Specialist (4)**

Issues and trends in resource specialist service delivery models and programs. Examination and analysis of current problems, current curricular and instructional practices relevant to the resource specialist. 4 seminar. Prerequisite: TED 583/GED 583.

### **TED 586/GED 586 - Communicating with Parents of Student with Disabilities (4)**

Communication strategies for working with parents of handicapped students. Parent education, rights, due process, resource agencies, local and state parent organizations, counseling, and in-service training techniques and procedures. 4 seminars. Prerequisites: TED 501/GED 501 or TED 551/551A or GED 551, TED 532/GED 532, TED 581/GED 581.

### **TED 587/GED 587 Current Issues and Research in Special Education (4)**

Study of educational research theory and methods in the context of a critical review of current literature that affects or involves special education. Investigation of issues and trends in special education research. Twenty student/classroom/activity contact hours required. 4 seminar/discussion. Prerequisite: Level II status or permission of instructor.

### **TED 588/GED 588 Introduction to Assistive Technology (4)**

Overview and introduction to assistive technology, adaptive computer hardware and software, and integration of adaptive devices into curricular activities for students with severe disabilities. Alternative and augmentative communication strategies in the context of language development. 4 seminar/discussion.

### **GED 589 Introduction to Serious Emotional Disturbance (4)**

Advanced seminar in the study of serious emotional disturbance within an educational context. Concepts, significance, etiology, characteristics, and educational considerations of seriously emotionally disturbed students who present academic and social learning problems. 4 seminars. Prerequisite: GED 530 or GED 582.

### **GED 590 Instruction of Culturally and Linguistically Different Students with Disabilities (4)**

Introduction to instructional approach strategies for teaching culturally and linguistically diverse exceptional students. Overview of training techniques in specialized informal assessment, culturally and linguistically appropriate programming, language minority parent involvement strategies, and provision of school-based support/consulting. Prerequisites: GED 501, GED 532, GED 551, GED 581.

### **TED 591/GED 591 Leadership in Special Education (4)**

Application of leadership techniques relevant to special education settings including organizational behavior, group culture, consultation and collaboration, communication skills, problem solving, and group dynamic theory. Preparation in coordination of special education placements and professional interactions. Twenty student/classroom/activity contact hours required. Seminar - discussion - 4 units.

### **GED 594/594A Analysis, Development of Language and Literacy Curricula (3,1)**

Examination of language/literacy curricula; development of needs assessment for language/literacy programs and formative/summative evaluations. 3 seminars, 1 two-hour activity. Prerequisites: GED 596, 528 or consent of instructor

### **GED 596 Language, Literacy, and Human Development (4)**

Introduction to literacy in the context of life-long learning in a pluralistic society. Political, economic, social and psychological factors affecting language/literacy development explored. Models of first and second language acquisition examined. 4 seminars. Prerequisites: TED 424, 432, or consent of instructor.

### **GED 650 Seminar in Current Problems and Strategies in Education (4)**

Critical treatment of new strategies, innovations, conditions, and the findings of research that currently affect or involve education. Choice of topics will be related to contemporary education problems. 4 seminars. May be repeated for a maximum of 12 units. Unconditional standing required.

### **GED 690 Seminar in Educational Research (4)**

Overview of research in education; emphasis on the design and implementation of research projects and theses preparation; discussion of educational issues relevant in the development of a research project. Required of Master of Arts Degree in Education students. 1 three-hour seminar/discussion. Unconditional standing required.

**GED 691 Directed Study (1-9)**

Study, research or readings of a particular problem in education directed by a faculty advisor. May be repeated for credit up to 9 units. Required of Master of Arts in Education students. Prerequisite: consent of the Graduate Coordinator and/or faculty advisor. Unconditional standing required.

**GED 692 Independent Study (1-6)**

Independent study, research or readings proposed by the student and conducted under the supervision of a faculty member, but not leading to a thesis/project. May be repeated for credit up to 6 units. Unconditional standing required.

**GED 693 Conducting Educational Research (4)**

Introduction to educational research. Analysis of qualitative and quantitative evaluation and research methods. Planning a research study and organization of a research report. Required of students in the Master of Arts degree in Education. 4 seminars. Prerequisite: GED 532 and GED 690 or consent of instructor. Unconditional standing required.

**GED 695 Master's Degree Project (3-6)**

Independent research leading to successful completion of a project. Open to graduate candidates and with approval of Graduate Department Chair. Maximum credit, 9 units. Prerequisite or concurrent: GED 694/691. Advancement to Candidacy required and approved committee form filed in the Graduate and Professional Studies Office.

**GED 696 Master's Degree Thesis (3-6)**

Independent research leading to successful completion of a thesis. Open to graduate candidates and with approval of Graduate Department Chair. Maximum credit, 9 units. Prerequisite or concurrent: GED 693/691. Advancement to Candidacy required and approved committee form filed in the Graduate and Professional Studies Office.

**GED 697 Comprehensive Examination (1)**

Preparation for and completion of an examination on the subject area of the candidate's coursework listed on the degree program. May be taken no more than two times. Failure to complete exam satisfactorily the second time will result in termination from the program. Candidates must register through the Graduate and Professional Studies Office. Advancement to Candidacy required. Course may be taken on a credit/no credit basis.

**GED 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis or project. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.



## ENGINEERING

### Master of Science in Engineering

#### Master of Science in Electrical Engineering

In the College of Engineering

Elhami T. Ibrahim, Director, Division of Graduate Studies

Engineering Graduate Studies Committee:

Elhami T. Ibrahim, Chair

Ali R. Ahmadi

Narayan Mygoor

Norman C. Cluley

Peter Dashner

Barbara Glasscock

Thuan K. Nguyen

John D. O'Neil

The College of Engineering offers two graduate programs:

- 1) An interdisciplinary program leading to the Master of Science in Engineering degree which, coupled with a bachelor's degree, provides the student with a comprehensive preparation for advanced work in the engineering profession. This program is designed to accept students with diverse undergraduate engineering backgrounds. Each student in this program has the opportunity to choose from all the graduate courses offered by the College of Engineering. The student completes a course of study individually tailored to the student's unique talents and professional goals.

The student can choose any of the following emphasis areas: aerospace, chemical, civil, electrical, environmental, industrial, manufacturing, materials, mechanical, and structural engineering or engineering management.

- 2) A more structured program leading to the Master of Science in Electrical Engineering degree which, coupled with a bachelor's degree in Electrical Engineering or a closely related field, provides comprehensive preparation for advanced work in the electrical engineering profession. This program has three options: Communication Systems Engineering, Computer Engineering, and Control Systems Engineering. After completing a limited number of required courses, students have the opportunity to choose from an extensive list of approved courses to tailor the program of study to their professional goals.

Proposals to institute new master's degrees in Environmental, Mechanical, Structural Engineering, and Engineering Management are currently under review. Please check with the Graduate Studies Office in the College of Engineering for planned date of implementation of these new programs.

The programs of study for each degree feature breadth courses supplemental to the student's undergraduate education, courses designed to emphasize the chosen technical area of specialization, and a thesis or a comprehensive examination.

### ADMISSION TO THE PROGRAMS

An applicant for admission to either program must meet university criteria as specified in the Admission section of this catalog as well as the criteria outlined below. Applicants are advised that a reasonable proficiency in computer programming is necessary for successful completion. If the student is deficient in this area, he or she will be expected to remove the deficiency early in the program.

Successful applicants will be admitted to the program either unconditionally or with conditions imposed on them. To receive unconditional admission, an applicant must satisfy these criteria:

- 1) The applicant must hold a baccalaureate degree in engineering from a program that has been accredited by the Accreditation Board for Engineering and Technology (ABET) and for which the accreditation was in effect at the time of award of the degree. The degree must have been granted within five years prior to the proposed beginning of the graduate program. A baccalaureate degree in engineering technology does not satisfy this criterion.
- 2) The applicant must have achieved a grade point average of at least 3.0 in all undergraduate upper division coursework in mathematics, science and engineering and, additionally, in all coursework attempted with graduate standing.
- 3) The applicant must receive a positive recommendation from the Director of Engineering Graduate Studies and approval by the Dean of the College of Engineering.

Conditional admission may be granted in cases in which the applicant's academic preparation for graduate study is such that criteria 1) and/or 2) above are not satisfied. In such cases, the applicant is required to submit recent test scores of the Graduate Record Examination, letters of recommendation, and other documents attesting to the applicant's aptitude for graduate studies. Applicants who do not satisfy criterion 1) may be required to take a limited number of preparatory courses with no degree credit. Criterion 3) above must be met. When an applicant is admitted conditionally, the conditions to be met and the time allowed for meeting them are stated in the letter of admission. If these conditions are not satisfied, the student may be disqualified.

### PROGRAM REQUIREMENTS

Admission to a program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted a student upon the recommendation of the graduate faculty and implies a readiness to attempt the thesis or comprehensive examination. Students who are not candidates are not eligible to register for EGR 692, 696 or 697.

In order to advance to candidacy for either the Master of Science in Engineering degree, or the Master of Science in Electrical Engineering degree, the student must:

- 1) satisfy all admissions conditions, if any;
- 2) complete at least 32 units of graduate coursework with a grade point average of 3.0 or better;
- 3) satisfy the Graduation Writing Test; and
- 4) with the assigned advisor, develop and file a program of study and have it approved by the Engineering Graduate Studies Committee, by the Graduate Studies Analyst, and by the Director of Engineering Graduate Studies.

The program of study must be submitted for approval before the end of the second quarter of attendance.

At the time of filing of the program of study, the student must opt for publishing a thesis or performing an independent study with a comprehensive examination as a culminating experience of his/her graduate education after completing the required coursework. The thesis effort is intended to involve independent research by the student with the goal of advancing knowledge in a specialized area. The thesis effort includes a defense of the effort by the student before a committee of faculty members. The independent study with comprehensive examination is a one-quarter case study or research, which concludes with a written report and a comprehensive written or oral exam conducted by a committee of faculty members. Information regarding the thesis and independent study with comprehensive examination is available at the Engineering Graduate Studies Office.

In addition, each student is responsible for satisfying all university requirements specified elsewhere in the catalog.

### CURRICULAR REQUIREMENTS

General requirements for advanced degrees are found in the Graduate Scholastic Requirements section of this catalog. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total of 13 transfer, Extended University, or units petitioned for graduate credit, or any combination of 13 units, may be included on a master's contract.

Technical specialty courses are chosen to emphasize an area which is a logical continuation of the student's undergraduate and graduate preparation. At most, one 400-level course may be included in this category, and a maximum of 4 transfer units can be used to satisfy this requirement.

The remainder of the courses in the student's program of study will be chosen in collaboration with an advisor to insure consistency with undergraduate preparation and graduate goals, and to assure an integrated educational experience. A course in the program of study may be taken only after the student has satisfied the course prerequisites for enrolling in the course. It is the student's responsibility to satisfy all prerequisites for a course before enrolling in the course.

Engineering graduate students may be granted graduate credit only for courses numbered 400 and above. A grade point average of 3.0 (B) or better must be maintained in all upper-division and all graduate courses. Candidates must be enrolled in the university during the quarter of graduation.

### Master of Science in Engineering

The curriculum for the Master of Science in Engineering degree requires a minimum of 45 quarter units of coursework, of which at least 32 units must be in 500 and 600 level courses. Each program of study consists of at least 15 units of breadth courses, at least 15 units of technical specialty courses, elective course, and either a thesis (4-8 units) or an independent study with comprehensive examination (2 unit). The breadth courses are intended to insure that the student acquires a broad basis in fundamental courses in advanced mathematics, science and engineering, and are chosen so that they will be most beneficial to the student, complementing the student's undergraduate program. Breadth courses may include at most one course from the sequence EGR 521, 538, 539, 540, 553; the rest of the breadth courses must be chosen from the sequence EGR 509 through 515.

### Master of Science in Electrical Engineering

The curriculum for the Master of Science in Electrical Engineering degree requires a minimum of 46 quarter units of coursework, of which at least 34 units must be in 500 and 600 level courses. Each program of study consists of at least 8 units of breadth courses, at least 16 units of technical emphasis courses, at least 16 units of elective courses, and either EGR 696, thesis (4-6 units) or EGR 692, independent study with a comprehensive examination (2 units). Breadth courses include one required and one optional course from among EGR 509, 510, 511, 512, and 515. They are intended to insure that the student acquires a fundamental knowledge in advanced mathematics. Two required emphasis area courses are specified for each option. The rest of the emphasis courses and electives may be chosen from an extensive list of courses in electrical engineering and related areas of mathematics, science, and engineering.

### GRADUATE COURSE DESCRIPTIONS

#### EGR 509 Advanced Differential Equations for Engineers (4)

An advanced course in applied differential equations. Multi-disciplinary engineering models are developed and solved. Analytical and numerical techniques for solving differential systems with either a single independent variable or multiple independent variables are used. 4 lectures/problem-solving. Prerequisite: Undergraduate course in differential equations.

#### EGR 510 Engineering Probability and Statistics (4)

Mean square estimation, introduction to stochastic processes, time averages and ergodicity, continuous testing and estimation, confidence intervals, significance, applications in thermodynamics, machine design, systems analysis, and reliability. 4 lectures/problem-solving. Prerequisite: Undergraduate course in probability theory.

#### EGR 511 Numerical Modeling (4)

Advanced interpolation and approximation methods. Advanced integration concepts. Solution of ordinary differential equations. Systems of differential equations. Statistical methods. Applications to electrical networks, transport phenomena, structural systems, dynamic systems, etc. 4 lectures/problem-solving. Prerequisite: Undergraduate course in numerical analysis or consent of instructor.

#### EGR 512 Vector Analysis and Complex Variables (4)

Vector and scalar fields. Gradient, divergence, curl. Green and Stokes theorems. Complex functions and conformal mapping. Applications in electrodynamics, heat transfer, fluid dynamics and aerodynamics. 4 lectures/problem-solving. Prerequisite: Mathematics equivalent to ABET-accredited curriculum.

#### EGR 513 Engineering Tensor Analysis (4)

Vector-tensor notation. Generalized coordinate systems. Tensor algebra and calculus. Transport and conservation laws in continuum mechanics. Formulation and modeling of engineering phenomena. 4 lectures/problem-solving. Prerequisite: Mathematics equivalent to ABET-accredited curriculum.

#### EGR 514 Variational Methods in Engineering (4)

Calculus of variations. Approximate methods. Applications in fluid dynamics, heat transfer, dynamics, structures. 4 lectures/problem-solving. Prerequisite: Mathematics equivalent to ABET-accredited curriculum.

#### EGR 515 Matrix Methods in Engineering (4)

Application of matrix methods in engineering analysis. Matrix algebra. Eigenvalues and eigenvectors. Energy techniques. Transformations. Applications in classical mechanics, analysis of structures, circuit analysis, vibrations, heat transfer and fluid dynamics. 4 lectures/problem-solving. Prerequisite: Mathematics equivalent to ABET-accredited curriculum.

#### EGR 516 Advanced Indeterminate Structures (4)

Analysis of multi-degree of freedom systems by slope deflection and superposition of distribution process. Elements of matrix application including flexibility and stiffness methods. Deflection of continuous trusses and frames. Stability analysis of beam-column utilizing classical strain energy theorems. 4 lectures/problem-solving. Prerequisite: Upper-division course in structural analysis.

**EGR 517 Advanced Steel Design (4)**

Structural steel analysis and design including long span and tapered girders, orthotropic plates, space frames. Column stability and post buckling states, secondary stresses. Design of lateral force resistant building frames and composite steel-concrete systems. Plastic analysis and design of rigid frame structures. 4 lectures/problem-solving. Prerequisite: Upper-division course in structural steel analysis.

**EGR 519 Advanced Reinforced Masonry Design (4)**

Applied design and analysis of one and two-story reinforced masonry buildings. Design considerations in high-rise masonry structures. Design and analysis of masonry retaining walls. 4 lectures/problem-solving. Prerequisite: CE 442, or equivalent.

**EGR 520 Elasticity (4)**

Theory of stress and strain for continuous media. Stress-strain relations of elasticity. Plane stress and strain. Introduction to thermoelasticity. 4 lectures/problem-solving. Prerequisite: Upper-division courses in structural analysis and EGR 513, or consent of the instructor.

**EGR 521 Structural Dynamics (4)**

Concepts of the dynamics of elastic bodies. Longitudinal, transverse and torsional vibrations of structural elements. Vibrations of plates and shells. Approximate methods in dynamics of structures. 4 lectures/problem-solving. Prerequisites: Upper-division courses in structural analysis, dynamics, vibrations and EGR 515.

**EGR 522 Advanced Reinforced Concrete Design (4)**

Advanced design and analysis of continuous building frames to include floor systems, eccentrically loaded columns, folded plate and shell roof elements. Retaining structures, composite deck sections. 4 lectureS/problem-solving. Prerequisite: Upper-division course in design of reinforced structures.

**EGR 523 Prestressed Concrete Design (4)**

Design and analysis of prestressed concrete components including slabs, beams, and columns utilizing both elastic and ultimate strength design concepts; special problems involving composite design of structural systems. 4 lectures/problem-solving. Prerequisite: Upper-division course in reinforced concrete design.

**EGR 524L Advanced Aerospace Vehicle Design (2)**

Preliminary design of aerospace systems. Interdisciplinary concepts in design. System analysis and integration. Design optimization. Design compromise in multidisciplinary systems. Trades study evaluations. Verbal and written presentation of system design. Individual and team projects. 2 three-hour laboratories. Prerequisite: completion of 24 units of graduate level coursework.

**EGR 525 Advanced Foundation Engineering (4)**

Advanced analysis and design of foundations and earth retaining structures, including both structural and geotechnical considerations. Laterally loaded piles, braced excavations, sheet piles and tieback anchors. 4 lectures/problem-solving. Prerequisite: CE 424 or equivalent.

**EGR 528 Hypersonic Aerodynamics (4)**

Two- and three-dimensional flow fields. Hypersonic small disturbance and Newtonian impact theories and application. Boundary layer interaction with the inviscid flow field. Real gas phenomena. Blunt body and conical flow fields; minimum drag bodies; aerodynamic analysis of complete configurations. 4 lectures/problem-solving. Prerequisite:

Upper-division course in supersonic aerodynamics.

**EGR 532 Conduction Heat Transfer (4)**

Application of principles of heat transfer and thermodynamics in solution of steady-state and transient heat transfer problems. Classical heat conduction theory. Derivation of Fourier equation and integration of various single and multidimensional problems. Detailed discussion of thermal conductivity. 4 lectures/problem-solving. Prerequisite: Upper-division course in heat transfer.

**EGR 533 Mechanical Metallurgy (4)**

Study of the mechanical behavior of metals. Fundamental mechanisms controlling deformation phenomena, strain-hardening, creep, fatigue, and fracture. Strengthening mechanisms involving alloying and heat treatment. 4 lectures/problem-solving. Prerequisite: Undergraduate courses in strength of materials and materials science.

**EGR 534 Fracture of Solids (4)**

Engineering and microscopic approaches, fracture of steels, creep and fatigue, stress corrosion cracking, and hydrogen embrittlement. 4 lectures/problem-solving. Prerequisite: Upper-division course in stress analysis.

**EGR 535 Advanced Fluid Dynamics (4)**

Governing field laws: mass, momentum, energy. Reynolds' Transport Theorem: mass, momentum, energy. Cartesian tensor notation. Rotation, stress, rate-of-strain relations. Flow kinematics. Ideal fluid flow. Conformal transformations. Viscous flows: pipe, flat plate. 4 lectures/problem-solving. Prerequisite: Upper-division course in fluid mechanics or consent of instructor.

**EGR 536 Advanced Classical Dynamics (4)**

Lagrange's equations, Hamilton's principle, variational principles, equations of motion in Eulerian angle systems, characteristic equation of inertia matrix, cuspidal motion and nutation. 4 lectures/problem-solving. Prerequisites: EGR 515 and upper-division course in dynamics, or consent of instructor.

**EGR 537 Polymer Fluid Dynamics (4)**

The structure, flow phenomena, and material functions for polymeric fluids. Constitutive equations available to solve polymeric fluid dynamics problems. Applications in plastics manufacturing, performance of lubricants, processing of food-stuffs, and movement of biological fluids. 4 lectures/problem-solving. Prerequisites: Upper-division courses in heat transfer, fluid mechanics, and EGR 513.

**EGR 538 Advanced Engineering Economy (4)**

Engineering economic decision criteria and models for evaluating capital investment proposals and engineering projects. Replacement studies, risk and uncertainty, tax effects, intangibles, probabilistic models, computer techniques. 4 lectures/problem-solving. Prerequisite: 3 quarter units of undergraduate engineering economy.

**EGR 539 Advanced Human Factors in Engineering Design (4)**

Methods and research techniques in engineering design of optimum man-machine systems. Designing systems with the objective of developing optimum combinations of physical and human components. Effects of environment on human performance. Man-machine dynamics. 4 lectures/problem-solving. Prerequisite: Upper-division course in human engineering principles.

**EGR 540 Systems Theory (4)**

Application of matrix theory and linear vector spaces to the mathematical representation of systems. Analysis of the state equations for linear, time varying and invariant, continuous and discrete systems, controllability and observability for linear systems. 4 lectures/problem-solving. Prerequisite: EGR 515. (Some previous exposure to Laplace Transforms is recommended.)

**EGR 543 Stochastic Processes (4)**

Analysis of random phenomena associated with the transmission of digital and analog signals. Investigation of random binary signals, thermal noise, signal-to-noise ratios, and Markov processes. Applications include optimum filtering, estimation theory, and queuing theory. 4 lecture/problem-solving. Prerequisite: EGR 510 or equivalent.

**EGR 544 Communication Theory (4)**

Selected advanced topics in communication systems such as information theory for continuous and discrete channels; signal detection and recognition; coding for optimal communication nets. 4 lectures/problem-solving. Prerequisite: Upper-division course in communications systems.

**EGR 545 Advanced Engineering Thermodynamics (4)**

Development of concept of equilibrium. Reversible and irreversible principles of thermodynamics, second law consequences; estimation and correlation of thermodynamic properties. Physical basis of conservation equations. Statistical foundations. 4 lectures/problem-solving. Prerequisites: Upper-division course in thermodynamics.

**EGR 546 Heterogeneous Phase Equilibria (4)**

Applied phase equilibria. A development of theoretical and empirical principles for understanding complex multiphase behavior in multicomponent chemical systems. 4 lectures/problem-solving. Prerequisite: Upper-division course in engineering thermodynamics.

**EGR 547 Process Modeling and Analysis (4)**

Mathematical modeling of physical and chemical processes. Analytical and numerical solutions for steady and unsteady state problems. Design project based on results of modeling. 4 lectures/problem-solving. Prerequisite: Baccalaureate degree in Chemical Engineering or consent of the instructor.

**EGR 548 Solid State Electronics (4)**

Quantum theory and atomic structure. Classical and quantum statistics. Description of crystal structures. Lattice vibrations. Band theory of solids. Transport phenomena in semi-conductors and metals. 4 lectures/ problem-solving. Prerequisite: Upper-division course in solid-state electronics.

**EGR 549 Advanced Methods in Operations Research (4)**

Methodology of operations research and algorithms for system and subsystem optimization; emphasis on methods yielding practical numerical procedures. Linear programming and extension, dynamic and integer programming, queuing theory, network analysis, game theory and decision theory. 4 lectures/problem-solving. Prerequisite: Upper-division course in operations research.

**EGR 550 Advanced Transport Phenomena (4)**

Differential balances for momentum, heat, and mass transfer. Convective energy, mass, and momentum transfer; internal and external flow, exact and approximate solutions. Application for space vehicle re-entry, binary and multicomponent systems, nuclear reactor cooling, mass transfer and

heat exchanger analysis. 4 lectures/problem-solving. Prerequisites: Upper-division courses in heat transfer and fluid mechanics.

**EGR 551 Digital Signal Processing (4)**

Analysis and design of multirate signal processing and its applications. Linear prediction filter design and implementation using FIR and lattice filters. Non-parametric, parametric, and eigensystem algorithms for power spectrum estimation. 4 lectures/problem-solving. Prerequisites: Upper-division courses in Fourier transforms and ECE 428, or equivalent.

**EGR 552 Introduction to Neural Networks (4)**

Theory and engineering applications of artificial neural networks. 4 lecture/problem solving sessions. Prerequisites: Basis Probability Theory and EGR 515.

**EGR 553 Computer Simulation of Engineering Systems (4)**

Systems theory as foundation for engineering analysis and synthesis of complex systems. Numerical methods and simulation models using digital computers. Optimization of engineering systems design and performance. Applications to engineering systems problems. 4 lectures/problem-solving. Prerequisite: Undergraduate course in computer programming.

**EGR 555 Microprocessor-based Control Systems (4)**

Typical computer control systems. Supervisory and DDC Control. Mathematics of sample-data control systems. Development of controller algorithms using Z-transforms and microprocessors. On-Line identification techniques, advanced control techniques. Typical microprocessor-based process control systems. 4 lectures/problem-solving. Prerequisites: Upper-division courses in microprocessor and control theory.

**EGR 556 Advanced Mechanics of Materials (4)**

Stress and strain analysis, 2-D elasticity problems, unsymmetrical bending, shear center, torsion of prismatic members, inelastic and plastic behavior in torsion and bending, topics from: micro-mechanics of composite materials, energy methods, failure theories, theory of plates, thick walled pressure vessels. 4 lectures/problem-solving. Prerequisite: Upper-division course in stress analysis.

**EGR 557 Analysis of Mechanical Designs (4)**

Analysis of common machine elements. Relation to design decision making. Optimization, reliability, miniaturization, and statistical strength theory. 4 lectures/problem-solving. Prerequisite: Upper-division course in stress analysis.

**EGR 558 Computer Arithmetic (4)**

High speed multiplication and division algorithms. Residue, floating-point, and distributed arithmetic. Hardware structure for functional evaluations. 4 lectures/problem-solving. Prerequisite: Undergraduate course in computer architecture.

**EGR 559 Computer Networks (4)**

Principles, Protocols, Architecture and Performance Analyses of Local Area Networks, Wide Area Networks, and Internetworking. Asynchronous transfer mode (ATM) networks. 4 lecture/problem solving sessions. Prerequisite: ECE 342 and ECE 405 or equivalent.

**EGR 560 Information Theory and Coding (4)**

Channel models, coding theorems, coding systems, statistical properties of information sources. 4 lectures/problem-solving. Prerequisite: Upper-division course in probability theory.



**EGR 561 Advanced Microprocessors (4)**

State of the art 32- and 64-bit microprocessors; assembly language and C programming; input/output techniques; system design and peripheral interfacing. 4 lectures/problem-solving. Prerequisite: ECE 432/482L or equivalent.

**EGR 562 Advanced Microwave Engineering (4)**

Analysis of microwave components and networks, Green's functions; plane, cylindrical, and spherical wave functions; wave guides, cavities, scattering and diffraction of waves, microwave networks and radiation. 4 lectures/problem-solving. Prerequisite: Undergraduate course in field theory.

**EGR 563 Solid State Microwave Devices and Circuits (4)**

Introduction to parameter matrices and microwave circuit design techniques. Microstrip lines. Design and evaluation of FET amplifiers, FET oscillators. Varactors, mixer diodes, control devices and their microwave circuit applications. Computer-aided design of microwave circuits. New developments. 4 lectures/problem-solving. Prerequisites: Upper-division courses in EM theory and linear active circuits.

**EGR 564 Radiation Heat Transfer (4)**

Radiation properties of surfaces; radiant interchange among surfaces separated by radiatively non-participating media including the interchange among black and gray surfaces; radiant energy transfer through absorbing, emitting, and scattering media. 4 lectures/problem-solving. Prerequisite: Undergraduate course in heat transfer.

**EGR 565 Water Quality Analysis (4)**

Application of chemical principles to analysis of natural water systems, water purification technology, and water pollution control. Physiology of organisms of importance in water supply and in wastewater treatment processes. Enzymatic reaction. Biochemical oxidation and fermentations. Ecology and eutrophication. 4 lectures/problem-solving. Prerequisite: Undergraduate lecture and laboratory course in sanitary engineering.

**EGR 566 Fundamentals of Aseismic Design (4)**

Characteristics of strong ground motion, causes, response spectra, earthquake response of single degree and multiple degree of freedom systems. Structural analysis and design based on UBC and SEAOC recommendations relative to earthquake-resistant design. 4 lectures/problem-solving. Prerequisite: Upper-division course in structural analysis.

**EGR 567 Unit Processes in Water and Wastewater Treatment (4)**

The physical and chemical unit processes in water and waste treatment, relationship of design practice and theory, operational considerations, and the optimization of unit processes; aeration, sedimentation, flocculation, flotation, adsorption, filtration, ion exchange, coagulation, corrosion, control, and disinfection. 4 lectures/problem-solving. Prerequisite: Upper-division course in sanitary engineering.

**EGR 568 Biological Unit Processes in Wastewater Treatment (4)**

Microbial reactions related to water and wastewater treatment. Biological interactions in various unit processes related to design and operational considerations required for optimization; disinfection, activated sludge, trickling filters, and sludge digestion. 4 lectures/problem-solving. Prerequisite: Upper-division course in sanitary engineering.

**EGR 569 Groundwater Hydrology & Modeling (4)**

Properties of water-bearing materials, basic differential-flow equations, well-mechanics, sources and types of contamination, mass transport equations advection, dispersion, sorptions, numerical modeling, and remediation methods: Optimum design, groundwater modeling techniques, and the use of advanced software packages. 4 lectures/problem-solving. Prerequisite: Upper-division course in hydrology.

**EGR 570 Nonlinear Dynamics (4)**

Complementary methods of nonlinear modeling of physical, chemical and fluid systems. Analytic, topologic and computational perspectives. Dimensions and fractals. Bifurcations and catastrophes. Deterministic chaos. Solitons. Applications to ecology, hydrodynamics, electrical and mechanical systems. 4 lectures/problem-solving. Prerequisite: EGR 536 or consent of the instructor.

**EGR 573 Advanced Operations Planning and Control Systems (4)**

Operations analysis of integrated production systems; mathematical and computer models for planning, scheduling, and control of production and service systems. Statistical techniques in forecasting; optimization of resources utilization. 4 lectures/problem-solving. Prerequisite: Upper-division course in operations research.

**EGR 574 Advanced Facilities Planning (4)**

Planning, analyzing, justifying, controlling, and evaluating physical facilities. Long- and short-range facilities plans, decision criteria, authorization and control procedures, post completion audits. Resource allocation, optimization, simulation, and computer techniques. Technical, economic, ecological, safety, and intangible factors. Case studies. 4 lectures/problem-solving. Prerequisite: Undergraduate course in engineering economy.

**EGR 575 Inlet Design (4)**

Subsonic, supersonic and hypersonic inlet design. Subsonic inlets: friction loss, diffusion, plenum chambers, pressure recovery. Transonic effects: pre-entry flow, separation, shock-boundary layer interaction. Supersonic compression: external, internal, boundary layer bleed. Cowl design. Additive drag. Flow distortion. Matching and control. Applications to aircraft and helicopters. 4 lectures/problem-solving. Prerequisites: Undergraduate courses in gas dynamics and propulsion.

**EGR 576 Combustion Theory (4)**

Molecular structure and statistical thermodynamics. Real gases. Transport phenomena. Chemical reactions in gases. Reactive gas dynamics. Combustion phenomena and diffusion flames. Premixed gas flames; flame propagation, cellular flames, quenching. Aerodynamics of flames; flame shape, turbulent flames. Detonation. Applications. 4 lectures/problem-solving. Prerequisites: Undergraduate courses in thermodynamics and heat transfer.

**EGR 577 Aerodynamics of Wings and Body (4)**

Three-dimensional wings; steady, subsonic flow; supersonic flow. Lifting line theory: span-wise lift distribution, induced drag, twist, sweepback. Introduction to lifting surface theory: planar, nonplanar, interference. Transonic small-disturbance flow. Unsteady flow. Conical flows. 4 lectures/problem-solving. Prerequisite: Undergraduate course in aerodynamics.

**EGR 578 Aircraft Stability (4)**

General equations of unsteady motion. Stability derivatives. Stability of uncontrolled motion; longitudinal, lateral. Response of the vehicle to actuation of the controls. Flight in turbulent air. Automatic stability and control. Specialization to missiles. Simulation. Transfer functions. 4 lectures/problem-solving. Prerequisite: Undergraduate course in stability and control.

**EGR 579 Vibration and Flutter (4)**

Two- and three-dimensional flutter theory. Structural damping. Aerodynamics forces. Flutter stability. Non-linear characteristics. Aspect ratio and compressibility effects. Empennage vibration and flutter analysis. Wing torsional divergence, aileron reversal and effectiveness. Modeling concepts. 4 lectures/problem-solving. Prerequisites: Upper-division courses in aerodynamics, structures and dynamics and EGR 515.

**EGR 580 Materials for Electronics (4)**

Preparation techniques for materials used in electronic devices. Structure and purity control. Crystal growth, epitaxy, vapor deposition, magnetic domains, and solid state phase transformations. Current problems concerning Si and III-V compound device production and research. 4 lectures/problem-solving. Prerequisite: An undergraduate course in materials science.

**EGR 581 Open Channel Hydraulics (4)**

Advanced topics in open channel flow. Energy and momentum principles applied to non-prismatic channels. Gradually varied flow. Rapidly varied flow. Computer applications. 4 lectures/problem-solving. Prerequisite: Upper-division lecture and laboratory hydraulics course.

**EGR 583 Aerodynamic Heating (4)**

Fundamental equations. Laminar and turbulent boundary layer properties. Laminar and turbulent skin friction. Recovery temperature. Reference enthalpy method. Slip flow. Free molecule flow. Stagnation point heat transfer. Mass transfer cooling. Calculation of skin temperature. 4 lectures/problem-solving. Prerequisites: Undergraduate courses in heat transfer and gas dynamics.

**EGR 584 Convective Heat Transfer (4)**

Conservation principles. Fluid stresses and flux laws. Laminar and turbulent boundary layers. Internal flow; noncircular cross section, entrylength, asymmetric heating. External flow; variable velocity, injection, specified temperature and heat flux distribution. Temperature dependent fluid properties. Computer solutions. 4 lectures/problem-solving. Prerequisite: Undergraduate course in heat transfer.

**EGR 585 Computer Organization (4)**

Memory Subsystems: Cache, virtual and interleaved memories. Instruction pipelines. Dynamic scheduling algorithms and principles of vector processing. Principles of pipeline processing. Arithmetic and instruction pipeline design. Pipeline scheduling and control. 4 lectures/problem-solving. Prerequisite: ECE 425 or consent of instructor.

**EGR 586 Satellite Communication (4)**

Introduction to satellite system configurations and digital communication techniques. Link budget analysis. Baseband transmission systems. Power efficiency and spectrally efficient modulation techniques for linear and non-linear satellite channels. Coding for error detection and correction. Synchronization systems. Time division, frequency division, and code division multiple access techniques. Satellite transponders and earth stations. 4 lectures/problem-solving. Prerequisite: EGR 544 or equivalent, or consent of instructor.

**EGR 587 Advanced Integrated Circuit Applications (4)**

The analysis and applications of the latest linear integrated circuits. Operational amplifier stability and compensation techniques. The phase-locked loop transfer functions, noise performance, tracking, and acquisition. RF Amplifier design techniques, matching, low noise specifications, and signal-to-noise ratio optimization. COS/MOS devices, equivalent circuits, gain configurations, and applications. 4 lectures/problem-solving. Prerequisites: Two upper-division courses in linear active circuits.

**EGR 588 Biological Control Systems (4)**

Application of control systems analysis to biological control systems. Development of mathematical models of selected biological control systems and the application of computer techniques in simulation of these systems. 4 lectures/problem-solving. Prerequisite: Upper-division course in control systems.

**EGR 589 Antenna Theory (4)**

Dipole, loop and small antennas, arrays, wire, aperture, lens, horns, reflectors and other special antenna: currents and impedances; radiation and radiation patterns. 4 lectures/problem-solving. Prerequisites: Two upper-division courses in field theory.

**EGR 590 Solar Energy Systems (4)**

Analysis of advanced, hybrid solar collectors. Advanced solar energy storage. Design of solar energy systems. 4 lectures/problem-solving. Prerequisite: Upper-division course on solar energy or equivalent.

**EGR 591 Direct Energy Conversion (4)**

Conversion of primary chemical, nuclear, solar and heat energy directly to electrical energy without intermediate mechanical elements. Fuel cells, solar cells, magnetohydrodynamic generators, and fusion plasma generators. 4 lectures/problem-solving. Prerequisite: Upper-division course in thermodynamics.

**EGR 595 Boundary Layer Concepts (4)**

Treatment of Newtonian and nonNewtonian fluids in the laminar and turbulent regimes. Positive and negative pressure gradients. Development of the thermal boundary layer. Some exact and inexact solutions. Wedge flow. 4 lectures/problem-solving. Prerequisite: EGR 535 or consent of instructor.

**EGR 596 Research Methods (2)**

Introduction to research methods with emphasis on preparing an engineering thesis problem statement. This course prepares engineering graduate candidates for writing theses and independent research papers. Writing problem statements; research questions; experimental and non-experimental design; sampling; instrument design. 2 discussions. Prerequisite: completion of all required breadth courses on contract.

**EGR 599/599A/599L Special Topics for Graduate Students (2-4)**

Selected topics comprising new or experimental courses not otherwise offered. Each offering identified in the current schedule and on the student's transcript. Prerequisite: consent of instructor.

**EGR 618 Stability of Structures (4)**

Stability of beam columns; elastic and inelastic buckling of straight columns; torsional buckling of bars; lateral buckling of beams; local buckling of plate elements; stability to frames. 4 seminars. Prerequisite: EGR 511. Unconditional standing required.

**EGR 624L Advanced Aerospace Vehicle Design (2)**

Completion of the design of an interdisciplinary aerospace vehicle system. Preparation of a final report on the project together with an oral briefing to an industrial design review panel. 2 three-hour laboratories. Prerequisite: EGR 524. Unconditional standing required.

**EGR 632 Computational Fluid Dynamics (4)**

Fundamentals of finite-difference methods: partial differential equations, difference representation, stability, errors. Dynamics of a body moving through a fluid medium. Inviscid fluid flows. Compressible fluid flows. Viscous fluid flows. Secondary flows and flow instabilities. Panel methods. 4 lectures/problem-solving. Prerequisites: EGR 509 and 535. Unconditional standing required.

**EGR 640 Systems Theory (4)**

Pole-placement design using state-feedback for linear systems, observer (state-estimator) design. Introduction to nonlinear systems and perturbation theory; stability for linear and nonlinear systems using Liapunov methods. 4 seminars. Prerequisite: EGR 540. Unconditional standing required.

**EGR 642 Digital Control Systems (4)**

Basic theory of sampling, quantizing and modeling of the digital computer for computer controlled feedback systems. State-space and Z-transform representation. Time response stability and design using both classical and modern techniques. 4 seminars. Prerequisites: Upper-division course in control systems and EGR 540. Unconditional standing required.

**EGR 643 Optimal Control Systems (4)**

Selected topics in optimal control theory such as variational calculus; maximum principle; dynamic programming; state estimation and computational methods in optimal systems control. 4 seminars. Prerequisite: EGR 540. Unconditional standing required.

**EGR 644 Advanced Communication Systems (4)**

Selected advanced topics in communication systems such as spread spectrum systems, computer communications, optical communications and image processing. 4 lecture discussions. Prerequisite: EGR 544 or equivalent. Unconditional standing required.

**EGR 651 Advanced Signal Processing (4)**

Selected advanced topics in signal processing such as multirate signal processing, adaptive filtering, parametric spectrum estimation and signal analysis with higher order spectra. 4 lecture discussions. Prerequisite: EGR 551 or equivalent. Unconditional standing required.

**EGR 652 Nonlinear Control Systems (4)**

Numerical approximation methods in the solution of non-linear systems. Phase-plane techniques including method of isoclines, delta, and analysis of singular points. Describing function techniques, perturbation reversion, variation of parameters and harmonic balance methods. Liapunov stability methods. 4 seminars. Prerequisites: upper-division course in control-systems and EGR 540, or consent of instructor. Unconditional standing required.

**EGR 685 Advanced Computer Organization (4)**

Array processing. Multiprocessor architecture programming and control. Data flow computers and introduction to artificial neural networks. 4 lectures/problem-solving. Prerequisite: EGR 585. Unconditional standing required.

**EGR 691 Directed Study (2-6)**

Case study or investigation of selected engineering problems under the direction of a graduate faculty member. May be repeated as needed for a maximum of 6 units. Students must register through the Engineering Graduate Studies Office. The study should be in the student's emphasis; area and should conclude with a written report. May be combined with EGR 692. Unconditional standing required.

**EGR 692 Independent Study with Comprehensive Examination (2)**

Study, research, or readings (not leading to a thesis) proposed by the student with the consultation and approval, and under the supervision of, a graduate faculty member. The student must pre-register through the Engineering Graduate Studies Office during the quarter prior to taking the course. The study should be in the student's emphasis area, and should conclude with a report and an exam conducted by a committee of faculty members. Advancement to Candidacy required.

**EGR 696 Master's Degree Thesis (2)**

Independent investigation intended to be an extension of an existing body of knowledge into an area not thoroughly investigated before, directed by a committee of graduate faculty members, and resulting in a published thesis. Must be repeated as appropriate. Students must register through the Engineering Graduate Studies Office. Credit assigned upon successful completion of entire thesis and approval of the committee. Total credit, 4, 6 or 8 units. Advancement to Candidacy required.

**EGR 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis, project or comprehensive examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

## ENGLISH

### Master of Arts in English

In the Department of English and Foreign Languages, College of Letters, Arts, and Social Sciences

George Stavros, Chair

Donald J. Kraemer, Jr., Graduate Coordinator

The program leading to the Master of Arts in English features a broad-based curriculum that offers three concentrations: 1) Literature; 2) Rhetoric/Composition; and 3) Teaching English as a Second Language. Within a 45 (or 49) quarter-unit degree requirement, students, working with their advisors, tailor their course of study to their own interests and needs. The primary objective of the Literature concentration is to deepen the student's understanding of literary texts through close analysis and through related readings in theory and culture. It also provides useful preparation for the teaching of literature in high school and community college, as well as for entry into a doctoral program. The Rhetoric and Composition concentration offers training for graduate students in the teaching of writing at all levels of the educational system. The concentration in Teaching of English as a Second Language provides refined technical expertise in this discipline, enabling the student to perform valuable service in school and community upon completion of the degree program. The English M.A. program prepares students to become English teachers in high schools and community colleges or to proceed directly to doctoral studies; it offers the opportunity for students to engage in sustained pursuit of advanced study within the discipline of English.

### ADMISSION TO THE PROGRAM

In order to be admitted as an unconditional student in the Master of Arts program in English, the applicant must have successfully completed an undergraduate program of study in all major periods of English and American literature, as well as in critical theory and in the English language. Deficiencies in any of these areas will be made up by course work; at the discretion of the chair of the departmental graduate committee, a portion of such work may count toward the 45 (or 49) units required for the degree. The student's grade point average in the upper-division English courses of his/her undergraduate program must be at least 3.0 (B). A student who does not meet these requirements may request special consideration for admission as a conditional student. Removal of conditional status will require the completion of at least 12 quarter units of graduate work in English, in residence, with an average of B (3.0). No grade below C (2.0) will be accepted.

### REQUIREMENTS AND CURRICULUM

#### 1. Advancement to Candidacy

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted, with the recommendation of the graduate faculty, when the student has completed all preparatory course work. Advancement to Candidacy is a prerequisite for the culminating experience of the comprehensive examination or thesis.

The Graduation Writing Test (GWT) must have been passed prior to Advancement to Candidacy. If the GWT is not taken the quarter following the completion of 8 units in the English M.S. program, a hold will be placed on the student's registration.

#### 2. Course Work

A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer, Extended University units petitioned for graduate credit may be included on a master's contract.

The candidate must be enrolled in the university during the quarter of graduation.

The student will complete 45 (or 49 if Literature is primary and TESL is secondary) units as follows:

#### I. REQUIRED COURSES FOR ALL CONCENTRATIONS (5-8 UNITS)

Introduction to Graduate Research	ENG	500	4
Master's Degree Thesis	ENG	696	4
or Comprehensive Examination	ENG	697	1
Total			5-8

#### II. REQUIRED COURSES WITHIN CONCENTRATIONS (16-24 UNITS)

Three concentrations available:

- 1) Literature (20 units if primary concentration, 16 if secondary)
- 2) Rhetoric and Composition (16 units)
- 3) Teaching of English as a Second Language (24 units)

#### Literature Concentration (16-20 units)

The student must choose two of the following three sequences (16 units). In sequences A and B, study is to be continuous by chronological period (e.g., ENG 551a/ENG 552a, NOT ENG 551a/ENG 552c).

A. Studies in English Literature	ENG	551, 552	4,4
a. to 1500			
b. 1500-1660			
c. 1660-1800			
d. 19th Century			
e. 20th Century			
B. Studies in American Literature	ENG	561, 562	4,4
a. to 1800			
b. 19th Century			
c. 20th Century			
C. Studies in World Literature	ENG	541, 542	4,4

One course selected from either of the following groups (4 units):

D. Studies in Fiction	ENG	571, 572	4,4
Studies in Drama	ENG	573, 574	4,4
Studies in Poetry	ENG	575, 576	4,4
E. Teaching ESL Composition	ENG	525	
Teaching High School Composition	ENG	586	
Teaching Basic Writing	ENG	587	
Teaching College Freshman Composition	ENG	588	

#### Rhetoric and Composition Concentration (16 units)

Three courses (12 units) selected from the following:

History of Rhetoric	ENG	581	4
Rhetoric and Poetics	ENG	582	4
Composition Theory	ENG	583	4
Theory and Practice of Modern Rhetoric	ENG	584	4
Special Topics in Rhetoric and Composition	ENG	585	4
Pedagogies of Reading	ENG	589	4



One course selected from the following (4 units):

Teaching High School Composition . . . . .	ENG 586	4
Teaching Basic Writing . . . . .	ENG 587	4
Teaching College Freshman Composition . . . . .	ENG 588	4

### Teaching English as a Second Language Concentration (24 units)

Introduction to Teaching English as a Second Language . . . . .	ENG 521	4
Second Language Acquisition . . . . .	ENG 522	4
Grammar for Teachers of ESL . . . . .	ENG 523	4
Principles of Accent Reduction in TESL . . . . .	ENG 524	4
Teaching ESL Composition . . . . .	ENG 525	4
Practicum in TESL . . . . .	ENG 526/526A	3,1

### III. ELECTIVE COURSES (13-24 units)

(Contingent upon choice of concentration[s] and/or thesis)

These may include electives listed under any of the concentrations above, and any of the following:

Ethnic Literatures of the United States . . . . .	ENG 531,532	4,4
Special Topics . . . . .	ENG 550	4
Contemporary Literary Theory . . . . .	ENG 570	4
The Contemporary American Novel . . . . .	ENG 577	4
Pedagogies of Dramatic Literature . . . . .	ENG 590	4
Directed Study . . . . .	ENG 691	1-4
Teaching Associate Practicum . . . . .	ENG 692	1

In consultation with his/her advisor, the student may take a maximum of 8 upper-division or graduate units in fields related to English—chiefly philosophy, history, drama, communication arts, history of art, and teacher preparation.

### GRADUATE COURSE DESCRIPTIONS

#### ENG 500 Introduction to Graduate Research (4)

Principles and techniques used in scholarly and critical writing; bibliographical sources and methods, including on-line research. Emphasis may be placed in specialized subjects, such as literature period or genre, rhetoric and composition, teaching English as a Second Language, etc. 4 seminars.

#### ENG 521 Introduction to Teaching English as a Second Language (4)

Overview of TESL terminology, historical perspectives, methodologies, socio-political aspects of language and language-teaching profession, and TESL research tools, including elements of qualitative and quantitative design. Readings, discussions, computer applications, and research. 4 seminars.

#### ENG 522 Second Language Acquisition (4)

Survey of the current research and literature on second-language acquisition. Attention will be given to research methodology in second-language acquisition and to current theories in SLA. 4 seminars.

#### ENG 523 Grammar for Teachers of English as a Second Language (4)

Survey of aspects of English grammar most troublesome for non-native speakers of English. 4 seminars.

#### ENG 524 Principles of Accent Reduction in Teaching English as a Second Language (4)

Features of the English sound system that are important in achieving accurate pronunciation. Emphasis on consonant and vowel articulation,

intonation, stress, consonant clusters, contextual alterations, and speech rhythm. 4 seminars.

#### ENG 525 Teaching ESL Composition (4)

Topics in pedagogical and theoretical perspectives. Methods for helping non-native, English-speaking students master the requirements of basic and academic written English. Strategies for integrating recent research on second-language composing into a course or curriculum in ESL composition. 4 seminars.

#### ENG 526, 526A Practicum in Teaching English as a Second Language (3) (1)

Emphasis on curriculum analysis, textbook and material selection, lesson preparation, and classroom teaching practice. TESL program administration also considered. 3 seminars; 1 two-hour activity. Prerequisite: ENG 592.

#### ENG 531, 532 Ethnic Literatures of the United States (4) (4)

Selected authors and topics. In the first quarter, extensive reading and comparative analysis. In the second, selected authors and topics in one of the following: (A) African-American Literature, (B) Asian-American Literature, (C) Mexican-American Literature, (D) Native-American Literature. ENG 532 may be repeated with different content for up to 12 units of credit. 4 seminars.

#### ENG 541, 542 Studies in World Literature (4) (4)

Selected authors and topics in world literature, including major works and movements in the European and non-European traditions. In the first quarter, extensive reading. In the second, intensive study of individual authors, genres, movements, or topics included in the first quarter. ENG 542 may be repeated with different content for up to 12 units. 4 seminars.

#### ENG 550 Special Topics (4)

Topics in advanced areas of language or literature. May be repeated for a total of 12 units. 4 seminars. Prerequisite: consent of instructor.

#### ENG 551, 552 Studies in English Literature (4) (4)

Selected authors and topics in one of the following periods: (A) to 1500, (B) 1500-1660, (C) 1660-1800, (D) 19th century, (E) 20th century. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. Enrollment in the second quarter by consent of the instructor. May be repeated with different content for up to 12 units each. 4 seminars.

#### ENG 561, 562 Studies in American Literature (4) (4)

Selected authors and topics in one of the following: (A) to 1800, (B) 19th century, (C) 20th century. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. Enrollment in the second quarter by consent of the instructor. May be repeated with different content for up to 12 units each. 4 seminars.

#### ENG 570 Contemporary Literary Theory (4)

Important ideas in contemporary theory, focusing on such theorists as Bakhtin, Barthes, Derrida, Kristeva, Lacan, Fish, Lukacs, de Lauretis. 4 seminars.

#### ENG 571, 572 Studies in Fiction (4) (4)

Selected authors and topics. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. 4 seminars.

**ENG 573, 574 Studies in Drama (4) (4)**

Selected authors and topics. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. 4 seminars.

**ENG 575, 576 Studies in Poetry (4) (4)**

Selected authors and topics. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. 4 seminars.

**ENG 577 The Contemporary American Novel (4)**

Structure and theme in the American novel since 1945. Such writers as Bellow, Malamud, Morrison, Updike, Walker, Erdrich. 4 seminars.

**ENG 581 History of Rhetoric (4)**

History of rhetoric from pre-classical times through the 18th century; the interplay of theory and practice in this history. 4 seminars.

**ENG 582 Rhetoric and Poetics (4)**

Examination of converging theories and practices focused on the rhetorical nature of literature and literary study; emphasis on providing future rhetoricians and teachers with a coherent understanding of the relations between rhetorical and literary disciplines. 4 seminars.

**ENG 583 Composition Theory (4)**

Major theories of the composing process and analysis of the research on which they are based. 4 seminars.

**ENG 584 Theory and Practice of Modern Rhetoric (4)**

Readings in rhetorical theory since the 18th century, with reference to its relevance in public written discourse and composition pedagogy. 4 seminars.

**ENG 585 Special Topics in Rhetoric and Composition (4)**

Intensive study of a topic or figure of special interest to advanced students. May be repeated for credit with a different content. 4 seminars.

**ENG 586 Teaching High School Composition (4)**

Topics in pedagogical and theoretical perspectives. Methods for helping students to master the writing process. Strategies for integrating recent research on composing into a course or curriculum in composition. 4 seminars.

**ENG 587 Teaching Basic Writing (4)**

Topics in pedagogical and theoretical perspectives. Methods for helping basic writing students to master the writing process. Strategies for integrating recent research on composing into a course or curriculum in composition in basic writing. 4 seminars.

**ENG 588 Teaching Freshman Composition (4)**

Topics in pedagogical and theoretical perspectives. Methods for helping students to master the writing process. Strategies for integrating recent research on composing into a course or curriculum in composition. 4 seminars.

**ENG 589 Pedagogies of Reading (4)**

Developmental, historical, and theoretical approaches to reading. 4 seminars. Prerequisite: consent of instructor.

**ENG 590 Pedagogies of Dramatic Literature (4)**

Theory, research, and practice in using performance approaches for teaching plays to students at high school and college levels. These techniques will be presented in combination with the use of writing for discovery. 4 seminars.

**ENG 691 Directed Study (1-4)**

Independent investigation of selected topics in English under the direction of a graduate faculty member. Students must register through the office of the graduate coordinator in English. Unconditional standing required.

**ENG 692 Teaching Associate Practicum (1)**

Practicum for Teaching Associates. Readings, discussions, supervised classroom teaching. Prerequisite: Teaching Associate appointment, unconditional standing required. 1 seminar/discussion. May be repeated twice.

**ENG 696 Master's Degree Thesis (4)**

An analytical study, using critical sources and/or literary theory, on a topic chosen by the student in consultation with the graduate coordinator in English. The student undertakes this study, under the direction of a thesis committee, as the culminating project of the graduate program. Advancement to Candidacy required.

**ENG 697 Comprehensive Examination (1) (Credit/No Credit)**

An examination on areas of special concentration in English as determined by the student in consultation with the graduate coordinator in English and other graduate faculty. May be taken no more than two times. Failure to complete exam satisfactorily the second time will result in termination from the program. Students must register through the office of the graduate coordinator in English. Advancement to Candidacy required.

**ENG 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of the thesis or comprehensive examination. The candidate must be enrolled in the university during the quarter in which she/he graduates. Advancement to Candidacy required.

## KINESIOLOGY AND HEALTH PROMOTION

### Master of Science in Kinesiology

In the Department of Kinesiology and Health Promotion, College of Letters, Arts, and Social Sciences

Priscilla F. Stromer, Chair

Wanda J. Rainbolt, Graduate Coordinator

Stanley Bassin  
Leo H. Teghtmeyer

George Eisen  
G. S. Don Morris

The Master of Science in Kinesiology curriculum is planned to provide the student with an opportunity to improve professional competencies within a chosen area of specialization. Experiences will be provided to enhance the analytical and critical tools for research and decision making. The student will be provided with a frame of reference that will aid in understanding today's problems in the profession.

A candidate for the Master of Science in Kinesiology will be required to choose among four areas of specialization: Adapted Physical Education; Curriculum and Instruction; Exercise Physiology; Socio-Psychological Aspects of Sport and Play/Sport History.

The Adapted Physical Education Specialization is directed toward those interested in working with persons with special needs. It combines practical experience with theoretical knowledge of individuals with disabilities.

The Curriculum and Instruction Specialization focuses on methodology, curriculum development, preparation for college teaching, and evaluation with practical implementation.

The Exercise Physiology Specialization offers a varied theoretical base including the influence of physical activity on public health issues along with clinical experience in the assessment of human performance. Objectives of the program include the preparation of students for research positions and advanced graduate programs or for careers in the exercise science area such as health fitness specialists and counselors.

The Socio-Psychological Aspects of Sport and Play/Sport History Specialization is directed toward two diverse populations. Socio-Psychological Aspects of Sport and Play prepares the student in either sociology or psychology of sport and is scientifically grounded in the social and behavioral sciences. Sport History emphasizes the social and cultural forces which influenced and shaped sport and games throughout history. It utilizes the past to develop an understanding of today's sport and physical education. These two areas aim toward either a practical coaching career or future graduate study.

Opportunity exists for selection of elective courses within the department as well as from other graduate programs in the university for all KHP graduate students regardless of the specialization chosen.

The Sports Nutrition option, an interdisciplinary program, is offered jointly by the Departments of Kinesiology and Health Promotion and Food, Nutrition and Consumer Sciences. Refer to "Sports Nutrition Option."

### ADMISSION TO THE PROGRAM

An applicant for admission to this program must have received a baccalaureate degree in physical education or a related discipline from an accredited institution. A student with a baccalaureate degree in a major other than physical education may be admitted subject to review of the student's academic background, performance and interests by the Graduate Coordinator.

An undergraduate grade point average of 3.0 or better, or an undergraduate grade point average of 2.5 or better with a 3.0 grade point average in all upper division work, is required for admission. An applicant not meeting these admission criteria will be reviewed by the KHP Graduate Coordinator. If the Coordinator approves, the applicant will be admitted conditionally.

The conditions, including the time allowed for meeting them, will be stated in writing at the time the applicant is admitted to the university. One condition will be completion of KIN 590, Research Methods, with a grade of B or better.

Each graduate student will select an advisor from the KHP graduate faculty. This should be based upon the student's area of specialization and the thesis topic so that the advisor's expertise will coincide with the student's academic emphasis. The student, with an advisor, will develop a program based on the individual's interests and preparation. This program (also referred to as a "contract") will include required core courses, area of specialization courses and appropriate elective courses. All programs will be reviewed and approved by the student's advisor, the Graduate Coordinator, and the Graduate Studies Analyst.

### REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units. No more than 18 units may be in approved upper-division courses. An overall 3.0 grade point average in all graduate work attempted is required. Six units of required core courses and 9-11 units in an area of specialization must be included.
2. Students must take a minimum of 6 units outside their chosen area of specialization and still in the KHP Department.
3. No more than 13 units of acceptable graduate credit may be transferred from another institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, or units petitioned for graduate credit may be included in a master's contract.
4. Advancement to Candidacy is granted upon the recommendation of the graduate coordinator and implies a readiness of the candidate to fulfill the terminal requirement of either a thesis or a comprehensive examination. The Graduation Writing Test (GWT) must have been passed prior to Advancement to Candidacy.
5. The student shall indicate at the time of filing the program the decision as to the manner of fulfilling the terminal requirement. The candidate who chooses to write a thesis must enroll for 9 units of thesis credit. Prior to beginning the collection of data, the candidate must make a formal presentation of the thesis proposal to the thesis committee and receive its approval. Upon completion of the thesis, the candidate must present it to the KHP graduate faculty. The candidate adopting the option of a comprehensive examination will be tested on material from the core and specialization areas.
6. The candidate must be enrolled in the university during the quarter of graduation.

### CURRICULUM

#### REQUIRED COURSES

Philosophical Bases of Sport and Physical Education	KIN	510	3
Research Methods	KIN	590	3

Option I:		
Research Design . . . . .	KIN 591	3
Master's Degree Thesis . . . . .	KIN 696	9
Option II:		

Comprehensive Examination . . . . .	KIN 697	1
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## SPECIALIZATION AREAS

### Adapted Physical Education

Management of Adapted Physical Education Programs . . . . .	KIN 570	3
Motor Practicum for Individuals with Disabilities . . . . .	KIN 575/575A 2,	1
Issues in Adapted Physical Education . . . . .	KIN 670	3

### Curriculum and Instruction

Curriculum Development in Physical Education . . . . .	KIN 553	3
Evaluating Teacher Effectiveness in Physical Education . . . . .	KIN 555	3
Contemporary Approaches to Physical Education Instruction . . . . .	KIN 559	3

### Exercise Physiology

Sports Medicine . . . . .	KIN 455	4
Advanced Physiology of Exercise . . . . .	KIN 683/683L	3,1
Advanced Concepts in Exercise Testing and Counseling . . . . .	KIN 684	3

### Socio-Psychological Aspects of Sport and Play/Sport History

Select three of the following courses:

Sociology of Sport and Physical Education . . . . .	KIN 540	3
Sport History . . . . .	KIN 543	3
International Physical Education and Sport . . . . .	KIN 545	3
Sport Psychology . . . . .	KIN 548	3

## ELECTIVES

Elective courses to complete the required minimum of 45 units must be selected. Electives must have approval of the student's advisor.

A list of electives, which includes upper-division and graduate courses in related disciplines is available from the department's Graduate Coordinator.

## GRADUATE COURSE DESCRIPTIONS

### KIN 510 Philosophical Bases of Sport and Physical Education (3)

The development of the philosophies of physical education and the assumptions upon which current professional philosophies rest. 3 lecture discussions.

### KIN 540 Sociology of Sport and Physical Education (3)

Preparation and presentation of critical reviews of literature in sociology of sport. The topics to be considered are: the impact of sport on industry, economics, and the institutions of politics and education; sport as it affects one's sociocultural development and value system. 3 lecture discussions.

### KIN 543 Sport History (3)

Development of sport in Western civilization; emphasis on political, religious and social influences and their effect on American sport. 3 lecture discussions. Prerequisite: graduate standing.

### KIN 545 International Physical Education and Sport (3)

Examination and analysis of similarities and differences of physical activities in developed and developing countries. Cultural, educational, and historical backgrounds of contemporary physical education and sport programs. 3 seminars.

### KIN 548 Sport Psychology (3)

Personal characteristics of athletes, coaches, and various sports environs in relation to athletic participation, performance, and learning. 3 lecture/ discussions.

### KIN 550 Problems in Administration of Physical Education (3)

Study and critical analysis of theories and philosophies relating to administrative situations. Effective evaluation with reference to interrelated conditions, decision-making, and developing an integrated way of behaving while implementing decisions. 3 seminars.

### KIN 552 Theory and Inquiry in Management of Physical Education and Athletics (3)

Advanced concepts and theories in organization and management of schools, education institutions and recreation delivery systems. Student inquiry into administrative decision-making and personal management styles. 3 seminars.

### KIN 553 Curriculum Development in Physical Education (3)

Basic considerations and problems of physical education curricula in secondary schools. 3 lecture discussions.

### KIN 554 Administration of Athletic Programs (3)

Administrative skills and expanded concepts for effecting change. Budgets, personnel, equipment and facilities, publicity, and legislation related to the athletic director's responsibilities. 3 seminars.

### KIN 555 Evaluating Teacher Effectiveness in Physical Education (3)

Strategies and procedures used for evaluating and implementing on-site teacher effectiveness. 3 seminars.

### KIN 559 Contemporary Approaches to Physical Education Instruction (3)

Strategies for improving instruction, interpersonal-interaction skills, instruments for measuring teaching outcomes and research studies on teacher effectiveness. 3 seminars. Prerequisite: KIN 553 or permission of instructor.

### KIN 563 Behavioral Aspects of Sport Performance (3)

Examination of mental aspects related to performance and techniques for enhancing sport performance. 3 lecture/problem-solving. Prerequisite: KIN 428.

### KIN 570 Management of Adapted Physical Education Programs (3)

Teacher training approaches, grant writing, research responsibilities, in-service presentations, service delivery in the public schools, advocacy practices and other skills in management needed by the adapted physical education teacher. 3 seminars. Prerequisite: KIN 206 or graduate standing.

### KIN 575/575A Motor Practicum for Individuals with Disabilities (2/1)

Supervised clinical type experience in APE at selected public and private agencies. May be taken a maximum of 3 times for credit. 2 lectures/problem-solving; 2 hours fieldwork. Concurrent enrollment required. Prerequisite: KIN 206 or graduate standing.



**KIN 580 Advanced Motor Learning and Human Performance (3)**

Preparation and presentation of critical reviews of literature in motor learning. Topics are: kinesthesia, reaction time, strength in neuromotor coordination, motor learning, and transfer factors affecting motor performance. 3 seminars. Prerequisite: KIN 430/430L.

**KIN 583 Advanced Motor Development (3)**

Preparation and presentation of critical reviews dealing with physical growth and motor development throughout life. Changes in anthropometric measurements, rates of growth of various body tissues, organs and segments, and ossification of the skeleton from infancy to adulthood. 3 seminars. Prerequisite: KIN 312/312A.

**KIN 590 Research Methods (3)**

Study the nature of research and the various methods for acquiring information relevant to the profession. 3 lecture discussions.

**KIN 591 Research Design (3)**

Examine the nature and role of applying and interpreting statistical techniques for specific problems related to our professional field. 3 seminars. Prerequisite: KIN 590.

**KIN 655 Legal Aspects of Health, Physical Education, Recreation, and Athletics (3)**

Legal theory relating to health, physical education, recreation, and athletics; legislation, court decisions, and legal procedures affecting these fields. 3 seminars. Unconditional standing required.

**KIN 670 Issues in Adapted Physical Education (3)**

Study of current trends and issues in adapted physical education as influenced by special education legislation. 3 seminars. Prerequisite: KIN 206 or graduate standing. Unconditional standing required.

**KIN 680 Kinesiological Analysis (3)**

Advanced kinesiological analysis utilizing knowledge of muscle groups and principles of movement and human performance to develop a logical and cohesive understanding of human movement. 3 lecture discussions. Prerequisite: KIN 302. Unconditional standing required.

**KIN 683/683L Advanced Physiology of Exercise (3,1)**

The physiological and biochemical adjustments made by the body during exercise and changes which result from prolonged periods of intensive physical training. 3 seminars, 2 one-hour laboratories. Prerequisite: KIN 303/303L. Unconditional standing required.

**KIN 684 Advanced Concepts in Exercise Testing and Counseling (3)**

Advanced concepts of graded exercise testing (GXT), interpretation, and counseling. GXT preparation, administration, and evaluation. Modes and purposes of GXT, exercise electrocardiography, energy cost calculations, and principles of exercise prescription. Special considerations for select population groups and case study preparation. 3 lectures/problem-solving. Prerequisite: KIN 683/683L. Unconditional standing required.

**KIN 685/FN 685 Nutrition in Sports and Exercise (4)**

Knowledge concerning the role of nutrients in optimizing human performance. Assessment of caloric and nutrient requirements associated with exercise. Special consideration is given to gender specific needs of athletes, nutritional ergogenic aids, and eating disorders. 4 seminars. Prerequisites: KIN 683/683L and FN 533. Unconditional standing required.

**KIN 691 Directed Study (2)**

A thorough investigation and research of a theme or subject selected by the student in consultation with the faculty. The scholarly research should be undertaken by the initiative of the student but with general guidance and advice from the faculty. Maximum credit 4 units. Unconditional standing required.

**KIN 696 Master's Degree Thesis (3)**

Development of a terminal creative research report on a topic selected by the student, approved by the department graduate studies committee and submitted to the faculty as evidence of his/her mastery of the principles of the profession. May be scheduled for a maximum of 9 units. Prerequisite: KIN 591, except Sport History. Advancement to Candidacy required.

**KIN 697 Comprehensive Examination (1)**

Preparation for and completion of the written comprehensive examination. May be taken no more than two times. Failure to complete exam satisfactorily the second time will result in termination from the program. Advancement to Candidacy required.

**KIN 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

## KINESIOLOGY AND HEALTH PROMOTION

### Master of Science in Agriculture Master of Science in Kinesiology

#### Sports Nutrition Option

A joint program in the College of Letters, Arts, and Social Sciences, Department of Kinesiology and Health Promotion, and the College of Agriculture, Department of Food, Nutrition and Consumer Sciences.

Dr. Wanda Rainbolt, Graduate Coordinator, Department of Kinesiology and Health Promotion

Dr. Anahid Crecelius, Graduate Coordinator, Department of Food, Nutrition and Consumer Sciences

The Sports Nutrition graduate study option is an interdisciplinary program offered jointly by the Kinesiology and Health Promotion Department and the Food, Nutrition and Consumer Sciences Department. It is designed for students interested in pursuing graduate work which integrates nutrition science and human performance.

The curriculum has been developed to provide an advanced understanding of nutrition science and exercise physiology and to facilitate the pursuit of a variety of careers in clinical and/or applied settings. The curriculum consists of two parts—a required core area and a restricted electives area. Students can choose courses from the elective area in accordance with their particular interest and goals. Students are expected to meet all of the prerequisites for the core courses.

#### Admission to the Program

An applicant for admission to the program must have received a baccalaureate degree in kinesiology or foods and nutrition or a related discipline from an accredited institution. A student with a baccalaureate degree in a major other than kinesiology or foods and nutrition may be admitted subject to review of the student's performance and academic background by the graduate coordinators of the respective departments. The student must file complete application forms, three letters of recommendation, a statement of purpose, and official transcripts from all colleges and/or universities attended.

#### CURRICULUM

##### REQUIRED CORE (19– 21 units required)

Research Methods in Nutrition/Laboratory . . . . .	FN	538/538L	1/1
or Research Methods . . . . .	KIN	590	3
Statistics for Agriculture . . . . .	ABM	575	4
or Research Design . . . . .	KIN	591	3
Advanced Nutrition . . . . .	FN	533	3
Physiology of Exercise/Laboratory . . . . .	KIN	683/683L	3/1
Advanced Exercise Testing and Counseling . . . . .	KIN	684	3
Nutrition in Sports and Exercise . . . . .	FN/KIN	685	4

##### RESTRICTED ELECTIVES (15– 20 units required)

Sports Medicine . . . . .	KIN	455	4
Exercise Metabolism and Weight Control . . . . .	KIN	456	3
Advanced Nutrition (cellular nutrient metabolism) .FN		433	4
Nutritional Assessment Methods/Laboratory . . . .FN		435/435L	1/1
Advanced Nutrition (hormonal effects on nutrient metabolism) . . . . .	FN	434	4
Recent Advances in Nutrient Metabolism . . . . .	FN	535	3
(may be repeated for credit)			
Seminar . . . . .	FN	570	2-4
Immunology-Serology/Laboratory . . . . .	MIC	415/415L	3/2

Hematology . . . . .	MIC	444/444L	3/1
Endocrinology . . . . .	BIO	520/520L	3/1
Cellular Immunity and Disease . . . . .	BIO	570/570L	3/1
Advanced Topics in Biology (as pertinent and with approval) . . . . .	BIO	575	2
Bioethics . . . . .	PHL	433	4
Theories of Counseling . . . . .	PSY	412	4

#### TERMINAL REQUIREMENT

Thesis . . . . .	KIN/FN	696	6-9
Core courses must be completed and student must be Advanced to Candidacy prior to enrolling in thesis.			
Total units required . . . . .			45

#### GRADUATE COURSE DESCRIPTIONS

See Biological Sciences, Philosophy, and Psychology for other course descriptions.

##### KIN 590 Research Methods (3)

Study the nature of research and the various methods for acquiring information relevant to the profession. 3 lecture discussions.

##### FN 538/538L Research Methods in Nutrition (1,1)

Contemporary research techniques and methods used in the field of nutrition. Interpretation of data in relationship to the nutritional status of humans and experimental animals. 1 lecture/discussion; 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: FN 433, 435/435L, and ABM 575 or equivalent.

##### KIN 591 Research Design (3)

Examine the nature and role of applying and interpreting statistical techniques for specific problems related to our professional field. 3 seminars. Prerequisite: KIN 590.

##### ABM 575 Statistics for Agriculture (4)

A summary of statistical tools and techniques used in agriculture. Application of computer to selected statistical techniques. 4 lecture discussions.

##### KIN 683/683L Advanced Physiology of Exercise (3,1)

The physiological and biochemical adjustments made by the body during exercise and changes which result from prolonged periods of intensive physical training. 3 seminar/discussion. 1 two-hour laboratory. Prerequisite: KIN 303/303L.

##### KIN 684 Advanced Concepts in Exercise Testing and Counseling (3)

Advanced concepts of graded exercise testing (GXT), interpretation, and counseling. GXT preparation, administration, and evaluation. Modes and purposes of GXT, exercise electrocardiography, energy cost calculation, and principles of exercise prescription. Special considerations for select population groups and case study preparation. 1 three-hour lecture/problem-solving. Prerequisite: KIN 683/683L.

##### KIN 685/FN 685 Nutrition in Sports and Exercise (4)

Knowledge concerning the role of nutrients in optimizing human performance. Assessment of caloric and nutrient requirements associated with exercise. Special consideration is given to gender specific needs of athletes, nutritional ergogenic aids, and eating disorders. 4 seminars. Prerequisites: KIN 683/683L and FN 533.

**KIN 696 Master's Degree Thesis (3)**

Development of a terminal creative research report on a topic selected by the student approved by the department graduate studies committee and submitted to the faculty as evidence of his/her mastery of the principles of the profession. May be repeated for a maximum of 9 units. Prerequisite: KIN 591, except Sport History. Advancement to Candidacy required.

**FN 696 Master's Degree Thesis (3)**

Compilation of data culminating in the summarizing and reporting, in thesis form, of independent supervised research. May be repeated for a maximum of 9 units. Advancement to Candidacy required.

**KIN 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

**FN 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.





## LANDSCAPE ARCHITECTURE

### MASTER OF LANDSCAPE ARCHITECTURE

In the Department of Landscape Architecture, College of Environmental Design

Kenneth S. Nakaba, Chair

Landscape Architecture Graduate Studies Committee:

Joan M. Woodward, Chair and Graduate Coordinator

John T. Lyle

Mark J. von Wodtke

Jeffrey K. Olson

Philip N. Pregill

Joan M. Safford

The Department of Landscape Architecture welcomes graduate students from a variety of academic disciplines who are concerned with the shaping of our physical environment. Students learn current and advanced methods for establishing strong, well-defined, and mutually life-sustaining and enhancing relationships between people and the land. The curriculum emphasizes case study projects at scales varying from the garden to the region with frequent review, discussion, and seminar sessions.

Students with degrees in non-design disciplines take a series of preparatory courses designed specifically to meet their needs. The preparatory courses, which begin in summer quarter, will normally require four quarters of study before the student proceeds with regular graduate courses. Completion of the degree program requires six quarters in residence for students with bachelor's degrees in landscape architecture or architecture. Students seeking a first professional design degree will have ten quarters in residence for completion of degree requirements.

The Landscape Architecture Department considers its location in southern California to be of special advantage for the study of landscape and environment. The presence of sea coast, mountain and desert terrain as well as one of the major metropolitan centers in North America offers a unique opportunity for professional study. Project sites may range throughout the southern area of California and field trips to a variety of areas and locations throughout the state are a regular aspect of the graduate program. Applicants to the program should anticipate frequent field trips as an essential part of their studies. A variety of trips ranging from one week to ten days duration are usually conducted. Applicants should be prepared to participate in at least two of these major field trips.

The objectives of the graduate program encompass both a general professional educational background and advanced specialized study. Upon completion of the degree requirements the graduate should have developed:

- I. An advanced level of professional expertise in ecosystematic land planning, that is, in shaping and controlling land in conformance to and in harmony with the processes of natural ecosystems (LA 512/512L, 602/602L, 606/606L).
- II. A basic competence in the major skills of landscape architecture and be able to function productively, though probably not yet independently, in professional practice. These skills and the courses in which they are emphasized are: (a) Plant materials and planting design (LA 540/540L, 541/541L) (b) Landscape construction and technology (LA 531/531L, 532/532L, 632/632L) (c) Project design and site planning (LA 510/510L, 512/512L, 603/603L) (d) Environmental analysis and impact prediction (LA 604/604L)
- III. An ability to make a creative and original contribution to some particular area of landscape architecture, either theoretical or practical, according to personal interest (LA 601, 692, 695, 696).
- IV. A comprehension of the literature, history, and theory of landscape architecture sufficient to communicate the concepts of the profession to others and to use as a philosophical basis for individual professional work (acquired primarily through LA 322/322L, LA 423/423L, LA 424/424L, LA 521/521L, LA 552).

### ADMISSION TO THE PROGRAM

Admission to the Master of Landscape Architecture program requires an undergraduate grade point average of 3.0 (B) or better. An applicant with an average between 2.5 and 3.0 will be considered for admission if other qualifications can be demonstrated.

Admission as an unconditional graduate student requires a professional design degree (such as landscape architecture or architecture). Applicants with degrees in other disciplines are admitted as conditional graduate students. The conditions of admission are described in the section on Curricular Requirements.

Complete applications must be received by the Graduate Studies Committee by March 1 to be considered for admission the following summer or fall quarter. Applications are accepted from students with degrees in all disciplines. Applicants who have developed skills and knowledge in areas directly applicable in landscape architecture, such as ecology, geography, or fine arts, may be given priority in selection.

### PROGRAM REQUIREMENTS

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted a student upon the recommendation of the graduate faculty and implies a readiness to attempt the project or thesis. Students who are not candidates are not eligible to register for LA 695 or 696.

In order to advance to candidacy for the Master of Landscape Architecture the student must: (1) satisfy all admissions conditions, if any; (2) satisfy the Graduation Writing Test; and (3) with the graduate advisor, develop and file a program of study and have it approved by the graduate studies analyst, and by the graduate coordinator for Landscape Architecture. The curriculum specified in the program may be altered only by written petition, which shall be submitted in accordance with university regulations.

### CURRICULAR REQUIREMENTS

1. A minimum of 72 quarter units of graduate work must be completed in the graduate degree program. Prerequisite courses are in addition to this minimum. Upper division courses in elective and minor emphasis areas must be approved by the student's advisor. A minimum grade point average of 3.0 must be maintained in all courses taken to satisfy degree requirements as well as in all graded course work attempted while in graduate standing at this university.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, or units petitioned for graduate credit may be included on a master's contract.
3. The following courses are required for all graduate students in landscape architecture: LA 512/512L, LA 601, LA 602/602L, LA



604/604L, LA 606/606L (18 units), LA 632/632L, and LA 695 or 696. Students with a degree in landscape architecture have the option of including LA 540/540L to satisfy degree requirements if it is their preference.

4. In addition to the above, the following courses are required for first professional design degree students: one of the following three courses in history: LA 322/322L, LA 423/423L or LA 424; LA 509/509L; LA 510/510L; LA 511/511L; LA 521/521L; LA 531/531L; LA 532/532L; LA 540/540L; and LA 541/541L. Additional courses may be required for students without adequate preparation for graduate study in landscape architecture.
5. Each student must also identify a program elective pattern from the following:
  - A. Design: LA 551, LA 552, LA 553 (required only of first professional design degree students); LA 555, LA 556, and LA 652 (4 units).
  - B. Planning: LA 551, LA 552, LA 553 (required only of first professional design degree students); LA 576, LA 652 (4 units).
  - C. Research/Education: LA 692 (6-12 units).
6. Additional elective content is required to satisfy the minimum unit requirements for the Master of Landscape Architecture degree. Courses may be selected from offerings in the College of Environmental Design as well as other colleges.
7. The candidate must be enrolled in the university during the quarter of graduation.

## CURRICULUM

In consultation with an advisor and in accordance with the above requirements, each student will select courses from the following list and approved electives to complete the requirements for the Master of Landscape Architecture degree.

Foundations of Landscape Design . . . . .	LA 509/509L	3,3
Foundations of Landscape Design . . . . .	LA 510/510L	3,3
Design Graphics . . . . .	LA 511/511L	2,2
Methods and Applications for Landscape Architecture . . . . .	LA 512/512L	4,5
Landscape Awareness . . . . .	LA 521/521L	3,1
Landscape Construction and Design . . . . .	LA 531/531L	2,2
Landscape Construction and Design . . . . .	LA 532/532L	2,2
Plant Ecology and Design . . . . .	LA 540/540L	2,3
Landscape Planting . . . . .	LA 541/541L	2,2
Seminar on the Profession . . . . .	LA 551	2
Seminar on Theory and Literature . . . . .	LA 552	2
Seminar on Professional Directions . . . . .	LA 553	2
Seminar on Human Behavior in the Landscape . . . . .	LA 555	2
Seminar on Human Behavior and Landscape Design . . . . .	LA 556	2
Seminar on Landscape Planning . . . . .	LA 576	4
Design Research . . . . .	LA 601	4
Landscape Design and Natural Processes . . . . .	LA 602/602L	3,3
Environmental Analysis . . . . .	LA 604/604L	2,3
Ecosystematic Landscape Design . . . . .	LA 606/606L	3,6
Landscape Technology . . . . .	LA 632/632L	3,3
Graduate Seminar . . . . .	LA 652	2
Independent Study . . . . .	LA 692	1-6
Master's Degree Project . . . . .	LA 695	4
or Master's Degree Thesis . . . . .	LA 696	4

## GRADUATE COURSE DESCRIPTIONS

### LA 509/509L Foundations of Landscape Design (3/3)

Principles and techniques of basic design as applied to shaping the landscape. Concepts in visual thinking, introduced and developed by means of studio exercises, and their importance in design concepts. Offered summer quarter only. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required.

### LA 510/510L Foundations of Landscape Design (3/3)

Principles and techniques of environmental design applied to shaping the landscape; development of landscape design skills. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required.

### LA 511/511L Design Graphics (2/2)

Techniques of graphic communication for environmental design; freehand sketching, orthogonal drafting; audio-visual presentation applied to the development and presentation of design ideas and proposals. To be taken during summer quarter concurrently with LA 509/509L and LA 521/521L. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required.

### LA 512/512L Methods and Applications for Landscape Architecture (4/5)

Examination of concerns underlying landscape design and planning and processes for dealing with them at scales from the very small project to the region; emphasis on applied ecology, systems techniques, and environmental policy and management as well as design and planning techniques. 4 lecture discussions, laboratory 15 hours to be arranged. Concurrent enrollment required. Prerequisite: LA 510/510L or degree in design discipline.

### LA 521/521L Landscape Awareness (3/1)

Sensory exploration of natural and man-made environments in relation to historical and contemporary theory and philosophy of landscape architecture; discussion and analysis of contemporary movements and the various roles of the landscape architect. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required.

### LA 531/531L, LA 532/532L Landscape Construction and Design (2/2) (2/2)

Basic methods of landscape alteration, augmentation and control including grading, drainage, roads and trails, utilities, and small structures; the uses, limitations, and effects of such alterations. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required.

### LA 540/540L Plant Ecology and Design (2/3)

Exploration and study of plant associations of southern California and the environmental factors that control these communities as related to planting design theory and application. Identification of native and adapted species; introduction to cultural, functional, and aesthetic criteria in the organization of design associations of plants. 2 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required.

### LA 541/541L Landscape Planting (2/2)

Selection of plant association for the developed landscape on the basis of culture, utility, and visual character; identification, classification, and use of common plants. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: LA 540/540L or unconditional graduate standing.

**LA 551 Seminar on the Profession (2)**

Analysis and discussion of the structure and organization of the profession of landscape architecture; its history and future. Case studies of professional firms and organizations in the Los Angeles region. 1 two-hour seminar.

**LA 552 Seminar on Theory and Literature (2)**

Review and analysis of the existing body of literature concerning landscape architecture, relationships between humans and the natural environment, and humans and the designed environment. 1 two-hour seminar.

**LA 553 Seminar on Professional Directions (2)**

Analysis and discussion of current and future activities in the profession of landscape architecture; emphasis on individual development and specialization. 1 two-hour seminar. Prerequisite: LA 552.

**LA 555 Seminar on Human Behavior in the Landscape (2)**

Analysis and discussion of human behavior in designed environments, methods of observation and recording of behavioral activities. Application of behavioral analysis to design. 1 two-hour seminar.

**LA 556 Seminar on Human Behavior and Landscape Design (2)**

Analysis and discussion of design theory and application as a response to human needs and behavior. 1 two-hour seminar/discussion. Prerequisite: LA 555.

**LA 576 Seminar on Landscape Planning (4)**

Investigation and discussion of political, economic, social and institutional influences on planning decisions and policy formulation with particular concentration on issues related to the natural environment. 1 four-hour seminar.

**LA 601 Design Research (4)**

Investigation and discussion of basic research methods; development of design research techniques and skills. 2 two-hour lecture discussions. Prerequisite: LA 512/512L or permission of instructor. Unconditional standing required.

**LA 602/602L Landscape Design and Natural Processes (3/3)**

Application of ecosystematic principles and methods to physical problems of landscape design, encompassing a broad and complex range of human and natural considerations. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: LA 512/512L. Unconditional standing required.

**LA 604/604L Environmental Analysis (2/3)**

Techniques for prediction of alterations in social and natural processes brought about by human use of the land and the application of such assessments to environmental management. 2 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: LA 512/512L, LA 602/602L, and LA 601 or permission of instructor. Unconditional standing required.

**LA 606/606L Ecosystematic Landscape Design (3/6)**

Application of the ecosystematic approach to complex large-scale problems of landscape design and natural resource planning. May be repeated. Maximum credit 18 units. 3 lecture discussions, laboratory 18 hours to be arranged. Concurrent enrollment required. Prerequisite: LA 604/604L or permission of instructor. Unconditional standing required.

**LA 632/632L Landscape Technology (3/3)**

Application of modern technology to landscape construction involving adaptation of the landscape for human purposes. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: LA 512/512L and LA 532/532L or degree in landscape architecture. Unconditional standing required.

**LA 652 Graduate Seminar (2)**

Seminar presentations and discussion of work in progress by graduate students. May be repeated. Maximum credit 4 units. 1 two-hour seminar. Unconditional standing required.

**LA 692 Independent Study (1-6)**

Independent study and research on a subject chosen by the student with the consultation, approval, and direction of an advisor. Course may be repeated. Maximum credit, 12 units. Unconditional standing required.

**LA 695 Master's Degree Project (4)**

Development of a terminal creative project designed to demonstrate skills and knowledge achieved in the graduate program. The subject will be selected by the student in consultation with an advisor. Prerequisite: LA 606/606L. Advancement to Candidacy required.

**LA 696 Master's Degree Thesis (4)**

Development of a terminal creative research report on a problem in landscape architecture selected by the student and approved by the graduate studies committee. Prerequisite: LA 606/606L. Advancement to Candidacy required.

**LA 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis or project. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

## MATHEMATICS

### Master of Science in Mathematics

In the Department of Mathematics, College of Science

Claudia Pinter-Lucke, Chair

Alan Krinik, Coordinator, Graduate Program

There are two programs for the Master of Science in Mathematics. The Pure Mathematics Program is for individuals whose principal interest is in pure mathematics. It is intended for students who are interested in either further graduate study or in attaining the teaching credential for the community college. The Applied Mathematics Program is intended for students who wish to learn the applications of mathematics, in particular with a goal of working in industry. This program is also appropriate for the individual seeking the community college teaching credential.

### ADMISSION TO THE PROGRAM

An applicant for admission should have completed a baccalaureate degree program in mathematics comparable to that offered at this university or a baccalaureate degree in a related field with at least 20 quarter units of upper-division courses in mathematics. Students whose undergraduate degree is in a field other than mathematics will generally find it necessary to follow a program of additional preparation before undertaking graduate work in mathematics. Applicants for the Pure Mathematics Program must have course work which includes MAT 314, MAT 315, MAT 417, MAT 418 and MAT 428 (or their equivalent). Applicants for the Applied Program must have course work which includes MAT 314, MAT 315, MAT 417 and MAT 428 (or their equivalent). Work experience, as well as undergraduate course work, may be taken into account by the Graduate Committee for credit towards the admission of an applicant.

An upper-division grade point average of at least 3.0 is required for admission as an unconditional graduate student in mathematics. Each applicant will be considered by the departmental graduate committee and recommended for admission on the basis of all evidence applicable to the student's admission. An applicant not meeting the minimum standards of the department may be admitted as a conditional student, if space is available. The student must comply with the conditions of admittance within the time stipulated.

### Student Program

The student's program will be based upon his/her undergraduate preparation, current interests in mathematics, occupational and professional goals. During the first quarter of residence, each unconditional graduate student will prepare a contract in consultation with the graduate coordinator. This will define all courses and requirements which the student must fulfill to earn the degree. Once approved by the College of Science and verified by the Graduate Studies Office, the study list may be amended only by petition, as outlined in the appropriate sections of this catalog.

### Advancement to Candidacy

Advancement to candidacy is required of all students who register for MAT 696 (thesis) or 697 (comprehensive exam). In order to advance to candidacy, a student must:

1. Have an overall GPA of at least B (3.0);
2. Satisfy the GWT requirement;
3. Satisfy all requirements stipulated by the graduate coordinator at the time of admission;

4. Have a contract approved by the graduate coordinator and the associate vice president for Academic Programs;
5. Complete at least 6 courses which appear on the student's contract, 4 of which must be at the 500 level; and
6. Have at least a B (3.0) average on contract courses taken.

### REQUIREMENTS

1. Applied Mathematics Program: At least 45 units of acceptable graduate work must be completed in the master's degree program. At least 33 of these units shall be in courses at the graduate level. A thesis (three units) and directed readings (two units) are required..
2. Pure Mathematics Program: Two alternatives: either a thesis (three units) and directed readings (two units), or a comprehensive exam (one unit) is required. Those students who take the comprehensive exam must complete at least 49 units of acceptable graduate work in the master's degree program. At least 36 of these units shall be in courses at the graduate level. Those students who write a thesis must complete at least 45 units of acceptable graduate work in the master's degree program. At least 33 of these units shall be in courses at the graduate level.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University (400- level only) may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, or units petitioned for graduate credit may be included on a master's contract.
4. A grade-point average of at least 3.0 shall be maintained in all course work taken to satisfy the degree requirements, as well as in all courses taken at Cal Poly Pomona postbaccalaureate which number 300 or more.
5. The candidate must be enrolled in the university during the quarter of graduation.

### Curriculum for Pure Mathematics

The student is required to complete 6 of the following 7 courses: MAT 511, MAT 512, MAT 517, MAT 518, MAT 521, MAT 528, MAT 529. In addition, either a thesis or comprehensive examination is required.

Electives can be graduate or senior level mathematics courses other than MAT 417, MAT 418, MAT 428, MAT 429, and MAT 400 or MAT 499 by petition.

### Curriculum for Applied Mathematics

Required courses are MAT 508, 511, 512, 545 and the completion of three sequences from the list: MAT 508 and 509; MAT 545 and 546; MAT 570 and 580; STA 533 and 534; STA 530 and either STA 584 or MAT 540. In addition, the thesis is required. Electives can be graduate or senior level mathematics courses other than MAT 417, 418, and MAT 400 or MAT 499.

### GRADUATE COURSE DESCRIPTIONS

#### MAT 508 Numerical Linear Algebra (4) W (even years)

Topics will include numerical methods for determinants, systems of linear equations (direct and iterative methods), matrix inversions, eigenvalues, eigenvectors, techniques to minimize error propagation, splittings, rates of convergence of methods. 4 lectures/problem-solving. Prerequisites: "C" or better in MAT 208, MAT 315 and MAT 401 or consent of instructor.

**MAT 509 Error Analysis (4) Sp (even years)**

Topics will include sources of error, types of error, error propagation, techniques for minimizing error, backward error analysis, approximation of functions, error analysis of iterative methods for non-linear equations. 4 lectures/problem-solving. Prerequisites: "C" or better in MAT 401 and 402 or consent of instructor.

**MAT 511, 512 Real Analysis (4) (4) F, W**

Properties of Lebesgue measure and integration, Borel Sets, monotone functions and functions of bounded variation, classical Banach spaces,

metric spaces, measure spaces and measurable functions, the Radon-Nikodym theorem, the Fubini theorems, Daniel integrals, applications. 4 lecture discussions. Prerequisite: "C" or better in MAT 315 or consent of instructor.

**MAT 517, 518 Abstract Algebra (4) (4) W, Sp (odd years)**

Groups, Sylow theorems, rings and modules, chain conditions, morphism theorems, principal ideal domains, field extensions and finite fields, Galois theory. 4 lecture discussions. Prerequisite: "C" or better in MAT 418 or consent of instructor.





**MAT 521 Topology (4) F (even years)**

Topological spaces, connectedness, compactness, continuity, separation and countability axioms, metric spaces, product spaces, function spaces and quotient spaces, uniform spaces, paracompactness. 4 lecture discussions. Prerequisite: consent of instructor.

**MAT 528, 529 Complex analysis (4) (4) F (odd years) W (even years)**

General form of Cauchy's theorem, conformal mappings, normal families. Riemann mapping theorem, theorems of Mittag-Leffler and Weierstrass, analytic continuation. Picard's theorem. Selected topics such as Dirichlet's problem, generalization of Picard's theorem, gamma and zeta functions. 4 lecture discussions. Prerequisite: MAT 314 or 428, or consent of instructor.

**MAT 535 History of Mathematics (4)**

Historical development of selected mathematical topics drawn generally from the body of 18th century and later mathematics. Topics to be covered announced by the professor prior to registration. 4 lecture discussions. Prerequisite: consent of instructor.

**MAT 540 Kalman Filter (4) F (odd years)**

Discrete- and continuous-time Kalman Filter. Design, simulation, and implementation; the extended Kalman Filter. Applications to radar, tracking, communication networks, space navigation, social and environmental systems. 4 lectures/problem-solving. Prerequisites: CS 120 or CS 125, MAT 208, MAT 216, STA 330, or STA 326, or consent of instructor.

**MAT 545, 546 Modeling (4) (4) W, Sp (odd years)**

Modeling of deterministic systems and random processes using ordinary and partial differential equations. Fourier methods, general modeling principles and techniques, perturbation theory and sensitivity analysis, applications. 4 lectures/problem-solving. Prerequisite: consent of instructor.

**MAT 550 Seminar in Mathematics (1-4)**

Topics in advanced mathematics chosen according to the interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. May be repeated for a maximum of 8 units. 1-4 seminars. Prerequisite: consent of instructor.

**MAT 570 Graphs and Network Flows (4) Sp (even years)**

Matching theory in graphs and network flows in capacity-constrained networks. Major topics include the Konig-Egervary Theorem for bipartite graphs and the Maximal Flow Algorithm for networks, along with a wide variety of applications. 4 lectures/problem-solving. Prerequisite: MAT 370 or consent of the instructor.

**MAT 580 Optimization Theory and Applications (4) F (odd years)**

Topics will include convex sets, extrema of functions, convex functions, non-linear convex, quadratic and dynamic programming, applications, primal-dual methods for solving constrained problems, applications to large scale mathematical programming problems. 4 lectures/problem-solving. Prerequisite: "C" or better in MAT 480 or consent of instructor.

**MAT 599/599A/599L Special Topics for Graduate Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Lecture/Activity/Laboratory /or combination of these. Prerequisite: consent of Instructor.

**MAT 691 Directed Study (1)**

Individual reading program in an area chosen by the student under the direction and supervision of the faculty. Maximum of 4 units credit. Students must obtain the written permission of the graduate coordinator in order to register for this course. Unconditional standing required.

**MAT 696 Master's Degree Thesis (1)**

Independent research and study under supervision of a faculty advisor. Research results must be reported in an acceptable form. Require 3 units credit for thesis. Students must obtain the written permission of the graduate coordinator in order to register for this course. Advancement to Candidacy required.

**MAT 697 Comprehensive Examination (1) Credit/no Credit**

Preparation for the comprehensive examination. Students must obtain the written permission of the graduate coordinator in order to register for this course. May be taken no more than twice. Failure to complete exam satisfactorily the second time will result in termination from the program. Only applicable with Pure Math option. Advancement to Candidacy required.

**MAT 699 Master's Degree Continuation (0)**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis. The candidate must be enrolled in the university during the quarter in which he/she graduates. Students must obtain the written permission of the graduate coordinator in order to register for this course. Advancement to Candidacy required.

**STA 530 Random Processes (4) Sp (odd years)**

Topics will include second order stationary processes, mean and covariance properties, Gaussian processes, Wiener process and white noise, counting and renewal processes. 4 lectures/problem-solving. Prerequisite: "C" or better in STA 330 or STA 326, or consent of instructor.

**STA 533 Linear Statistical Models I (4) W (even years)**

Introduction to general linear models, distribution of quadratic forms, the Gauss-Markov theorem, estimation, testing the general linear hypothesis. Computer package SAS will be used. 4 lectures/problem-solving. Prerequisite: C or better in STA 432 or consent of instructor.

**STA 534 Linear Statistical Models II (4) Sp (even years)**

Fixed and random components models, balanced and unbalanced cases, analysis of covariance, components of variance. Computer package SAS will be used. 4 lectures/problem-solving. Prerequisite: C or better in STA 533 or consent of instructor.

**STA 550 Probability Theory (4) W (odd years)**

Independence, zero-one laws, laws of large numbers, convergence theorems, characteristic functions, and basic limit theorems. Prerequisite: "C", or better, in STA 440, or consent of instructor.

**STA 584 Queueing Theory (4) F (even years)**

Analysis of queueing systems, discrete and continuous time Markov processes, birth and death processes, equilibrium results for single and multiple server queues, method of stages, priority queues. Prerequisites: "C" or better in MAT 382 or STA 430, and STA 332 or STA 441, or consent of instructor.

## PSYCHOLOGY

### MASTER OF SCIENCE IN PSYCHOLOGY

In the Department of Psychology, College of Letters, Arts, and Social Sciences

Gary A. Cretser, Chair

Jeffery Mio, Director, Graduate Program

The purpose of the Master of Science Program in Psychology is to provide students with coursework and the foundation in pre-degree supervised practice in marriage, family, and child counseling (MFCC). The program will prepare students for eventual MFCC licensure. This, in turn, will prepare them for a variety of counseling jobs, from counselor positions in industrial programs to marriage, family, and child counseling in clinic settings and private practice.

### ADMISSION TO THE PROGRAM

An applicant for admission to this program must hold a bachelor's degree from an accredited college or university and satisfy university and departmental requirements for graduate study. A minimum requirement for admission is a baccalaureate degree in psychology with at least 24 semester or 36 quarter units in upper division psychology. Students with a baccalaureate degree in other fields, but who have strong psychology backgrounds, will also be considered. Applicants should have successfully completed at least one upper division undergraduate psychology course each in statistics, experimental, history and systems, abnormal, personality, and psychological testing, and either an upper or lower division course in physiological psychology. Any deficiencies must be made up before the student receives unconditional graduate standing.

Applicants should have an undergraduate minimum grade point average of 3.0 (B) or better in both psychology courses and in their overall GPA. Students will be expected to furnish GRE scores for both the General Test and the Advanced Test in psychology by the application deadline. The minimum GPA and GRE cutoff scores may vary somewhat from year to year, depending on the applicant pool. It is anticipated that the GRE cutoff score will be at or above 950 for the General Test and above the 50th percentile for the Advanced Test.

Applicants will also be required to submit three letters of recommendation, a brief biographical sketch, and a statement of purpose. Finalists will be expected to come to campus for an interview with the department's Graduate Admissions Committee. These sources of information will be used in evaluating each candidate with respect to character, emotional maturity, and general aptitude for the counseling profession. Applications must be postmarked by the second Friday in May for admission to the fall quarter. There are no mid-year admissions into this program.

### REQUIREMENTS

A minimum of 75 quarter units (two years) is required for the Master of Science degree in Psychology. Coursework will satisfy course requirements for California MFCC licensure. Students who are accepted to the program in a given year are expected to attend school full-time and to proceed through the program as a cohort group. Full-time attendance is a requirement for continuance in the program.

A minimum GPA of 3.0 must be maintained in graduate studies. All courses must be passed with a minimum grade of a B.

Admission to the program does not admit a student to candidacy for the degree. Advancement to Candidacy is granted, upon the recom-

mendation of the psychology faculty, when the student has completed all preparatory coursework prior to the comprehensive examination. In addition, the Graduation Writing Test (GWT) must be passed prior to Advancement to Candidacy. A total limit of 13 transfer and/or Extended University units petitioned for graduate credit may be included on a master's contract.

The candidate must be enrolled in the university during the quarter of graduation.

### PROGRAM FOR THE MASTER OF SCIENCE IN PSYCHOLOGY

#### First Year Courses

Research Methods and Statistics . . . . .	PSY 510/510L	4/1
Advanced Topics - Human Development . . . . .	PSY 515	4
Introduction to Family and Marital Therapy . . . . .	PSY 545	4
Development-Family Life Cycle . . . . .	PSY 550	4
Psychopathology I . . . . .	PSY 555	4
Psychopathology II . . . . .	PSY 560	4
Advanced Testing . . . . .	PSY 565/565L	4/1
Ethical Issues in Counseling and Family Therapy . . . . .	PSY 570	4
Cross-cultural and Gender Issues in Therapy . . . . .	PSY 575	4
Total quarter units, first year. . . . .		38

#### Second Year Courses

Psychobiology of Mental Disorders . . . . .	PSY 540	4
Practicum I . . . . .	PSY 580	2
Practicum II . . . . .	PSY 585	2
Practicum III . . . . .	PSY 590	2
Group Process and Group Therapy . . . . .	PSY 595	2
Human Sexuality . . . . .	PSY 598	4
Diagnosis and Treatment of the Family/Elder Abuse . . . . .	PSY 605	4
Diagnosis and Treatment of Couples/Spousal Abuse . . . . .	PSY 606	4
Diagnosis and Treatment of Children/Child Abuse . . . . .	PSY 607	4
Special Problems in Treatment: Substance Abuse/Addiction . . . . .	PSY 610	2
Supervised Practice . . . . .	PSY 620	2
Advanced Supervised Practice I . . . . .	PSY 621	2
Advanced Supervised Practice II . . . . .	PSY 622	2
Comprehensive Exam . . . . .	PSY 697	1
Total quarter units, second year. . . . .		37
TOTAL QUARTER UNITS FOR PROGRAM . . . . .		75

### GRADUATE COURSE DESCRIPTIONS

#### PSY 510/510L Research Methods and Statistics (4/1)

Review of basic research methods. Systematic examination of advance research methods and statistical procedures. Extensive supervised experience in statistical analysis and in critiquing and redesigning research studies. 4 lectures/problem-solving, 1 three-hour laboratory in either general or clinical analysis. Prerequisites: BHS 307, BHS 340, PSY 433 or equivalent and graduate standing.

#### PSY 515 Advanced Topics in Human Development (4)

This course focuses on developmental changes in, and interactions between, the physical, cognitive, social and emotional domains throughout the life span. The influence of heredity and environment on development, including cross-cultural influences, will be considered. Psychopathology and its causes throughout the life span will also be highlighted. Prerequisites: Undergraduate course in development, graduate standing or consent of instructor.

**PSY 530 Psychobiology of Mental Disorders**

A neuropsychological overview of effects of brain trauma (stroke, closed head injury, etc.), and a psychobiological overview of the major mental disorders including schizophrenia, the affective disorders, Alzheimer's and developmental disorders such as autism. Introduction to neuropsychological assessment, and to pharmacological therapies. 4 seminars. Prerequisites: PSY 210 or equivalent, PSY 415 or equivalent and graduate standing.

**PSY 545 Introduction to Family and Marital Therapy (4)**

History and development of family and marital therapy. Introduction to a variety of theoretical approaches with special emphasis on family systems. Exploration of the therapy process and the relationship of therapist's personality to that process. 4 lecture discussions. Prerequisite: Admission to the clinical MS, PSY 515.

**PSY 550 Development—The Family Life Cycle (4)**

Review of the literature on family life cycle stages and clinical outcomes. Major stages which nuclear, single parent and step families undergo during significant changes in life events and horizontal and transgenerational relationship changes. 4 lecture discussions. Prerequisites: Admission to clinical MS, PSY 515.

**PSY 555 Psychopathology I (4)**

Clinical features, diagnosis, prognosis, and suggested etiological explanations of non-psychotic, DSM categories from Axis 1, with special attention given to the familial and interpersonal relationship influences on pathological behavior. 4 lecture discussions. Prerequisites: PSY 403 and PSY 415 or equivalent MS program.

**PSY 560 Psychopathology II (4)**

Clinical features, diagnosis, prognosis, and suggested etiological explanations of psychotic disorders, nonpsychotic disorders not covered in Psychopathology I, and Axis 2 categories, with special attention given to the familial and interpersonal relationship influences on pathological behavior. 4 lecture discussions. Prerequisites: Admission to MS, PSY 555.

**PSY 565/565L Advanced Testing (4/1)**

Theory and practice in assessment techniques in clinical practice. Includes use of assessment procedures in diagnosis, outcome evaluation, as an intervention strategy, and in clinical research. 4 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: Admission to clinical MS, undergraduate testing course.



**PSY 570 Ethical Issues in Counseling and Family Therapy (4)**

Values, ethics, and legal issues in relational therapy. Emphasis on ethical thought and decision-making. Review of professional codes and family, marriage, and divorce laws as they relate to clinical practice. 4 lecture discussions. Prerequisites: Admission to clinical MS, PSY 545.

**PSY 575 Cross-cultural and Gender Issues in Therapy (4)**

Exploration of gender and race/ethnic relations and their impact on family therapy interventions, on a micro as well as a macro level. Analysis of roles and tasks in families from a multi-cultural and gender perspective. 4 lecture discussions. Prerequisite: Admission to clinical MS.

**PSY 580 Practicum I (2)**

Introduction to supervised experience in clinical skills required of marital and family therapists. Group supervision through video-taped sessions, and live supervision and case notes, will focus on difficult aspects of case management for the beginning therapist. Prerequisites: Admission to clinical MS program, PSY 545, 515, 555, and 570. Corequisite: PSY 620.

**PSY 585 Practicum II (2)**

Second in a series of group supervision courses. Students' work with marriage and family clients is supervised through faculty and peer discussion of video-taped and live cases. Help-seeking is encouraged for therapy/therapist difficulties. Prerequisite: PSY 580 with B or better. Corequisite: PSY 621.

**PSY 590 Practicum III (2)**

Third in a series. Group supervision of students' therapy sessions with marriage and family clients. Supervision and peer discussion of video-taped and live sessions will be used. Students will present their difficult cases for supervision. Prerequisite: PSY 585 with B or better. Corequisite: PSY 622.

**PSY 595 Group Process and Group Therapy (2)**

First in a sequence of two courses. Examines the techniques and processes of group therapy through readings, discussion and group exploration of various techniques. Experimental group therapy under professional clinical supervision. 2 lectures/problem-solving. Prerequisites: Admission to clinical MS, PSY 580.

**PSY 598 Human Sexuality (4)**

Interdisciplinary considerations (biological, psychological, social) of research and theory related to human sexuality. Prevention and remediation of sexual problems. Clinical case material used to demonstrate dysfunctions and treatment. 4 lecture discussions. Prerequisites: Admission to clinical MS and BIO 301, PSY 455, PSY 412 or equivalents.

**PSY 605 Diagnosis and Treatment of the Family/Family Violence (4)**

Part of a three-course sequence in Marriage and Family Therapy. Diagnostic assessment of family dysfunctions and therapeutic interventions, covering various approaches. Examination of family violence issues. Student begins to develop a personal orientation to family therapy using a systems approach. 4 lectures/problem-solving. Unconditional standing required.

**PSY 606 Diagnosis and Treatment of Couples (4)**

Part of a three-course sequence of didactic material in Marriage and Family Therapy. The focus is on the diagnostic assessment of couple dysfunctions and therapeutic interventions covering various approaches to working with couples. 4 lectures/problem-solving. Prerequisites: PSY 515 and PSY 598. Unconditional standing required.

**PSY 607 Diagnosis and Treatment of Children/Child Abuse (4)**

Part of a three-course sequence of didactic material in Marriage and Family Therapy. The focus in this course is on the diagnostic assessment of child behavior problems and child abuse and interventions with children and their families. 4 lectures/problem-solving. Prerequisite: PSY 515. Unconditional standing required.

**PSY 610 Special Problems in Treatment: Substance Abuse/Addiction (2)**

Exploration of the theory, research, and clinical treatment of substance abuse and addiction. The medical model of substance abuse treatment will be considered as well as the approach of systemic therapists. 2 lecture discussions. Unconditional standing required.

**PSY 620 Supervised Practice (2)**

Directed and supervised training in psychotherapy in a field placement or on-campus clinic setting. Weekly case presentations and discussions. Student functions with substantial responsibility at this level. Corequisite: PSY 580. Unconditional standing required.

**PSY 621 Advanced Supervised Practice I (2)**

Directed and supervised training in psychotherapy in a field placement or on-campus clinic setting. This continues the format of PSY 620 with steadily increasing student responsibility and autonomy. Weekly case presentations and discussions. Prerequisite: PSY 620 with B or better. Corequisite: PSY 585. Unconditional standing required.

**PSY 622 Advanced Supervised Practice II (2)**

Directed and supervised training in psychotherapy in a field placement or on-campus clinic setting. This continues the format of PSY 622A with steadily increasing student responsibility and autonomy. Weekly case presentations and discussions. Prerequisites: PSY 620 and PSY 622A with B or better. Corequisite: PSY 590. Unconditional standing required.

**PSY 697 Comprehensive Exam (1)**

Students will take an essay examination based on all required coursework. The examination may be taken no more than two times. Failure to complete it satisfactorily the second time results in termination from the program. Advancement to Candidacy required.

**PSY 699 Master's Degree Continuation**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until completion of thesis or project. The candidate must be enrolled in the university during the quarter in which she/he graduates. Advancement to Candidacy required.



## URBAN AND REGIONAL PLANNING

### Master of Urban and Regional Planning

In the Department of Urban and Regional Planning, College of Environmental Design

Richard W. Willson, Chair

Urban and Regional Planning Graduate Studies Committee:

Jerry V. Mitchell, Graduate Coordinator

Felix R. Barreto

David Bess

Herschel Farberow

Charles M. Hotchkiss

Richard E. Lloyd

Charles E. Loggins

Gwendolyn Urey

Ana Maria C. Whitaker

Professional planners improve our quality of life and the quality of the built and natural environments by working to solve environmental, transportation, housing, social, economic, and design problems at urban, regional and national levels. Graduate study leads to the Master of Urban and Regional Planning degree which qualifies graduates for employment in a variety of departments at all levels of government, as well as in private consulting. Planners also work with public foundations, non-profit corporations, and environmental or public interest groups.

The program offers a broad, interdisciplinary, and rigorous two-year curriculum that combines lectures, seminars, and studio projects. Students specialize in areas of interest through specialization modules, program electives and courses that may be taken at other departments or universities upon approval of the Graduate Coordinator. The program features extensive contact with faculty. All required core courses are offered in the evening to accommodate working students. Students in the program come from a variety of undergraduate disciplines and professional experience. The program may be completed on a part-time basis. The Master of Urban and Regional Planning Program is fully accredited by the Planning Accreditation Board and has been cited as a national model for the education of planners.

### ADMISSION TO THE PROGRAM

Admission to the Master of Urban and Regional Planning program requires an undergraduate grade point average of 3.0 (B) or better, three letters of recommendation, and a "Statement of Purpose" setting out an applicant's interest in planning, along with a brief background. An applicant with an undergraduate grade point average between 2.5 and 3.0 will be considered for admission on the basis of scores on the Graduate Record Examination (GRE). A minimum score required on this exam is 1000 on any two of the three parts with not less than 450 on any of the three parts. Applicants with an undergraduate grade point average of 3.0 or better are not required to take the GRE.

Students are admitted into the program from a variety of disciplines and work backgrounds. Because the planning program is multidisciplinary, a wide range of undergraduate degrees are considered good preparation.

Following admission, the student and the Graduate Coordinator prepare an individual program which specifies all courses and other requirements which the student must fulfill to earn the master's degree. Students select a specialization module in one of four areas: environmental policy, community development, land use and design, or transportation policy. Each student's program is designed to fit individual needs and interests. Selection of all elective courses must be approved by the Graduate Coordinator. There are opportunities to take interdisciplinary design courses during the summer prior to the first year of study, and to participate in international planning education programs.

### REQUIREMENTS

Seventy-two units must be completed in the graduate degree program. Certain required courses may be substituted by the departmental Graduate Studies Committee based either on a special examination or on an evaluation of the student's prior education and/or professional experience.

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable credit may be petitioned by an undergraduate student. A limit of a total of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract.

No course below the 400 level will be accepted for graduate credit. A grade point average of "B" (3.0) or better must be maintained in all graded course work at this University attempted by degree-declared graduate students in the Urban and Regional Planning program, and in all courses used to satisfy degree requirements. A maximum of eight units in required urban and regional planning required courses with the grade of "C" (2.0) will be accepted for credit.

### Completion of the Program

Students must pass the Graduation Writing Test and all courses on the student's contract to complete the program. Students may elect to complete the final part of their contract by either developing a master's thesis or project or by successfully completing the master's comprehensive exam. The exam is given once a year in the spring quarter. Students must take the exam preparatory course given in the winter quarter in order to take the exam that spring. The thesis, project, and exam options are all six units each and may be completed in a minimum of two quarters. Enrollment in thesis or project must begin by the first quarter of the seventh year after the first course taken in pursuit of the MURP degree. In no case will an extension be granted for a thesis, project, or exam which is not completed by the end of the seventh year. An oral defense of the thesis, project, or exam is required.

### CURRICULUM

		Units
Introduction to Graphic Communication and		
Physical Design . . . . .	URP 501/501L	3
Urban Analysis Fundamentals . . . . .	URP 502L	1
The Economic, Social and Environmental		
Context for Planning . . . . .	URP 505	4
Legal Foundations of Urban and Regional Planning	URP 506	4
Urban and Regional Planning Theory and Practice	URP 512/512A	4
Urban and Regional Planning Research Methods	URP 521/521L	4
Urban and Regional Planning Data Analysis		
and Simulation . . . . .	URP 522/522L	4
Policy Analysis, Implementation and Evaluation	URP 523/523L	4
Graduate Planning Studio I . . . . .	URP 641/641L	4
Graduate Planning Studio II . . . . .	URP 642/642L	4
Planning Administration and Professional Practice	URP 652	4
Independent Study with Comprehensive Exam	URP 692	6
or Master's Degree Project . . . . .	URP 695	
or Master's Degree Thesis . . . . .	URP 696	
Program Specialization. . . . .		12
Electives . . . . .		14
Total Units. . . . .		46

**SPECIALIZATION MODULE COURSES**

Each module is composed of 12 units, and is developed by the student and the Graduate Coordinator to include the following required module courses and other appropriate courses under departmental guidelines. Students may use 400-level planning courses with the permission of the Graduate Coordinator. Please see the undergraduate section of the catalog. With Graduate Coordinator approval, students may also use graduate and 400-level undergraduate courses in other departments and off campus courses to complete their module.

**Environmental Policy**

Environmental Policy for Planning . . . . .URP 637 4

**Land Use and Design**

Land Use Planning and Design . . . . .URP 638/638L 4

**Community Development**

Community Development Theory and Process . . .URP 434/434L 4

Advanced Planning Studio . . . . .URP 498/498L 4

**Transportation Policy**

Urban Transportation Planning . . . . .URP 488/488L 3,1

Urban Transportation and Circulation Systems . .URP 636/636L 3,1

**URP GRADUATE ELECTIVES (14 units)**

Evolution of the Planning Process . . . . .URP 513 4

Housing and Community Development . . . . .URP 534 4

Social and Political Planning Policy . . . . .URP 651 4

Directed Study . . . . .URP 691 1-2

Elective courses to complete the required minimum of 72 units may be selected from those listed above or any 400-, 500-, or 600-level course in any department of this university with the approval of the Graduate Coordinator. Specialization module courses may be used as electives. The student should select a group of electives that will help either to specialize in one area or to broaden the student's background and acquire a wider area of competence. A list of recommended electives, grouped by specialization, is available at the department office.

**GRADUATE COURSE DESCRIPTIONS****URP 501/501L Introduction to Graphic Communication and Physical Design Skills (1/2)**

Introduction to basic planning graphic and design techniques. Covers issues such as mapping, presentation and report graphics, site planning, development processes and computer applications. Concurrent enrollment required. 1 lecture discussion, 2 three-hour laboratories.

**URP 502/502L Urban Analysis Fundamentals (1)**

Intensive course focusing on a selected communication or analysis skill, the subject to be specified in advance. Topics may include listening and communication skills, report writing, negotiation/mediation processes, computer analysis, mapping or graphics, photography, etc. May be repeated for elective credit. 1 laboratory.

**URP 505 The Economic, Social and Environmental Context for Planning (4)**

Development of the economic and social structure of cities. Environmental factors in cities and regions. Historical development and current issues. Explores the forces that shape and affect possibilities for cities and regions. 4 lecture discussions.

**URP 506 Legal Foundations of Urban and Regional Planning (4)**

Legal and institutional framework for planning. Emphasis is placed on understanding federal and state requirements for planning, constitutional rights, and key legislation. 4 lecture discussions.

**URP 512/512A Urban and Regional Planning Theory and Practice (2/2)**

Application of planning theory to planning practice. Use of planning methods, research techniques, and decision theory in application to a range of urban problems. 2 lecture discussions, 2 seminars. Concurrent enrollment required.

**URP 513 Evolution of the Planning Process (4)**

Development of urban patterns in the context of planning. Introduction to the history of urban form and the contribution of the planning profession to civic improvement. 4 lecture discussions.

**URP 521/521L Urban and Regional Planning Research Methods (3/1)**

Introduction to the use of probability and statistics in urban and regional planning research. Basic planning techniques; data analysis and display; projection techniques; land use surveys and coding; simple models; economic base and locational analysis; electronic data processing. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required.

**URP 522/522L Urban and Regional Planning Data Analysis and Simulation (3/1)**

Introduction to data analysis and computers. Mathematical models related to land-use, and population projections and estimates. Application of data analysis in the solution of research problems, research design and project management. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Must be taken immediately following URP 521/521L. Prerequisite: URP 521/521L.

**URP 523/523L Policy Analysis, Implementation and Evaluation (3/1)**

Evaluation methods of public policies and private decisions on the public welfare, using quantitative and qualitative analytic tools. Emphasis is on application of statistical approaches, cost-benefit analysis, computer aided mapping and survey techniques to contemporary issues in planning. 3 lecture discussions, 1 three hour laboratory. Concurrent enrollment required. Prerequisite: URP 522/522L.

**URP 534/534A Urban Housing and Community Development (3/1)**

Housing requirements and prospects; local, state, and federal housing and community development policies; alternative solutions to housing problems. 3 lecture discussions, 1 two-hour activity. Concurrent enrollment required.

**URP 636/636L Urban Transportation and Circulation Systems (3/1)**

Problems of planning for urban transportation and circulation facilities. Interrelationship of these systems with land use future requirements. Public and private responsibilities. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Unconditional standing required.

**URP 637 Environmental Policy for Planning (4)**

Theories, ethics and methods of environmental planning in an intergovernmental context. Analysis of environmental equity in facility siting and urban design. Review of environmental elements for general plans, risk analysis, and habitat conservation planning. 4 lecture discussions. Prerequisite: URP 512/512A. Unconditional standing required.

**URP 638/638L Land Use Planning and Design (3/1)**

Methods of analyzing how people use and perceive public space. Principles of land-use organization and design. Translating design concepts to guidelines and policy. Concurrent enrollment required. 3 seminars, 1 three-hour laboratory. Prerequisite: URP 501/501L. Unconditional standing required.

**URP 641/641L Graduate Planning Studio I (2/2)**

Theory, process, design and method for strategic planning demonstrated by studio problems based on field studies. Synthesis of graduate planning coursework reviewed through practical application. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: URP 522/522L. Unconditional standing required.

**URP 642/642L Graduate Planning Studio II (2/2)**

Continuation and completion of the plan formulation begun in URP 641/641L. Must be taken immediately following URP 641/641L. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Unconditional standing required.

**URP 651 Social and Political Planning Policy (4)**

Survey of contemporary urban conditions from a social policy perspective. Basic principles and practices of contemporary social policy planning. Methods by which urban social trends are analyzed, social indicators developed and applied to program development and analysis. Established social, economic and political institutional considerations, centralized and decentralized social policy-decision models. 4 lecture discussions. Prerequisite: URP 512/512A. Unconditional standing required.

**URP 652 Planning Administration and Professional Practice (4)**

Administration of planning agencies; development and administration of planning and community development programs; the place of planning in local government organization and structure; function of the professional planner in public and private practice; professional ethics and responsibilities. 4 lecture discussions. Prerequisites: URP 512/512A. Unconditional standing required.

**URP 691 Directed Study (1-2)**

Independent investigation of an urban and regional planning topic selected by the student preparatory to enrollment in project or thesis and conducted under the direction of a graduate faculty member. May not be taken for credit/no credit. May be repeated for a maximum of 4 units. Unconditional standing required.

**URP 692 Independent Study with Comprehensive Examination (4)(2)**

A two-part terminal requirement. The first part includes study, research, and readings (not leading to a thesis or project) proposed by the student with consultation and approval and supervision of the Graduate Coordinator and graduate faculty members. The second part contains the written portion and examination conducted by the committee of faculty members. Advancement to Candidacy required.

**URP 695 Master's Degree Project (3) FWSp**

Development of a terminal research and/or design project on a topic selected by the student, approved by the graduate studies committee and conducted under the direction of a Project Committee chosen by the student. The Project Committee will consist of three graduate faculty members or, with the permission of the Project Committee Chair, two graduate faculty members and a third outside member who has recognized expertise in the subject topic. The examination may be taken no more than two times. Failure to complete it satisfactorily the second time will result in termination from the program. 6 units required. Advancement to Candidacy required.

**URP 696 Master's Degree Thesis (3) FWSp**

Development of a terminal research report on a topic selected by the student, approved by the graduate studies committee and conducted under the direction of a Thesis Committee chosen by the student. The Thesis Committee will consist of three graduate faculty or, with the permission of the Thesis Committee Chair, two graduate faculty and a third outside member who has recognized expertise in the thesis topic. 6 units required. Advancement to Candidacy required.

**URP 699 Master's Degree Continuation (0) FWSp**

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade "SP" until the completion of thesis or project. The candidate must be enrolled in the university during the quarter in which she/he graduates. Advancement to Candidacy required.









## SCHOOL OF EDUCATION AND INTEGRATIVE STUDIES (SEIS)

Richard A. Navarro, Dean

Karen Z. Anijar  
Aubrey Fine  
Toni C. Humber

Richard Jacobs  
Doreen Nelson

Faculty from the five academic units within SEIS as well as from across the university community will join those listed above in common teaching modules.

The School of Education and Integrative Studies (SEIS) is comprised of the departments of Ethnic and Women's Studies, Liberal Studies, Teacher Education, Graduate and Professional Studies as well as the Interdisciplinary General Education program. Departments pursue their goals independently and through joint development of pivotal, shared intellectual and social educational principles. Faculty and students in all programs participate in team-taught, interdisciplinary teaching modules. There is a common commitment to inquiry-based, interactive instructional strategies and interdisciplinary curriculum.

The school's objective is for faculty and students in SEIS to form a holistic and coherent learning community that will begin at the baccalaureate and continue through the professional and master's degree. The mission of the School of Education and Integrative Studies is to educate responsible citizens to take leadership in creating a free and just society, and to act with authenticity and social conscience in an atmosphere of candor and trust.

In pursuit of this educational goal, the School emphasizes excellence, equality, and ethics at all levels in public and private domains, through a broad multicultural and multidisciplinary approach. In its commitment to these principles, SEIS chooses to embrace the ethical dimensions of human inquiry, behavior and interaction in all its educational endeavors. Pluralism and diversity are at the core of its educational philosophy, encouraging a genuine respect for individual and cultural diversity, and an understanding of the forces that impact humans in their local, regional, national and world communities. Consequently, while subscribing to the traditional mission of educational institutions to transmit knowledge, SEIS pledges that this knowledge will not reinforce or maintain unequal or unjust privilege.

SEIS believes that the creative transformation of knowledge is integral to learning. Knowledge, to remain vital, must be discovered by the learner, contemplated, interpreted, discussed, applied and acted upon, for the collective well-being of humans. SEIS pledges to foster knowledge that is broad, inquiry-based, interactive and diverse in form and substance.

### Interdisciplinary General Education (IGE) Program

James Manley, Director  
Richard Johnson, Associate Director  
Nancy Ware, Associate Director

The Interdisciplinary General Education Program within the School of Education and Integrative Studies addresses the need for an integrated approach to curriculum, teaching, and scholarship and the creation of an extended learning community. The program consists of a 32 unit team-taught, thematically integrated sequence of General Education courses.

### Departments with Master's Programs, Certificates, and Credentials

#### GRADUATE AND PROFESSIONAL STUDIES

Jane S. McGraw, Chair  
Shahnaz Lotfipour, Coordinator, Educational Technology

#### Master of Arts in Education, Options:

- Bilingual/Cross-Cultural Education
- Curriculum and Instruction—Elementary; Secondary; Design and Creativity
- Educational Multimedia
- Language and Literacy
- Special Education—Mild/Moderate, Moderate/Severe

#### TEACHER EDUCATION DEPARTMENT

Dorothy J. Rubenstein, Chair  
Susan Mortorff Robb, Coordinator, Special Education and Field Experiences  
Gloria Guzman Johannessen, Coordinator, BCLAD Program

#### Credential and Certificate Programs

Multiple Subjects:

Multiple Subjects with a Crosscultural, Language, and Academic Development (CLAD) Emphasis

Multiple Subjects with a Bilingual (Spanish) Crosscultural, Language, and Academic Development (BCLAD) Emphasis

Single Subject:

Agricultural Education  
Art  
Business Education  
English  
Home Economics  
Mathematics  
Music  
Physical Education  
Science  
Social Science

Single Subject with a Crosscultural, Language and Academic Development (CLAD) Emphasis

Single Subject with a Bilingual (Spanish) Crosscultural, Language and Academic Development (BCLAD) Emphasis

Special Education – Mild/Moderate (MM)

Special Education – Moderate/Severe (MS)

Agricultural Specialist

Adapted Physical Education Specialist

Resource Specialist Certificate

CLAD Certificate

Designated Subjects Adult Education

#### Internship Programs:

Multiple Subject with a Cross-cultural, Language and Academic Development (CLAD) Emphasis

Multiple Subject with a Bilingual (Spanish) Cross-cultural, Language and Academic Development (BCLAD) Emphasis

Single Subject (Mathematics and Science) with a Cross-cultural, Language and Academic Development (CLAD) Emphasis

Single Subject (Mathematics and Science) with a Bilingual (Spanish) Cross-cultural, Language and Academic Development (BCLAD) Emphasis

Special Education - Mild/Moderate (MM)

Special Education - Moderate/Severe (MS)

### Departments with Majors and Minors

#### ETHNIC AND WOMEN'S STUDIES

Gilbert R. Cadena, Chair

Gender, Ethnicity, and Multicultural Studies major (BA): GEMS option with concentrations in African American Studies, American Indian Studies, Asian American Studies, Chicano/Latino Studies, or Women's Studies; pre-credential option for entry into Multiple Subjects of CLAD credential programs (pending CCTC approval).

Minors in African American Studies, American Indian Studies, Asian American Studies, Chicano/Latino Studies, Women's Studies.

### LIBERAL STUDIES

Joseph Block, Chair

Liberal Studies major (BA), Options: Pre-Credential , leading to entry into Multiple Subjects and CLAD Emphasis or Special Education Credential programs; Bilingual, Cross-cultural, Chicano Pre-Credential, leading to entry into Multiple Subjects, Multiple Subjects/CLAD, Multiple Subjects/BCLAD or Special Education programs; or into Liberal Studies (does not lead to a credential program).

### COURSE DESCRIPTIONS

#### School of Education and Integrative Studies Courses

##### EIS 470, 471, 472, 473 Cooperative Education (1-4, 1-4, 1-4, 1-4)

On-the-job experience for all majors in the School of Education and Integrative Studies. Students may alternate one or more quarters of full-time studies in their major with an equal number of quarters of relevant full-time work for pay. Prerequisite: consent of instructor and junior standing. Courses must be taken in ascending sequence.

## ETHNIC AND WOMEN'S STUDIES DEPARTMENT

Gilbert R. Cadena, Chair

Parvin M. Abyaneh	Patricia Lin
Gene I. Awakuni	Hai-ming Liu
John D. Bacheller	Richard Santillan
Patricia de Freitas	Leanne Sowande
John Hatfield	

The Ethnic and Women's Studies Department offers a program of courses on the history, culture and contemporary issues of ethnic groups and of the study of gender roles in human societies. The program is designed as an educational forum in which students and faculty explore the parallels of ethnic and gender stratification.

The purpose of Ethnic and Women's Studies is to provide students with the skills, intellectual habits, critical attitudes, and broad perspectives necessary to function in, and contribute to, a changing world. In addition, students need the ability to make sound ethnical judgments and to gain a sensitivity to the aesthetic and humanistic dimensions of the changing world.

Beginning Fall 1998, EWS will offer a major in Gender, Ethnicity, and Multicultural Studies with two options. The first option will allow for concentrations in African American Studies, Asian American Studies, Chicano/Latino Studies, Native American Studies, or Women's Studies. The second is a pre-credential option preparing students for Multiple Subjects or CLAD credential programs. The department offers minors in African American Studies, Native American Studies, Asian American Studies, Chicano/Latino Studies, and Women's Studies.

Courses are open to all students in the university. Enrollment is encouraged for those who are seriously concerned about the quality of life in 20th-century America, and wish to do something about it. Fields in which such concerns can find direct application are teaching, urban planning, social services, politics, recreation, law, the ministry, and others that have a direct bearing on particular ethnic groups.

### CORE COURSES IN MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Introduction to Ethnic Studies	EWS	140	(4)
Men and Women in Society	EWS	145	(4)

Select 2 of the following:

African American Experience	EWS	201	(4)
Chicano/Latino Experience	EWS	202	(4)
Native American Experience	EWS	203	(4)
Asian American Experience	EWS	204	(4)

Ethnic Women	EWS	390	(4)
Gender, Ethnicity, and Class	EWS	420	(4)

### GEMS OPTION COURSES

Social Science Methods	SSC	333	(3/1)
of Field Research Methods	SOC	434	

Select 2 of the following:

Ethnicity, Folklore, and Arts	EWS	410	(4)
Community Development	EW	475	(4)
Ethnic Thought and Values	EWS	430	(4)
Ethnic Thought and Values	EWS	431	(4)

Select 4 of the following:

U.S. Women in Contemporary GlobalContext	EWS	380	(4)
African American Contemporary Issues	EWS	401	(4)
Chicano/Latino Contemporary Issues	EWS	402	(4)
Native American Contemporary Issues	EWS	403	(4)
Asian American Contemporary Issues	EWS	404	(4)

### Areas of Concentration (Select one area- 24 units)

(Courses chosen in consultation with advisor)

African American Studies  
Asian American Studies  
Chicano/Latino Studies  
Native American Studies  
Women's Studies

### Support Courses (24 units)

### General Education (select courses from approved list) (72 units)

### Unrestricted Electives (14 units)

### PRE-CREDENTIAL OPTION COURSES

(Pending approval from Commission of Teacher Credentialing)

Language Acquisition	ENG	323	(4)
Structure of Language	ENG	320	(4)
or Concepts of Liberal Studies	LS	301	(4)
History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
Developmental Movement	KIN	328	(4)
Elementary Geometry	MAT	392	(4)
Foreign Language			(12)

### Support Courses

Art and the Child	ART	405	(4)
Child Psychology: The Middle Years	PSY	311	(4)
Introduction to Schooling	TED	301	(4)
Cultures of Childhood	EWS	360	(4)
Ethnicity, Folklore, and Arts	EWS	410	(4)
Liberal Studies: Evaluation and Synthesis I	LS	404	(2)
Liberal Studies: Evaluation and Synthesis II	LS	405	(2)

### Area of Concentration (consult with advisor) (18units)

### General Education (select from approved list) (72 units)

### Unrestricted Electives (4-5 units)

### AFRICAN AMERICAN STUDIES MINOR

Introduction to Ethnic Studies	EWS	140	(4)
African American Experience	EWS	201	(4)
Ethnic Women	EWS	390	(4)
African American Contemporary Issues	EWS	401	(4)
Gender, Ethnicity, and Class	EWS	420	(4)
16 elective units must be chosen in consultation with advisor.			(16)
Total units required for the minor.			(36)

### NATIVE AMERICAN STUDIES MINOR

Introduction to Ethnic Studies	EWS	140	(4)
Native American Experience	EWS	203	(4)
Ethnic Women	EWS	390	(4)
Native American Contemporary Issues	EWS	403	(4)
Gender, Ethnicity, and Class	EWS	420	(4)
16 elective units must be chosen in consultation with advisor.			(16)
Total units required for the minor.			(36)



**ASIAN AMERICAN STUDIES MINOR**

Introduction to Ethnic Studies	EWS	140	(4)
Asian American Experience	EWS	204	(4)
Ethnic Women	EWS	390	(4)
Asian American Contemporary Issues	EWS	404	(4)
Gender, Ethnicity, and Class	EWS	420	(4)
16 elective units must be chosen in consultation with advisor.			(16)
Total units required for the minor.			(36)

**CHICANO/LATINO STUDIES MINOR**

Introduction to Ethnic Studies	EWS	140	(4)
Chicano/Latino Experience	EWS	202	(4)
Ethnic Women	EWS	390	(4)
Chicano/Latino Contemporary Issues	EWS	402	(4)
Gender, Ethnicity, and Class	EWS	420	(4)
16 elective units must be chosen in consultation with advisor.			(16)
Total units required for the minor.			(36)

**WOMEN'S STUDIES MINOR**

Introduction to the Study of Women and Men in Society	EWS	145	(4)
U.S. Women in Contemporary Global Context	EWS	380	(4)
Ethnic Women	EWS	390	(4)
Gender, Ethnicity, and Class	EWS	420	(4)
Female and Ethnic Development	EWS	440	(4)
16 elective units must be chosen in consultation with advisor.			(16)
Total units required for the minor.			(36)

**COURSE DESCRIPTIONS****EWS 101 The University (4)**

Course helps students understand systems of governance and unique culture of the university. Students introduced to values associated with academic and scientific exploration. Emphasis on development of critical thinking and communication skills. 4 lecture discussions.

**EWS 140 Introduction to Ethnic Studies (4)**

Survey of ethnic American experience. Introduction to fundamental theories of race relations and social processes producing social and gender stratification. Introduction to concepts and terms such as racism, sexism, ethnocentrism, etc. The course includes a survey of the four major ethnic groups in America. 4 lecture discussions.

**EWS 145 Introduction to the Study of Women and Men in Society (4)**

Introduction to fundamental principles explaining reasons for the widely different roles women and men play in societies throughout the world. Includes introduction to concepts and terms such as sexism, sex vs. gender, and female/male roles in society. 4 lecture discussions.

**EWS 200 Special Problems for Lower Division Students (2)**

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**EWS 201 African American Experience (4)**

Survey of problems, methods, theories, and materials about African Americans; emphasis on historical factors and forces constituting the experience in the United States. 4 lecture discussions.

**EWS 202 Chicano/Latino Experience (4)**

Survey of various aspects of Chicano/Latino experiences and the formation of ideological perspectives; effects of the family, peer groups, social class, education and racism on identity development. 4 lecture discussions.

**EWS 203 Native American Experience (4)**

Survey of Native American heritage in the United States; emphasis on historical, political, educational, economic and social roles. 4 lecture discussions.

**EWS 204 Asian American Experience (4)**

Focus on historic and contemporary presence of persons of Asian descent in the U.S. Includes the study of the impact of legislation, public opinion, and American foreign policy in Asia on the lives of Asians in America. 4 lecture discussions.

**EWS 210 Interactive Dynamics of Ethnicity and Gender (4)**

Survey of multicultural readings by and about Native Americans, African Americans, Chicano/Latinos, Asian Americans, Women, Lesbians and Gays. The readings serve as the basis for analysis into the discursive practices of diverse communities. 4 lectures/problem-solving.

**EWS 270 Gender, Ethnicity and Film(4)**

A study of the representation of gender, race and ethnicity in film and television. Focus on both mainstream and self-representation of ethnic and female filmmakers. Examination of techniques, messages, and ideologies in constituting, subverting and reinventing social identities.

**EWS 280 Community Fieldwork and Tutorials (3)**

One-to-one tutorial work and interpersonal growth with elementary and secondary students in conjunction with the Mexican-American Student Association. Academic studies through innovative, experimental activities and social relationships in community agencies. May be repeated for a total of 6 units.

**EWS 290 Multicultural Leadership (4)**

Prepare students to be effective leaders in a multicultural world. Application of theory and practice through simulation activities, campus projects, case studies, and dialogue. Topics include multicultural leadership styles, cross cultural communication, values and ethics, group development, and decision making. Lecture and discussion.

**EWS 299/299A/299L Special Topics for Lower Division Students (4)**

Group study of a selected topic, to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, activity, laboratory, or a combination. Corequisites may be required. Prerequisite: permission of instructor.

**EWS 301 Ethnic Identity (4)**

Biological, psycho-social and cultural aspects of ethnic identity formation. Influences of family patterns, roles of educational system, peer group involvement, socio-economic status, racism, sexism, and discrimination. 4 lecture discussions. May be repeated for credit when different ethnic group offered.

**EWS 304 Asian American Communities: Comparative Analysis (4)**

An in-depth examination and comparative analysis of Asian American communities. Emphasis on intensive writing and oral presentation exercises for better understanding of the problems and issues confronting Asian American communities. 4 lectures/problem-solving. Prerequisite: EWS 204 or permission of instructor.

**EWS 330 Ethnicity and Family Life (4)**

Seminar in the unique social and cultural aspects of marriage and family styles from the perspective of American ethnic groups. 2 two-hour seminars. Prerequisite: EWS 140, SOC 321 or permission of the instructor. May be repeated for credit only when ethnic group differs.

**EWS 350 Ethnic Immigration (4)**

Historical analysis of socio-economic and political factors which have determined and continue to form the basis for development of U.S. immigration policies and practices toward ethnic minorities. 4 lecture discussions. May be repeated for credit when different ethnic group offered.

**EWS 360 Cultures of Childhood (4)**

The course identifies how different cultures conceptualize childhood, and correspondingly, construct the cultural artifacts and practices for children. 4 lectures/problem-solving. Prerequisite: LS 201, or EWS 140 or EWS 145.

**EWS 370 Women and Law (4)**

Analysis of the legal status and rights of women in the United States. Focus will be on employment law, marriage and family law, sexual assault, and domestic violence, and Civil Rights law. Principles such as privacy, equal protection, and legal regulation of women's sexuality will be examined in a cross-cultural perspective. 4 lectures/problem-solving. Prerequisite: EWS 145 or permission of instructor.

**EWS 380 U.S. Women in Contemporary Global Context (4)**

Examination of how individual ethnic and national cultures, economics, religion, and public policies generate issues that are particularly important to women. Seminar format; may be repeated as issues and topics vary. 2 two-hour seminars. Prerequisite: EWS 145 or permission of instructor.

**EWS 390 Ethnic Women (4)**

Issues concerning women in four ethnic communities: African American, Asian Pacific American, Native American, and Chicana/Latino. Examination of roles and status within community context. Particular attention is paid to the intersection of ethnicity and gender in each community. 4 lecture discussions. Prerequisite: EWS 140 or EWS 145 or permission of instructor.

**EWS 400 Special Problems for Upper Division Students (2)**

Individual or group investigation, research studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

**EWS 401 African American Contemporary Issues (4)**

Impact of African American movement on cultural continuity and social/political issues at local, state and national levels. The course will analyze the effects of educational, economic and political institutions of African American culture. 2 two-hour seminars. Prerequisite: EWS 140 or EWS 201 or permission of instructor.

**EWS 402 Chicano/Latino Contemporary Issues (4)**

The examination of effects of educational, economic and political institutions on Chicano/Latino culture in the U.S. Emphasis on legislation, employment, health and education, and public policy and its impact on Chicanos/Latino. 2 two-hour seminars. Prerequisite: EWS 140 or EWS 202 or permission of instructor.

**EWS 403 Native American Contemporary Issues (4)**

Seminar in the contemporary issues confronted by Native Americans; employment, education, problems of relocation, water land rights and Bureau of Indian Affairs. 2 two-hour seminars. Prerequisite: EWS 203, EWS 140, or permission of instructor.

**EWS 404 Asian American Contemporary Issues (4)**

A critical analysis of contemporary issues confronted by Asian Americans in the U.S. Emphasis will be placed on immigration, employment, health, family and cultural issues. 2 two-hour seminars. Prerequisite: EWS 140 or EWS 204 or permission of instructor.

**EWS 407 Sexual Orientation and Diversity (4)**

This course examines the contemporary lesbian, gay, and bisexual movement in the United States. Topics include the social and biological basis of sexual orientation; the cultural sources of homophobia and heterosexism; the challenges of coming out and passing; and family, spiritual, and employment issues affecting gays, lesbians, and bisexuals. 2 two-hour seminars.

**EWS 410 Ethnicity, Folklore and the Arts (4)**

Folklore, art, music of ethnic groups; their meaning and value. Images of ethnic identity, artistic expression in contemporary use. 2 two-hour seminars. Prerequisite: junior standing or permission of instructor.

**EWS 420 Gender, Ethnicity, and Class (4)**

Emphasis on the parallel strategies such as ranking, boundary maintenance, work ghettoization, sexual stereotypes, etc. that societies use to create racial and gender inequalities. 4 lecture discussions. Prerequisites: EWS 140, EWS 145 or permission of instructor.

**EWS 430 Ethnic Thought and Values (4)**

Exploration of religious and ethical systems of the four major ethnic groups in America. Comparative approach is used to identify similarities and differences in values and life choices among the four ethnic groups and mainstream American society. 4 lecture discussions.

**EWS 431 Ethnicity, Gender, and Religion (4)**

Exploration of religious and ethical systems of a selected ethnic group in America. Historical and comparative approaches used to examine inter- and intra-group similarities and differences in values and life choices. 2 two-hour seminars. Prerequisite: EWS 140 or EWS 145 or permission of instructor.

**EWS 440 Female and Ethnic Development (4)**

Examination of traditional theories and their explanation for gender inequality. Focus on alternative critiques by contemporary feminist and ethnic scholars regarding female roles and relationships. 2 two-hour seminars. Prerequisite: EWS 145 or permission of instructor.

**EWS 475 Community Development (2-4)**

Key concepts and variables in analysis of the dynamics of community power structures and ethnic community development. Prerequisite: EWS 140 or permission of instructor. 2 to 4 one-hour seminars.

**EWS 499 Special Topics for Upper Division Students (4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, activity, laboratory, or a combination. Corequisites may be required. Prerequisite: EWS 140 or EWS 145 or permission of instructor.

## INTERDISCIPLINARY GENERAL EDUCATION (IGE)

James Manley, Director  
Richard Johnson, Associate Director  
Nancy Ware, Associate Director

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

### FIRST YEAR (F,W,Sp)

#### IGE 120 Consciousness and Community (4)

First knowings, origin of consciousness, myth, symbol, performance, and ceremony; prehistory and patterns of living, making of meaning; university experience. 4 lecture discussions. Prerequisite: EPT score of 147 or better. Activity fee may be required.

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

The nature of tragedy; the ways of warriors, prophets, tyrants, philosophers, and citizens; ethics, convictions, and the sacred. 4 lecture discussions. Prerequisite: IGE 120. Activity fee may be required.

#### IGE 122 Authority and Faith: The Medieval and Renaissance Worlds (4)

Visions of hell, politics, social order, and redemption; constructions of the sacred and secular selves; journey of the soul; private lives and public spaces. 4 lecture discussions. Prerequisite: IGE 121. Activity fee may be required.

### SECOND YEAR (F,W,Sp)

#### IGE 220 Ways of Knowing: Culture and Contact (4)

Explorations of the multiple ways of constructing knowledge (science, art, the sacred as ways of knowing); knowledge as historically grounded in the era of the New World colonial conquest (national artistic cultures, scientific revolution, indigenous sacred articulations of space and time, perceptions of Self and Other). 4 lecture discussions. Prerequisite: IGE 122. Activity fee may be required.

#### IGE 221 Ways of Coexisting: Reform and Revolution (4)

Explorations of urban and global issues (social space; domination, resistance, and revolution; traditional/transitional cultures). Inquiries are historically grounded in the Enlightenment era (rise of individual rights, spirit of revolution, restructuring social, conceptual, and scientific structures). 4 lecture discussions. Prerequisite: IGE 220. Activity fee may be required.

#### IGE 222 Ways of Doing: The Industrial Age (4)

Explorations of technology and human purpose; science and scientists; divergent thinking, gender, genius, and anomalies; emergent ethical frameworks; inquiries are historically grounded in the Industrial Age; individual and collective ideologies; romanticism and realism. 4 lecture discussions. Prerequisite: IGE 221. Activity fee may be required.

### THIRD YEAR (F,W)

#### IGE 223 Ways of Living: The Contemporary World (4)

Explorations of environmental epistemology, ethics, aesthetics, and biographies; communities and cultures which offer life-enhancing practices; environmental education and responsibility; inquiries are historically grounded in the modern and postmodern worlds; global thinking and doing. 4 lecture discussions. Prerequisite: IGE 222. Activity fee may be required.

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

Research and presentation of an interdisciplinary project which extends and synthesizes themes from the IGE experience. 4 lecture discussions. Prerequisite: IGE 223 (W)

## LIBERAL STUDIES

Joseph Block, Chair

The major in Liberal Studies offers a diversified curriculum for those who are attracted to an interdisciplinary program of study. The purposes of Liberal Studies are twofold: (1) to prepare students for graduate work in such fields as law and ministry; or for work in business, human services, government, and public relations; or to pursue intellectual fulfillment for its own sake; and (2) to provide the undergraduate preparation for students to teach in the public schools of California. Liberal Studies is approved by the Commission on Teacher Credentialing as a baccalaureate waiver program for entry into a multiple subject or special education program. This credential licenses a person to teach in a self-contained classroom, primarily in elementary schools.

Three options are available. The first is a flexible program of study which assures a breadth of education and provides opportunity for concentration in an area of one's choice. The second is the recommended baccalaureate curriculum preparation for the teaching credential program (monolingual). The third is the baccalaureate curriculum preparation for teaching with a bilingual, cross-cultural Chicano focus.

Admission to the Teacher Education Program is by separate application, usually in the senior year. Students choosing a career in education should consult with Teacher Education for entrance requirements for the credential program. Students are also advised that the California Basic Education Skills Test (CBEST) should be taken in their junior year to appropriately address possible deficiencies prior to graduation or application to the Teacher Education program. Students taking the Bilingual/Cross-cultural option should consult with the department chair to ensure that they have the proper coursework and experience to meet the credentialing requirements in this area.

Effective with Academic (or Curriculum) Year 1992-93, students who plan to seek a multiple-subject teaching credential must have their subject-matter competency assessed by the Liberal Studies Department in order to be recommended for entry into the Teacher Education program. See department for specific information on how to complete the assessment process. Note that as part of this process students must have a grade of C or better in each upper division class.

The curriculum includes ten discipline areas: language studies, literature, mathematics, science, social science, history, humanities, the arts, physical education, and human development. By taking the courses listed, the student will satisfy all General Education requirements. Elective courses may be used to satisfy all or part of the requirements for a minor in another subject, a "double" or additional major or a diversified series of courses tailored to the student's own interests, and the professional program in teacher training but only if the student is applying to the Teacher Education program.

All students are assigned an advisor according to the first initial of their last name. Please see department for the list of advisors.

Students will meet with their advisors to obtain class scheduling materials. Advisors are available during the quarter to assist in scheduling relevant courses; to resolve problems of credit for courses completed at another college or university; to clarify procedures which might facilitate progress toward the degree; to determine which forms students must file with the university prior to taking special actions; and to help with other problems, major or minor, which might affect the student's academic life.

## CORE COURSES FOR MAJOR

(Required of all students) A 2.0 cumulative GPA is required in core courses, including option courses, in order to receive a degree in the major.

Art Skills Elective	.ART	(3)
Introduction to Liberal Studies	.LS	201 (4)
Concepts in Liberal Studies	.LS	301 (4)
Liberal Studies Seminar	.LS	401 (4)

## OPTION COURSES FOR MAJOR

(Required in specific options)

### Liberal Studies

The Visual Arts	.ART	110	(4)
or Introduction to the Theatre	.DR	203	
or Music Appreciation	.MU	101	
English Language or Literature (U.D.)	.ENG	(12)	
Foreign Language			(12)
History of Civilization	.HST	101	(4)
History of Civilization	.HST	102	(4)
History of Civilization	.HST	103	(4)
Elective in Math or Science (U.D.)			(4)
Elective in Math or Science (L.D.)			(4)
Electives in Social Science			(8)
Pre-Credential Language Acquisition	.ENG	323	(4)
Elem Geometry I	.MAT	392	(4)
Elem Geometry II	.MAT	491	(4)
Foreign Language			(12)
History of Civilization	.HST	101	(4)
History of Civilization	.HST	102	(4)
History of Civilization	.HST	103	(4)
Developmental Movement for Children	.KIN	328/328A	(3)
Sociology of Minority Communities	.SOC	323	(4)
* or Contemporary American Scene	.SSC	401	
* or Ethnic Thought and Values	.EWS	430	
or Social Anthropology	.ANT	358	

\* Does not count toward CLAD

### Bilingual/Cross-cultural, Chicano—Pre-Credential

Language Acquisition	.ENG	323	(4)
Elementary Geometry I	.MAT	392	(4)
Elementary Geometry II	.MAT	491	(4)
Spanish Language or Civilization	.FL		(8)
Art of Mexico, Central America, & S. America	.ART	314	(4)
or World of Music	.MU	103	
or Music of Mexico	.MU	311	
Developmental Movement for Children	.KIN	328/328A	(3)
Chicano/Latino Experience	.EWS	202	(4)
Mexico	.HST	362	(4)
or Latin America	.HST	336	
or Latin America	.HST	337	
American Ethnic Politics	.PLS	323	(4)
or Cultural Areas of the World (Meso America)	.ANT	399	

## SUPPORT AND ELECTIVE COURSES

(Required only in pre-credential options)

Cultural Geography	.GEO	102	(4)
Introduction to Schooling	.TED	301	(4)
Child Psychology: Middle Years	.PSY	311	(4)
Music Skills for Teachers	.MU	401	(2)
Music Literature for Children	.MU	402	(2)



Children's Literature	ENG	324	(4)
Art and the Child	ART	405	(4)
Liberal Studies: Evaluation and Synthesis I	LS	404	(2)
Liberal Studies: Evaluation and Synthesis II	LS	405	(2)
Select one approved concentration			(16)

**GENERAL EDUCATION COURSES**

(Required in specific options)

**Liberal Studies Option****Area 1:**

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

**Area 2:**

Must include at least one laboratory class.

Select from approved list (16)

**Area 3:**

A. Arts Elective			(4)
B. Introduction to Philosophy	PHL	201	(4)
or Religions of the World	PHL	220	(4)
or Introduction to Religious Studies	PHL	221	
C. Choose one literature course from the following:			
ENG 201 or 202, 203, 204, 205, 206 207,			
208, 211, 212, 217, 218.			(4)
D. Principles of Economics	EC	202	(4)
or Principles of Economics	EC	201	
E. Cultural Anthropology	ANT	102	(4)
or Principles of Sociology	SOC	201	
F. See Advisor.			(4)
G. General Psychology	PSY	201	(4)
or Human Nature/Human Affairs	ANT	201	

**Area 4:**

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

**Area 5:**

See Advisor (8)

**Pre-Credential Option****Area 1:**

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

**Area 2:**

A. Survey of Math	MAT	191	(4)
B. Physics Concepts and Activities	SCI	210/210L	(4)
Chemical Sciences	SCI	211/211L	(4)
Geological Sciences	SCI	212/212L	(4)
C. Life Science	BIO	110	(3)
D. Elementary Math	MAT	391	(4)

**Area 3:**

A. The Visual Arts	ART	110	(4)
or Introduction to Theatre	TH	203	
or World of Music	MU	103	
B. Introduction to Philosophy	PHL	201	(4)
or Religions of the World	PHL	220	(4)
or Introduction to Religious Studies	PHL	221	
C. Choose a literature course from the following:			

English 201 or 202, 203, 204, 205, 206, 207, 208,			
211, 212, 217, or 218			(4)
D. Principles of Economics	EC	202	(4)
or Principles of Economics	EC	201	
E. Cultural Anthropology	ANT	102	(4)
or Principles of Sociology	SOC	201	
F. California	HST	370	(4)
G. General Psychology	PSY	201	(4)
or Human Nature/Human Affairs	ANT	201	

**Area 4:**

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

**Area 5:**

Select two:

Geography of California	GEO	351	(4)
American State and Local Politics	PLS	328	(4)
Indians of California	ANT	320	(4)

**Bilingual/Cross-cultural, Chicano— Pre-Credential Option****Area 1:**

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

**Area 2:**

A. Survey of Math	MAT	191	(4)
B. Physics Concepts and Activities	SCI	210/210L	(4)
Chemical Sciences	SCI	211/211L	(4)
Geological Sciences	SCI	212/212L	(4)
C. Life Science	BIO	110	(3)
D. Elementary Math	MAT	391	(4)

**Area 3:**

A. The Visual Arts	ART	110	(4)
or Introduction to Theatre	TH	203	
or World of Music	MU	103	
B. Introduction to Philosophy	PHL	201	(4)
or Religions of the World	PHL	220	(4)
or Introduction to Religious Studies	PHL	221	
C. Any Spanish Language or Civilization course	FL		(4)
D. Principles of Economics	EC	202	(4)
or Principles of Economics	EC	201	
E. Cultural Anthropology	ANT	102	(4)
or Principles of Sociology	SOC	201	
F. California	HST	370	(4)
G. General Psychology	PSY	201	(4)
or Human Nature/Human Affairs	ANT	201	

**Area 4:**

Introduction to American Government	PLS	201	(4)
United States History	HST	202	(4)

**Area 5:**

Select two:

Geography of California	GEO	351	(4)
American State and Local Politics	PLS	328	(4)
Indians of California	ANT	320	(4)

Beginning in 1992-93, pre-credential students are subject to changes in the waiver program. Please see department for information.

**COURSE DESCRIPTIONS**

Note: Courses offered in Liberal Studies may be taken Credit/No Credit (CR/NC).

**LS 200 Special Problems for Lower Division Students (1-2)**

Individual or group investigation of selected problems. Total credits limited to 4 units, with a maximum of 2 units per quarter.

**LS 201 Introduction to Liberal Studies (4)**

Introduction to the key concepts and approaches which unite the humanities and social sciences and introduction to the organizing concepts in mathematics and the sciences. 4 lecture discussions.

**LS 299/299A/299L Special Topics for Lower Division Students (4)**

Group study of a selected topic, to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, activity, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

**LS 301 Concepts in Liberal Studies (4)**

Application of interdisciplinary methodologies to the concepts and values traditional to the liberal arts. 4 lectures/problem-solving. Prerequisite: LS 201, ENG 104, and ENG 105 or equivalent.

**LS 400 Special Problems for Upper Division Students (1-2)**

Individual or group investigation of selected problems. Total credits limited to 4 units, with a maximum of 2 units per quarter.

**LS 401 Liberal Studies Seminar (4)**

Analyses of enduring themes and issues in the humanities and social sciences. Frequent written and oral presentations. Prerequisites: LS 201, ENG 104 and ENG 105 or equivalent, upper division standing. 4 seminars. Some sections may require a fee.

**LS 404 Liberal Studies: Evaluation and Synthesis I (2)**

Assessment of Pre-Credential students' general academic competence and specific subject-matter competence in language studies, literature, mathematics, science, the arts, humanities, history, social science, human development and physical education. 1-2 lectures/counseling. Prerequisite: upper division standing or consent of instructor.

**LS 405 Liberal Studies: Evaluation and Synthesis II (2)**

Conclusion of assessment process begun in LS 404 for Pre-Credential students, including capstone essay analyzing and synthesizing upper-division elective concentration. 2 lectures/counseling. Prerequisite: LS 404.

**LS 499/499A/499L Special Topics for Upper Division Students (4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, activity, laboratory, or a combination. Corequisites may be required.

## TEACHER EDUCATION

Dorothy J. Rubenstein, Chair

Sue Robb, Coordinator, Special Education and Field Experiences

Frederick J. Baker

Barbara Bromley

Gary M. Garfield

Gloria Guzman Johannessen, BCLAD Coordinator

Dennis Jacobsen

David Jelinek

Dorothy MacNevin

Mario Ruiz

### PARTICIPATING FACULTY

Judith Anderson, Social Science (History Department)

Bruce Coulter, Physical Education (KHP Department)

Greg Chamblee, Mathematics

Barbara Ford, Physical Education (KHP Department)

Charles Frederick, Art

Flint Freeman, Agriculture

Judith Jacobs, Mathematics (CEEMaST)

Iris Levine, Music

John Maitino, English

Pamela McKenney, Business

Lilian Metlitzky, Mathematics

Don Morris, Physical Education (KHP Department)

Jack Price, Mathematics (CEEMaST)

Carol Smith, Mathematics

Perky Stromer, Physical Education (KHP Department)

Ruby Trow, Home Economics (Nutrition/Consumer Science Dept.)

Ed Walton, Science (Chemistry Department)

Cylette Willis, Biology (CEEMaST)

### CREDENTIAL AND CERTIFICATE PROGRAMS

Multiple Subjects:

Multiple Subjects with a Crosscultural, Language, and Academic Development (CLAD) Emphasis

Multiple Subjects with a Bilingual (Spanish) Crosscultural, Language, and Academic Development (BCLAD) Emphasis

Single Subject:

Agricultural Education

Art

Business Education

English

Home Economics

Mathematics

Music

Physical Education

Science: Biology, Chemistry, Earth Science, Physics

Social Science

Single Subject with a Crosscultural, Language and Academic Development (CLAD) Emphasis

Single Subject with a Bilingual (Spanish) Crosscultural, Language and Academic Development (BCLAD) Emphasis

Special Education – Mild/Moderate (MM)

Special Education – Moderate/Severe (MS)

Agricultural Specialist

Adapted Physical Education Specialist

Resource Specialist Certificate

CLAD Certificate

Designated Subjects Adult Education

### Internship Programs:

Multiple Subject with a Cross-cultural, Language and Academic Development (CLAD) Emphasis

Multiple Subject with a Bilingual (Spanish) Cross-cultural, Language and Academic Development (BCLAD) Emphasis

Single Subject (Mathematics and Science) with a Cross-cultural, Language and Academic Development (CLAD) Emphasis

Single Subject (Mathematics and Science) with a Bilingual (Spanish) Cross-cultural, Language and Academic Development (BCLAD) Emphasis

Special Education - Mild/Moderate (MM)

Special Education - Moderate/Severe (MS)

NOTE: No new Special Education students will be admitted to the Learning Handicapped or Severely Handicapped Credential Programs after Fall 1997. The LH and SH Programs have been replaced with the Mild/Moderate and Moderate/Severe Special Education Programs. The State is requiring that all students admitted to LH or SH Programs complete all requirements and apply for those credentials by July 1, 1999. Since the program requires two years of part-time work, admissions after Fall 1997 would not permit completion of the LH or SH programs by July 1, 1999.

### MISSION STATEMENT

The mission of the Teacher Education Department (TED) is to prepare teachers who will serve as educational leaders in our culturally and linguistically diverse society. The Teacher Education Department is committed to excellent professional preparation that provides students with the opportunity to acquire the skills, intellectual strategies, critical attitudes, and broad perspectives necessary to serve the needs of schools and communities. Within this context the department seeks to forge meaningful partnerships with schools both locally and globally.

PHILOSOPHICAL STATEMENT: The Department of Teacher Education of the California State Polytechnic University, Pomona is committed to the pursuit of excellence in education and to the search for new knowledge about learning and the educational process. The university, through the Department of Teacher Education, accepts the responsibility for the preparation of future school teachers, and strives to provide equal educational opportunities for all qualified students who wish to become teachers. The faculty of the Department of Teacher Education seeks to develop teacher candidates who:

- 1) exhibit respect for the worth and dignity of all students, regardless of academic achievement, intellectual potential, social maturity, sex; or ethnic, cultural or racial background;
- 2) are academically competent in their field of subject-matter expertise;
- 3) demonstrate pedagogically sound methods of teaching and apply them appropriately to meet individual and collective student needs;
- 4) are committed to lifelong learning, are stimulated by open inquiry, and desire to share these qualities with others.

## GENERAL INFORMATION

Public school teaching and credentials in the State of California are regulated and accredited by the State of California. All programs for students seeking credentials are approved and monitored by the California Commission on Teacher Credentialing (CCTC). Since credential programs described in this publication are subject to change, students are urged to seek current information concerning new credential requirements and deadlines from appropriate advisors in the Department of Teacher Education.

The preparation of teachers at Cal Poly Pomona is a university-wide function. Faculty members from each credential major department and designated university personnel are appointed to serve on the Teacher Education Selection Committee. Members of this committee advise on program-related issues as well as student selection. They also serve as departmental advisors to credential and degree students for program planning. The university has been approved to offer programs leading to the following credentials and areas of specialization:

- (1) Basic Teaching Credentials: Multiple Subjects, Single Subject, Multiple and Single Subject/CLAD Emphasis, Multiple and Single Subject/BCLAD (Spanish) Emphasis, Special Education Mild/Moderate, Special Education Moderate/Severe.
- (2) Specialist Credentials: Agriculture; Adapted Physical Education.
- (3) Certificates: Educational Multimedia, Computers in Education, Resource Specialist, CLAD.
- (4) Designated Subjects Adult Education Teaching Credentials.

The basic credential programs emphasize the integration of theory and practice in the study of educational foundations, curriculum, methodology, and the teaching of reading. The basic programs are organized around the four themes of Teacher as Reflector, Communicator and Organizer, Researcher and Practitioner, and Professional. The specialist credentials and certificates expand these concepts to enable students to function as specialists in schools and other educational settings.

## ADVISEMENT FOR CREDENTIALS

Students should initiate contacts and appointments for appropriate program advisement early in their undergraduate program. Since it is possible to begin the credential program (or to complete a preliminary credential) in the undergraduate years, it is recommended that contact be made with Teacher Education during the sophomore year. Students may petition to apply 13 units of credential course work completed while an undergraduate to graduate requirements. Contact Academic Programs, 98-T7-8 for additional information and the appropriate form.

Basic credential information materials can be secured at the Teacher Education Office, Building 5, Room 223A. Information regarding state credential requirements can be obtained from the Cal Poly Pomona Credential Analyst, Building 5, Room 223. Advisement regarding admissions to the professional preparation (credential) programs may be obtained from the Chair of the Department of Teacher Education or the appropriate program coordinator. Weekly TED advisement sessions are held during each academic quarter. Academic advisors are also assigned to individuals seeking a credential upon application to the program.

Advice regarding the academic major is available in each appropriate department. State and CSU credential regulations require students to verify subject matter knowledge for the credential sought by successfully completing the appropriate state adopted examination (Praxis/SSAT) or an appropriate approved academic program of study and an assessment of subject matter competence.

Students seeking the Multiple Subjects Credential will normally major in a pre-credential option in Liberal Studies or Philosophy. Cal Poly Pomona is approved to offer programs of study in the following subjects for students planning to enter the Single Subject Credential Program:

Agricultural Education	Music	History (Social Sciences)
Business Education	English	Mathematics
Home Economics	Physical Education	Science

## REQUIREMENTS FOR CREDENTIALS

The requirements for earning a Clear Multiple Subjects or Single Subject Credential or Special Education Level I are the following:

1. A baccalaureate (or higher) degree, in any major other than professional education, from an accredited institution.
2. Passing scores on the California Basic Education Skills Test (CBEST);
3. Satisfactory completion of at least 2 semester or 3 quarter units of work on the provisions and principles of the Constitution of the United States or successfully passing the appropriate U.S. Constitution examination. (Cal Poly Pomona students automatically fulfill this requirement with completion of a B.A. or B.S. degree.);
4. Satisfactory completion of an approved program of professional preparation, including supervised (student) teaching. This program usually requires four quarters of full-time course work;
5. Satisfactory completion of 6 quarter units of current reading methodology or successfully passing the PRAXIS, "Introduction to the Teaching of Reading Examination," with certification from the discipline area department;
6. Demonstration of subject matter competence in the initial credential area, achieved through completion of the appropriate program of study within a major (2.75 GPA) approved by the California Commission on Teacher Credentialing. The requirement may also be met by passing the appropriate sections of the "Praxis Series: Professional Assessments for Beginning Teachers" and "Single Subject Assessments for Teaching" (SSAT) Examinations. Additionally, all students must successfully complete the subject area department assessment;
7. Effective October 1, 1998, Multiple Subjects Credential candidates must pass the Reading Instruction Competence Assessment (RICA) before being recommended for a Multiple Subjects Credential;
8. A fifth year of college or university postgraduate education. Course work taken in graduate status must be at the upper division or graduate level;
9. Satisfactory completion of a course requirement in health education and a current CPR card. (KIN 441 or KIN442)
10. Satisfactory completion of training in the needs of, and methods of providing educational opportunities to individuals with exceptional needs. TED 501 or TED 551/551A meets this requirement; and,
11. Evidence of completion of computer competence. This requirement may be met through GED 505/505L or equivalent coursework required by the major.

Students may be recommended for a preliminary Single, Multiple, or Special Education Level I credential upon completion of requirements 1-6. Multiple Subjects candidates must complete #7 to obtain the first multiple subjects credential. To obtain a clear Multiple or Single Subject credential, requirements 8-11 must be completed within five years of the date of the issuance of the preliminary credential.



Clearing the Special Education credential requires completion of the Special Education Level II program. Some course work in the basic credential programs may be applied towards a Master of Arts in Education at Cal Poly Pomona. All Level II course work for the Special Education credential may be applied to the MA.

During the junior and senior years, courses in professional education (TED courses) may be taken from the elective units allowed in the major. Course work taken while an undergraduate may be petitioned for graduate credit if the courses are not required for graduation (for a maximum of 13 units). These courses must be upper division or graduate level in the major, in the departments of Teacher Education or Graduate and Professional Studies, or directly related to increasing the student's competency as a teacher. The provisions governing courses taken by undergraduates for graduate credit are found in this catalog under the Academic Policies section of Academic Regulations and Programs.

### ADMISSION PROCEDURES FOR THE BASIC CREDENTIAL PROGRAMS

Admission to the university does not constitute admission to the Multiple, Single Subject, or Special Education Teacher Education Program. Undergraduate students must apply for program admission prior to enrolling in methods classes. Undergraduate students who are not admitted to the Multiple, Single Subject, or Special Education Credential Program are not permitted to register in credential program methods courses. All programs utilize the services of a selection committee (the Multiple Subjects Selection Committee, Special Education Selection Committee and Single Subject Selection Committee). The committees are composed of university-wide representatives who make recommendations regarding application to the program. All fifth-year students must apply to and be admitted to the university and the Teacher Education Program to enroll in credential methods courses. The process for obtaining a teaching credential includes the following steps:

1. Application and admission to Cal Poly Pomona.
2. Application and admission to the Teacher Education Program.
3. Application and admission to supervised (student) teaching.
4. Application for the credential.

### STEP 1: REQUIREMENTS FOR ADMISSION TO THE MULTIPLE SUBJECTS, SPECIAL EDUCATION, AND SINGLE SUBJECT PROGRAMS:

1. Attendance at the Teacher Education Advisement Session.
2. Completion of University and Teacher Education Application.
3. GPA as required in accordance with Executive Order 547. (GPA for each major varies—refer to current list available in the Teacher Education Admissions Office.)
4. Letter of Exception if GPA requirement (or any other requirement) is not met.
5. Completion of TED 401/401A - Human Development Learning and Language Acquisition and GED505/505L - Educational Computer Technology
6. Two (2) recommendations. One must be based on academic performance and one on involvement with youth.
7. Submission of passing CBEST scores by the application deadline.
8. Purpose or Statement of Intent for pursuing a teaching credential (to be addressed as an essay).
9. Measles/Rubella Immunization.
10. Character and Identification clearance application (fingerprints).

Clearance must be received from (CCTC) prior to supervised teaching. (Students are encouraged to submit this application while enrolled in the TED prerequisite courses.)

11. Two sets of official transcripts required from all colleges/universities attended (submitted with the application to the university).
12. Successful oral interview.
13. BCLAD applicants must take the language assessment test prior to the TED program application deadline. See BCLAD advisors for details.

Evaluation of the student's qualifications as a credential student, in addition to the above requirements include, but are not limited to the following:

- a. Personal Adjustment: Evidence of satisfactory personal adjustment, habits, interests and attitudes as shown by evaluation instruments, observations, interviews, and faculty ratings.
- b. Physical Fitness: Evidence of good physical health.
- c. Scholarship: Must meet appropriate GPA at the time of admission, and must maintain a GPA of 3.0 in all credential classes attempted; must meet 2.75 GPA requirement in approved subject matter course work. Additionally, to earn a university recommendation for a credential, an earned grade of "B" or better is required in each block of student teaching as well as maintenance of a 3.0 GPA in all credential course work attempted.
- d. Professional Attitude: Documents evidence of ability and willingness to work with pupils, parents and school personnel through successful experiences in working with children and youth/or other school-related activities.

The university sponsorship of the credential applicant is a voluntary act that is offered only when the student has successfully completed (in the judgment of the university) all the professional preparation requirements. These requirements are subject to change. For up-to-date information, students should consult the Department of Teacher Education.

### STEP 2: REQUIREMENTS FOR ADMISSION TO SUPERVISED (STUDENT) TEACHING:

1. Application for student teaching: Submitted to the Credential Office as far in advance as two quarters prior to supervised teaching. Application deadlines are posted by the Credential Office, Room 5-223. Students seeking supervision on an Emergency Credential must apply for Student Teaching and Emergency Supervision.
2. Evidence of subject matter competence: Provided through either passage of the appropriate Praxis/SSAT exam or completion of the appropriate subject matter program and certification from the discipline area department. Passing scores on the Praxis/SSAT must be received by the application deadline for student teaching and/or verification of completion of the subject matter program and department assessment must be received by the end of the quarter prior to student teaching.
3. Completion of all foundation, methods, and prerequisite courses prior to beginning student teaching. If the applicant is pursuing the CLAD/BCLAD Emphasis, all CLAD and BCLAD emphasis courses must also be completed prior to beginning student teaching. BCLAD students must meet the Spanish language competency requirement.
4. Verification, prior to Selection Committee meeting date, of GPA of 3.0 in all TED courses and 2.75 minimum GPA in all subject matter

courses. A grade lower than a "C" in any course is not honored.

5. Verification, prior to Selection Committee meeting date, of the completion of all conditions and/or prerequisites identified at the time of admission to the program.
6. Current T.B. test with negative results.
7. Character and Identification clearance.

### MULTIPLE SUBJECTS PROGRAM

The following is the program of study for Multiple Subjects Credential candidates. Students must be officially admitted to the Multiple Subjects Credential Program prior to registering for any of the TED methodology courses. Only nine quarter units of TED course work may be completed before admission to the program.

Prerequisites	Units
Educational Computer Technology . . . . . GED 505/L	3,1
Human Development, Learning and Language Acquisition . . . . . TED 401/A3,2	
<b>Foundations</b>	
Culture and Cultural Imperatives in Education . . . TED 402/A	4,1
Planning and Presentation through the Visual-spatial, Musical and Kinesthetic Curriculum . . . . . TED 456/A	2,1
Inquiry, Discovery & Science Education in K-8 Classrooms . . . . . TED 431/A	1,1
<b>Methods</b>	
Social Science and Group Processes . . . . . TED 451/A	2,1
Structure of Language and Emergent Literacy in Diverse K-8 Classrooms . . . . . TED 443/A	4,1
Special Populations . . . . . TED 551/A	3,1
Positive Classroom Interventions . . . . . TED 581/A	2,1
Literacy and Comprehension in K-8 Classrooms . . TED 444/A	1,1
Teaching Mathematics and Problem Solving in K-8 Classrooms . . . . . TED 425/A	2,1
<b>Student Teaching</b>	
Multiple Subjects Student Teaching I . . . . . TED 427 *	4
Seminar & Student Teaching I . . . . . TED 428	3
The Professional Classroom . . . . . TED 440	3
Multiple Subjects Student Teaching II . . . . . TED 429 *	8

\* Interns take TED 449 (12-18 units)

### Professional Clear Credential Courses

Individuals earning a preliminary credential have five years in which to complete the appropriate course work and apply for a Clear Credential

Elementary School Health Education . . . . . KIN 441	3
CPR - Level B or Community CPR	

Note: The Special Education Clear Credential requirement is met through the basic program and the Computer Technology Clear Credential requirement is met through the pre-requisite course, GED 505/505L. Other approved courses may meet the computer literacy requirement. See an advisor or the Credential Analyst for a listing of all approved computer/technology courses. Liberal Studies pre-credential majors may meet the requirement for TED 401/401A by completing the following: TED 302/302A and TED 303/303A or TED 301 and LS 404, LS

405, ENG 323 and PSY 311.

### MULTIPLE SUBJECTS CROSSCULTURAL, LANGUAGE, AND ACADEMIC DEVELOPMENT (CLAD) EMPHASIS

Students seeking a Multiple Subjects Credential may add a CLAD Emphasis to the Credential by completing the basic Multiple Subjects Program and the following:

- (1) One year (6 semester or 9 quarter units) of a language other than English (one language) with an earned "C" or better or the equivalent.
- (2) One quarter of supervised teaching in a setting for English language development and Specially Designed Academic Content Instruction in English (SDAIE).

### MULTIPLE SUBJECTS BILINGUAL (SPANISH) CROSSCULTURAL, LANGUAGE, AND ACADEMIC DEVELOPMENT (BCLAD) EMPHASIS

Students seeking a Multiple Subjects Credential may add a BCLAD (Spanish) Emphasis to the Credential by completing the basic Multiple Subjects Program and the following:

- (1) Spanish language proficiency at the intermediate level or greater in listening, speaking, reading and writing Spanish. (Initial assessment through examination must be completed prior to application to the program.)
- (2) Required Course Work  
Two of the following EWS courses:
 

Chicano/Latino Experience . . . . . EWS	202	4
Chicano/Latino Contemporary Issues . . . . . EWS	402	4
Ethnicity, Folklore and the Art . . . . . EWS	410	4

Bilingual Education: Reading, Language Arts and Content Instruction in the Primary Language (Spanish) . . . . . TED 515/515A
- (3) One quarter of supervised teaching in a setting in which literacy and academic content are taught in Spanish and English Language Development and Specially Designed Academic Content Instruction in English (SDAIE) skills are implemented.

Students seeking a Multiple Subjects Credential with a BCLAD Emphasis, must complete all BCLAD option courses prior to supervised (student) teaching.

### SINGLE SUBJECT PROGRAM

The following is the program of study for Single Subject Credential candidates. Students must be officially admitted to the Single Subject Credential Program prior to registering for any of the TED methodology courses. Only nine quarter units of TED program course work may be completed before admission to the program.

#### Prerequisites

Educational Computer Technology . . . . . GED 505/L	3,1
Human Development, Learning and Language Acquisition . . . . . TED 401/A	3,2

#### Foundations

Culture and Cultural Imperatives in Education . . . TED 402/A	4,1
Planning and Presentation in Secondary Classrooms . . . . . TED 446/A	2,1
Group Processes within Middle and High School Education . . . . . TED 447/A	2,1

**Methods**

Content Area Reading in Diverse Classrooms		
Structure of Language	TED 432/A	3,1
Curriculum and Methods for Content Area Teachers	TED 434/A	3,1
Special Populations	TED 551/A	3,1
Positive Classroom Intervention	TED 581/A	2,1
Writing in the Secondary Classroom	TED 442/A	1,1

**Student Teaching**

Secondary Student Teaching I	TED 435 *	4
Secondary Seminar	TED 436	1
The Professional Classroom	TED 440	3
Secondary Seminar	TED 438	1
Secondary Student Teaching II	TED 437 *	8

\* Interns take TED 439 (12-18 units)

**Professional Clear Credential Courses**

Individuals earning a preliminary credential have five years in which to complete the appropriate course work and apply for a Clear Credential

Secondary School Health Education	KIN 442	3
CPR - Level B or Community CPR		

Note: The Special Education Clear Credential requirement is met through the basic program and the Computer Technology Clear Credential requirement is met through the pre-requisite course, GED 505/505L. Other approved courses may meet the computer literacy requirement. See an advisor or the Credential Analyst for a listing of all approved computer/technology courses. Agriculture, Physical Education and Mathematics Single Subject Credential candidates must take specified courses to meet GED 505/505L requirements.

**SINGLE SUBJECT CREDENTIAL WITH A CROSSCULTURAL, LANGUAGE AND ACADEMIC DEVELOPMENT (CLAD) EMPHASIS**

Students may earn a Single Subject Credential with a CLAD Emphasis by completing the basic Single Subject Program and the following:

1. One year (6 semester or 9 quarter units) of a language other than English (one language) with an earned "C" or better, or equivalent language preparation.
2. Supervised teaching in a setting for English Language Development and Specially Designed Academic Instruction in English (SDAIE).

**SINGLE SUBJECT PROGRAM WITH A BILINGUAL (SPANISH) CROSS-CULTURAL LANGUAGE & ACADEMIC DEVELOPMENT (BCLAD) EMPHASIS**

Students seeking a Single Subject Credential may pursue a BCLAD (Spanish) Emphasis by completing the basic Single Subject Program and the following:

1. Spanish language proficiency at the intermediate level or greater in listening, speaking, reading, writing Spanish. (Assessed through examination.)
2. Required course work
 

Two of the following EWS courses:		
Chicano/Latino Experience	EWS 202	4
Chicano/Latino Contemporary issues	EWS 402	4
Ethnicity, Folklore and the Arts	EWS 410	4
Bilingual Education: Reading, Language Arts and Content Instruction in the Primary		

Language (Spanish)	TED 515/515A	4
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3. Supervised teaching in a setting in which literacy and academic content are taught in Spanish and English language development and Specially Designed Academic Content Instruction in English (SDAIE) skills are implemented.

Students must complete all prerequisite, foundation, methodology, and BCLAD courses prior to supervised (student) teaching.

**COURSE WORK REQUIREMENTS FOR A CROSSCULTURAL, LANGUAGE, AND ACADEMIC DEVELOPMENT (CLAD) CERTIFICATE.**

Individuals possessing a basic California Credential may earn a CLAD Certificate by completing the following State approved course work:

1. One year (6 semester or 9 quarter units) of a language other than English (one language) with an earned "C" or better, or equivalent language preparation.
2. Required course work
 

Applied Linguistics in Literacy Acquisition	GED 534/534A*	3,1
or Structure of Language	ENG 320	4
Socio-Linguistic and Multicultural Aspects of Language and Literacy Acquisition	GED 528*	4
or Language Acquisition	ENG 323	4
Language Structure and Development for Teaching/Learning in English/Bilingual Classrooms	TED 452*	4
Culture and Cultural Diversity in Multicultural and International Educational Settings	TED 453*	4
Specially Designed Instruction for the Content Areas	GED 568/568A*	3,1

\*This CLAD Certificate course work may be applied toward a master of arts degree in Education.

**SPECIAL EDUCATION CREDENTIAL COURSE WORK SEQUENCE: LEVEL I MILD/MODERATE AND MODERATE SEVERE CREDENTIALS**

The following is the program of study for the Special Education Preliminary (Level I) Mild/Moderate and Moderate/Severe Credentials. Students must be officially admitted to a Special Education Credential Program prior to registering for any of the TED methodology course work. Only nine quarter units of TED course work may be completed prior to admission to the program.

**Pre-requisites**

Educational Computer Technology	GED 505/L	3,1
Human Development, Learning and Language Acquisition	TED 401/A	3,2

**Foundations**

Culture and Cultural Imperatives in Education	TED 402/A	4,1
Planning and Presentation through the Visual-spatial, Musical and Kinesthetic Curriculum	TED 456/A	2,1
Inquiry, Discovery and Science Education in K-8 Classrooms	TED 431/A	1,1

**Methods**

Social Science and Group Processes	TED 451/A	2,1
Structure of Language and Emergent Literacy in Diverse Classrooms	TED 443/A	4,1
Special Populations	TED 551/A	3,1
Positive Classroom Interventions	TED 581/A	2,1

Literacy and Comprehension in K-8 Classrooms . . . . .	TED	444/A	1,1
Teaching Mathematics and Problem Solving in K-8 Classroom . . . . .	TED	425/A	2,1
Assessment for Special Education . . . . .	TED	555/A	3,1

**Mild/Moderate Specialization****Student Teaching**

Special Education, mild/moderate Student Teaching I . . . . .	TED	455 *	4
Seminar & Student Teaching I . . . . .	TED	428	1
The Professional Classroom . . . . .	TED	440	3
Special Education, mild/moderate Student Teaching II . . . . .	TED	457*	8
Elementary or Secondary School Health Education . . . . .	KIN	441	
. . . . . or KIN		442	3
CPR - Level B or Community CPR			

\* Interns take TED 459 (12-18 units) for TED 455 and TED 457

**Moderate/Severe Specialization**

Curriculum for Students with Moderate/ Severe Disabilities . . . . .	TED	556/A	2,1
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**Student Teaching**

Special Education: moderate/severe Student Teaching I . . . . .	TED	465 *	4
Seminar & Student Teaching I . . . . .	TED	428	1
The Professional Classroom . . . . .	TED	440	3
Special Education: moderate/severe Student Teaching II . . . . .	TED	467 *	8
Elementary or Secondary School Health Education KIN		441	
. . . . . or KIN		442	3
CPR - Level B or Community CPR			

\* Interns take TED 469 for TED 465 and TED 467 (12-18 units)

If also seeking a CLAD, student teaching must include supervised teaching in a setting for English language development and Specially Designed Academic Content Instruction in English (SDAIE) with a CLAD (or equivalent) certificated teacher or mentor.

Note: GED 505/505L or other approved courses may meet the computer literacy requirement. See an advisor or the Credential Analyst for a listing of all approved computer/technology courses. Agriculture, Physical Education and Mathematics Single Subject Credential candidates must take specified courses to meet GED 505/505L requirements.

**SPECIAL EDUCATION CREDENTIAL COURSE WORK SEQUENCE: LEVEL II (CLEAR) MILD/MODERATE AND MODERATE SEVERE CREDENTIALS (Pending CCTC Approval)**

Level II (Clear) course work for the Special Education Mild/Moderate and Moderate/Severe Credentials may be applied to the Master of Arts in Education degree program at Cal Poly Pomona. See a Special Education advisor for details.

**Core Course Work for the Mild/Moderate and Moderate/Severe Level II (Clear) Special Education Credential**

Transition to Postsecondary Settings . . . . .	TED	552	4
Leadership in Special Education . . . . .	TED	591	4
Current Issues and Research in Special Education . . . . .	TED	587	4

or district equivalent for Professional Growth

**Mild/Moderate Emphasis**

Advanced Instruction of Students with Mild/Moderate Disabilities . . . . .	TED	554	
. . . . .		4	
Integrated Mathematics, Science, and Computer Curricula for Students with Mild/Moderate Disabilities . . . . .	TED	559	
4			
or GED Graduate Level Elective			

**Moderate/Severe Emphasis**

Characteristics of Moderate/Severe Disabilities . . . . .	TED	530	
4			
Introduction to Assistive Technology . . . . .	TED	588	
4			

**DUAL CREDENTIALS**

The Multiple Subjects, Single Subject and Special Education Programs have been designed to facilitate the earning of dual Single Subject and Special Education or dual Multiple Subjects and Special Education Credentials. Dual credentials can be earned with a minimum amount of additional course work and student teaching.

Special Education Candidates also seeking a Multiple Subjects Credential, must meet Subject Matter requirements for the Multiple Subjects Credential, complete one additional quarter of student teaching in a Multiple Subjects classroom (TED 429) and pass the RICA exam.

Special Education Candidates also seeking a Single Subject Credential, must meet the Single Subject Matter requirements, complete one quarter of additional student teaching in the appropriate Single Subject classroom (TED 437), and TED 434/434A Content Area Methods (3,1) and the appropriate Secondary Student Teaching Seminar to accompany student teaching.

Multiple Subjects Candidates seeking a dual Multiple Subjects/Special Education Credential must complete the CPP Clear Multiple Subjects Program and the following:

Mild/Moderate Emphasis:

TED 555/A – Assessment for Special Education

One quarter of student teaching in a setting appropriate to the credential

Moderate Severe Emphasis:

TED 555/A – Assessment for Special Education

TED 556/A – Adapting the Curriculum for Moderately to Severely

Handicapped Special Education Students

One quarter of student teaching in a setting appropriate to the credential

Single Subject Candidates seeking a dual Single Subject/Special Education Credential must complete the CPP Clear Single Subject Program and the following:

Mild/Moderate Emphasis:



TED 431/A – Inquiry, Discovery & Science Education in K-8 Classrooms

TED 425/A – Teaching Mathematics and Problem Solving in K-8 Classrooms

TED 443/A – Structure of Language and Emergent Literacy in Diverse K-8 Classrooms

TED 444/A – Literacy and Comprehension in K-8 Classrooms

TED 555/A – Assessment for Special Education

One quarter of student teaching in a setting appropriate to the credential

Moderate Severe Emphasis:

TED 431/A – Inquiry, Discovery & Science Education in K-8 Classrooms

TED 425/A – Teaching Mathematics and Problem Solving in K-8 Classrooms

TED 443/A – Structure of Language and Emergent Literacy in Diverse K-8 Classrooms

TED 444/A – Literacy and Comprehension in K-8 Classrooms

TED 555/A – Assessment for Special Education

TED 556/A – Adapting the Curriculum for Moderately to Severely Handicapped Special Education Students

One quarter of student teaching in a setting appropriate to the credential

### **DUAL SPECIAL EDUCATION AND MULTIPLE SUBJECTS OR SINGLE SUBJECT CREDENTIAL WITH A BCLAD EMPHASIS**

Special Education students seeking a BCLAD Emphasis must complete the basic Special Education Mild/Moderate or Moderate Severe Program, the additional requirements for the dual credential and the BCLAD language, course work and student teaching requirements.

### **INTERN CREDENTIAL PROGRAMS**

Cal Poly Pomona Department of Teacher Education offers Internship Programs in partnership with a number of districts in the area. The internship is an intensive two-year program which leads to a Clear Credential in Multiple or Single Subjects (Mathematics or Science) or Level I Special Education with the CLAD or BCLAD. During the internship, the intern is employed by a district as a full-time teacher.

Students interested in the Intern Program must attend an Orientation for the Basic Credential Programs and then attend an Intern Orientation. Intern Program Orientations are held twice per quarter. Please contact the Teacher Education Admissions Offices for more information, (909) 869-2303, Bldg. 5 -223A.

### **Intern Program Requirements**

1. Attendance at the Basic and Intern Program Orientations
2. Admission to the University
3. Successful completion of CBEST
4. Earned baccalaureate

5. Admission to the appropriate credential program (BCAP)

6. Subject Matter Competency

7. Successful interview with the University for the Internship Program

8. Offer of a contract from a participating district in a classroom appropriate to the credential sought

9. Successful completion of the U.S. Constitution requirement

10. Successful completion the following Pre-Intern Program course work:

Educational Computer Technology . . . . .	GED	505/L	3,1
Field Experience and Seminar for Pre-Interns . . . . .	TED	400	1,3
Planning and Presentation through the Visual-spatial, Musical and Kinesthetic Curriculum . . . . .	TED	456/A	2,1
or			
Planning and Presentation in Secondary Classrooms . . . . .	TED	446/A	2,1
Structure of Language and Emergent Literacy in Diverse Classrooms . . . . .	TED	443/A	4,1
or			
Content Area Reading in Diverse Classrooms Structure of Language . . . . .	TED	432/A	3,1
Positive Classroom Interventions . . . . .	TED	581/A	2,1

11. Payment of appropriate fees

12. Application for an Intern Credential through the University.

Continued participation in the Cal Poly Pomona Intern Program requires successful maintenance and completion of all University and employing district standards and conditions.

### **RESOURCE SPECIALIST CERTIFICATE OF COMPETENCE**

A Resource Specialist Certificate of Competence in Special Education was approved (August 1981) by the California Commission on Teacher Credentialing for Cal Poly Pomona. Admission to the university does not constitute automatic admission to the Special Education Resource Specialist Certificate program.

The Resource Specialist Certificate of Competence program has been approved by the Commission of Teacher Credentialing.

### **Requirements for admission to the Resource Specialist program:**

1. Application to the Resource Specialist program (available from the Coordinator of Special Education).
2. Minimum undergraduate GPA of 2.75 or graduate GPA of 3.0.
3. EITHER possession of a valid California special education credential (LH, SH, CH, OH, or VH) OR concurrent enrollment in a California Special Education credential program.
4. Three letters of recommendation to the Resource Specialist program.

The university sponsorship of the certificate applicant is a voluntary act that is offered only when the student has successfully completed (in the judgement of the university) all the professional preparation requirements. These requirements are subject to change. For up-to-date information, students should consult the Coordinator of Special Education.

The following courses (16 units) will be utilized to complete this certificate program:

### **Resource Specialist Certificate of Competency (16 Units)**

Introduction to Resource Specialist Program . . . . .	TED	583	4
Organization and Management of Special Education Programs . . . . .	TED	584	4
Current Education Issues for the Resource Specialist . . . . .	TED	585	4
Leadership in Special Education . . . . .	TED	591	4

### Adapted Physical Education Specialist Credential

Perky Stromer, Adapted Physical Education Advisor, KHP

This credential, coupled with a single-subject K-12 Physical Education Teaching Credential, authorizes one to teach adapted physical education in California public schools. The APE Credential Program can be included in a master's program.

Prerequisites to admission to the Adapted Physical Education Credential Program are: (1) K-12 Physical Education Teaching Credential and/or Multiple Subject Credential; (2) acceptable grade point average; and, (3) completion of admission to graduate school procedures.

The following courses are required for this credential program:

Motor Assessment for Individuals with Disabilities . . . . .	KIN	401/401A	3/1
Rhythms and Dance for Movement Education . . .	KIN	404/404A	2/1
Adapted Physical Education Fieldwork . . . . .	KIN	405/405A	2/1
Physical Education for Orthopedically and Health Impaired . . . . .	KIN	406/406A	3/1
Physical Activity for Individuals with Severe Disabilities . . . . .	KIN	410/410A	3/1
Classroom Management for Teachers of Students with Disabilities . . . . .	TED	581	4

### COURSE DESCRIPTIONS

#### TED 302/302A - Literacy and Schooling (1,1)

Exploration of issues and strategies related to literacy and literacy instruction. Effective techniques for literacy instruction are examined within ten hours of observation in diverse public school settings and applied to ten hours of tutoring. TED 302/302A and TED 303/303A are contiguous courses. Credit for TED 302/302A is earned upon completion of TED 302/302A and TED 303/303A. One seminar/discussion; one two-hour activity.

#### TED 303/303A - Seminar in Literacy (1,1)

Literacy instruction strategies are applied to twenty hours of tutoring in public school classrooms. Participants develop a literacy case study. TED 302/302A and TED 303/303A are contiguous courses. Credit is earned upon completion of TED 302/302A and TED 303/303A. One seminar/discussion; one two-hour activity. The combined courses of TED 302/302A and TED 303/303A meet the CCTC Early Field Experience Requirement for Liberal Studies Pre-credential Majors.

#### TED 400/400A - Field Experience for Pre-Interns (1,3)

Overview of theory and application of public school teaching strategies. Human development, classroom organizations, basic assessment, classroom management, active student learning, lesson planning and analysis, effective teaching behaviors, legal responsibilities, and cultural diversity. Sixty hours of field experience in appropriate settings required. Instructor approval required for admission. One seminar/discussion; three two-hour activities.

#### TED 401/401A: Human Development, Learning and Language Acquisition

### (3,2)

Theories and knowledge of human development, learning and language acquisition are explored in relation to self, others and schooling. Course provides opportunities for applied professional decision making, planning and reflection related to a variety of situations. Forty hours field experience required. Meets CCTC Early Field Experience Requirement. Required for admission to basic credential programs. 3 seminar/discussion; 2 two-hour activities.

#### TED 402/402A Culture and Cultural Imperatives in Education(4,1)

Explores the nature of culture as a complex body of knowledge related to the understanding of self, others and schooling. Explores diversity in relation to educational history, philosophy, sociology and law which forms a basis for equity, ethics and understanding. Minimum 20 hours of field experience required. 4 seminar/discussion, one two-hour activity.

#### TED 410 Public Schooling and Literacy (Student Literacy Corps I) (4)

Exploration of issues and strategies related to literacy and literacy instruction are applied to 20 hours of volunteer one-on-one tutoring in the community. TED 410 and 411 are contiguous courses. Credit for TED 410 is earned upon completion of TED 410 and TED 411. 4 seminars.

#### TED 411 Seminar in Community Tutoring (Student Literacy Corps II) (4)

Problem-solving strategies are applied to 40 hours of volunteer one-on-one tutoring in the community. Participants investigate an independent research topic related to literacy or literacy instruction. 4 seminars. Prerequisite: TED 410. Credit for TED 411 is earned upon completion of TED 410 and TED 411.

#### TED 412/412A - Developing and Implementing a Comprehensive Pre K - 3 Literacy Program. (3,1)

Development of literacy in children in grade Pre K - 3. Background information and introduction to the elements of a balanced reading program. Development and organization of an integrated reading program including: phonemic awareness, phonics, decoding, spelling, comprehension and writing. Twenty hours field experience required. Three seminar/discussion; one two-hour activity.

#### TED 425/425A - Teaching Mathematics and Problem Solving in K- 8 Classrooms (2/1)

Principles and methodology of teaching mathematics in the elementary school including instructional design, material selection, and student assessment with an emphasis on problem solving. Twenty hours field experience completed concurrently with student teaching or the equivalent. Two hour seminar/discussion; one two-hour activity. Prerequisites: Passing Score on the CBEST, completion of a Mathematics for Elementary School Teachers course sequence or a passing score on the MSAT. Pre-requisites: TED 401/401A and TED 456/456A

#### TED 427- Multiple Subjects Student Teaching I (4)

Supervised teaching in university-approved classroom. The prospective teacher will experience initial teaching responsibilities in culturally diverse public school settings. Admission to student teaching required. May be repeated upon the advice of the Basic Credentials Coordinator.

#### TED 428 Seminar: Elementary Student Teaching I (1)

Constructive analysis of problems and procedures of elementary student teaching experiences. Concurrent enrollment in TED 427 required. 1 seminar.

**TED 429 Multiple Subjects Student Teaching II (8)**

Supervised full-day teaching in university-approved schools. Concurrent enrollment in TED 440 required. May be repeated upon the advice of the Credential Coordinator. Prerequisites: TED 427

**TED 430 Seminar: Elementary Student Teaching II (1)**

Synthesis of knowledge and experiences provided in student teaching for a prospective elementary teacher. Concurrent enrollment in TED 429 required. 1 seminar.

**TED 431/431A (I) Inquiry, Discovery and Science Education in K-8 Classrooms (1,1)**

Theories, strategies and experiential learning opportunities for science education through inquiry and discovery in diverse classrooms. Topics address: standards, expectations, curricula, materials, assessment, and technology as they relate to the teaching of science. Minimum 20 hours field experience concurrent with student teaching or equivalent. One seminar/discussion; one two-hour activity. Pre-requisites: TED 401/401A and TED 456/456A

**TED 432/432A Content Area Reading in Diverse Classrooms and Structure of Language (3,1)**

Examines the role that language, cognition, culture, and social context play in learning subject matter across the curriculum. Presents diagnostic, developmental, and assessment techniques for comprehension of content materials in single-subject classrooms. Minimum 20 hours field experience, concurrent with student teaching or equivalent. 3 seminar/discussion; one two-hour activity. Pre-requisites: TED 401/401A and TED 446/446A

**TED 434/434A Curriculum and Methods for Content Area Teachers (3,1)**

Strategies and techniques for teaching in a content area in the secondary schools. Objectives, curriculum, methods and materials used in teaching secondary education. Course will be taught by Single Subject Specialist. Twenty hours of field work/activity required. Three seminar/discussion; one two-hour activity. Pre-requisites: TED 401/401A and TED 446/446A

**TED 435 - Secondary Student Teaching I (4)**

Supervised teaching in university-approved classroom. The prospective teacher will experience initial teaching responsibilities in culturally diverse public school settings. Admission to student teaching required. May be repeated upon the advice of the Basic Credentials Coordinator. Concurrent enrollment in TED 436 required.

**TED 436 Seminar: Secondary Student Teaching I (1)**

Constructive analysis of problems and procedures of secondary student teaching experiences. Concurrent enrollment with TED 435 required.

**TED 437 - Secondary Student Teaching II (8)**

Supervised student teaching in university-approved schools. Concurrent enrollment in TED 438 and TED 440 required. Prerequisites: TED 435 and TED 436.

**TED 438 Seminar: Secondary Student Teaching II (1)**

Synthesis of knowledge and experiences provided in the student teaching experiences of a prospective secondary teacher. Concurrent enrollment with TED 437 required.

**TED 439 Secondary Intern Teaching and Seminar (3-18 units; 12 units required)**

Supervised intern teaching in university-approved classrooms. The intern will experience teaching responsibilities in culturally diverse, Single Subject (mathematics or science) public school classrooms. Admission to Single Subject (mathematics or science) Intern Program required. May be repeated for up to 18 units.

**TED 440 - The Professional Classroom (3)**

Theory and practice of leadership styles and techniques relevant to the educational professional. Interpersonal relationships in educational settings including effective communication skills for collaborative classrooms. Application of school laws, and case studies as they relate to school culture and analysis of teaching situations. To be taken concurrently with full-day student teaching. Three-hour seminar/discussion.

**TED 442/442A Writing in the Content Areas (1,1)**

Examines the role that writing plays in learning. Examines the cognitive and socio-cultural characteristics shared by the reading and writing processes. Minimum 20 hours field experience, concurrent with student teaching or equivalent. Pre-requisite: TED 432/432A. 1 seminar/discussion.

**TED 443/443A - Structure of Language and Emergent Literacy in Diverse K-8 Classrooms (4,1)**

Theoretical models and pedagogical applications of research related to language and literacy acquisition for native English speaking and English language learners. Language development, emergent literacy, structure of language, phonemics, phonetics, letter formation, decoding, spelling, literature and literacy assessment; Minimum 20 hours field experience. 4 seminar/discussion; 1 two-hour activity.

**TED 444/444A Literacy and Comprehension in K-8 Classrooms (1,1)**

Acquisition of theories, research knowledge and pedagogues that develop comprehension, critical thinking and writing for native English speakers and English language learners. Questioning/discussion and reading/study strategies and the writing process within/for multicultural literature and expository text. Minimum 20 hours field experience, concurrent with student teaching or equivalent. Pre-requisite: TED 443/443A. One seminar/discussion; one two-hour activity.

**TED 446/446A Planning and Presentation in the Secondary Classrooms (2,1)**

Theories and models of teaching, presentation and applied instructional techniques. Focuses on planning, visualizing, displaying, organizing and developing lessons and concepts in the visual-spatial, musical, kinesthetic and thematic arenas of the curriculum.. Twenty hours of field experience required. Two seminar discussion; one two-hour activity.

**TED 447/447A Group Processes within Middle and High School Education (2,1)**

Studies techniques for addressing the diversity of classroom and school environments. Provides practice with a variety of mechanisms, methods, processes, tools, and techniques used to facilitate communication and collaboration. Twenty hours of field experience required. Two discussion/seminar; one two-hour activity.

**TED 449 Multiple Subject Intern Teaching and Seminar (3-18 units; 12 units required)**

Supervised intern teaching in university -approved Multiple Subject classrooms. The intern will experience teaching responsibilities in a Multiple Subject, culturally diverse public school setting. Admission to Multiple Subject Intern Program required.

**TED 450 Topics in Education (3)**

Emphasis on discussion and analysis of selected topics in education. May be repeated for a maximum of 9 units. 3 lecture discussions. Prerequisite: consent of instructor.

**TED 451/451A Social Science and Group Processes (2,1)**

Integration of theory and application of elementary social science curriculum and school and classroom group processes. Provides study and application of group processes such as, cooperative learning, collaboration, conflict resolution, and peer counseling. Alternative instructional approaches for teaching social science include provisions for learners with language and other special needs. Minimum 20 hours of field experience required. Two seminar/discussion, one two-hour activity. Pre-requisites TED 401/401A and TED 456/456A.

**TED 452 Language Structure and Development for Teaching/Learning in English/Bilingual Classrooms (4)**

Language structure, theories, pedagogical practices and assessment techniques of bilingual education and English language development for elementary and secondary classrooms. 4 lectures/problem-solving.

**TED 453 Culture and Cultural Diversity in Multicultural and International Educational Settings (4)**

Inquiry into the nature of culture, manifestations of culture, crosscultural analysis, cultural contact, and cultural diversity internationally, in the U.S.A. and California; development of skills and materials specifically designed for working in a multicultural learning environment. 4 seminars.

**TED 455 Student Teaching for Mild/Moderate Special Education Credential Candidates (4)**

Supervised experience with students with mild/moderate disabilities in special classes, resource rooms, or full inclusion settings. Integrates the competencies for the Mild/Moderate Special Education Credential. Maximum credit, 4 units. Prerequisite: Completion of all required mild/moderate Special Education course work and an approved Application for Special Education Student Teaching.

**TED 456/456A Planning and Presentation through the Visual-spatial, Musical and Kinesthetic Curriculum. (2,1)**

Theories and models of teaching, presentation and applied instructional techniques. Focuses on planning, visualizing, displaying, organizing and developing lessons and concepts in the visual-spatial, musical, kinesthetic and thematic arenas of the curriculum. Twenty hours of field experience required. Two seminar discussion; one two-hour activity.

**TED 457 Student Teaching for Mild/Moderate Special Education Credential Candidates (8)**

Supervised experience with students with mild/moderate disabilities in special classes, resource rooms, or full inclusion settings. Integrates the competencies for the Mild/Moderate (M/M) Special Education Credential. Maximum credit, 8 units. Prerequisite: Completion of all

required M/M Special Education course work and an approved Application for Special Education Student Teaching.

**TED 459 Intern Teaching and Seminar for Mild/Moderate Special Education Intern Credential Candidates (3-18; 12 units required)**

Supervised experience with students with mild/moderate disabilities in special classes, resource rooms, or full inclusion settings. Integrates the competencies for the Mild/Moderate Special Education Credential. Maximum credit, 18, taken in three unit sections. Prerequisite: Admission to Internship Program.

**TED 465 Student Teaching for Moderate/Severe Special Education Credential Candidates (4)**

Supervised experience with students with moderate/severe disabilities in special classes, resource rooms, or full inclusion settings. Integrates the competencies for the Moderate/Severe Special Education Credential. Maximum credit, 4 units. Prerequisite: Completion of all required moderate/severe Special Education course work and an approved Application for Special Education Student Teaching.

**TED 467 Student Teaching for Moderate/Severe Special Education Credential Candidates (8)**

Supervised experience with students with moderate/severe disabilities in special classes, resource rooms, or full inclusion settings. Integrates the competencies for the Moderate/Severe (M/S) Special Education Credential. Maximum credit, 8 units. Prerequisite: Completion of all required M/S Special Education course work and an approved Application for Special Education Student Teaching.

**TED 469 Intern Teaching and Seminar for Moderate/Severe Special Education Intern Candidates (3-18; 12 units required)**

Supervised experience with students with moderate/severe disabilities in special classes, resource rooms, or full inclusion settings. Integrates the competencies for the Moderate/Severe Special Education Credential. Maximum credit, 18, taken in 3 unit sections. Prerequisite: Admission to Internship Program.

**TED 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: consent of instructor. Corequisites may be required.

**TED 515/515A Bilingual Education: Reading, Language Arts and Content Instruction in the Primary Language (Spanish) (4/1)**

Issues in bilingual education; pedagogical practices, assessment techniques and exploration of instructional materials for reading, language arts, and content instruction in Spanish/English bilingual elementary and secondary classrooms. Minimum 20 hours student/classroom/activity contact hours required. 4 Seminar/discussion /1 two-hour activity. Pre-requisites: TED 401/401A, TED 446/446A or TED 456/456A and TED 443/443A or TED 432/432A.

**TED 530/GED 530 Advanced Study of Moderate and Severe Disabilities (4)**

Advanced study of moderate and severe developmental disabilities: mental retardation, autism, serious emotional disturbance, physical disabilities, traumatic brain injury, dual diagnosis, and multiple disabilities. Concepts, etiology, characteristics, and educational



implications for general and special educators. Twenty student/classroom/activity contact hours required. 4 seminar/discussion. Prerequisite: Level II status or permission of instructor.

#### **TED 551/551A / GED 551/551A, Special Populations (3,1)**

An overview of students with disabilities which includes principles for assessing and instructing mainstreamed students in relation to federal legislation requirements; diverse instructional strategies, IEP implementation, and fieldwork across a variety of special education settings. Minimum 20 hours student/classroom/activity contact hours required. Satisfies the California Special Education requirement for the Clear Credential. Three seminar/discussion; one two-hour activity.

#### **TED 552/GED 552 Transition to Postsecondary Settings (4)**

Examination and application of current legislation, theories, and strategies in transition services for students with mild/moderate/severe disabilities. Assessment procedures, community and agency resources, employment opportunities, transition domains and skills K-12, and joint program planning across multiple service agencies. Twenty student/classroom/activity contact hours required. 4 seminar/discussion. Prerequisite: Level II status or permission of instructor.

#### **TED 553 /GED 553 - Advanced Assessment and Remediation of the Mildly Handicapped (4)**

Advanced seminar in the theory and practice of assessment and remediation of mildly handicapped pupils. Experience in relating diagnostic and evaluative data to IEP prescriptive elements. 4 seminars. Prerequisites: TED 554/GED 554, TED 559/GED 559, TED 582/GED 582.

#### **TED 554/GED 554 Advanced Instruction of Students with Mild/Moderate Disabilities (4)**

Advanced seminar on needs and characteristics of students with mild/moderate disabilities and implementation of specific strategies in various educational settings. Includes cognitive, social and emotional instructional strategies and data-based decision-making. Emphasizes integrated content in literacy and social sciences. Twenty student/classroom/activity contact hours required. Prerequisite: Level II status or permission of instructor.

#### **TED 555/555A / GED 555/555A - Assessment of Students with Disabilities (3,1)**

Theory and practice of formal and informal assessment of students with mild/moderate and moderate/severe disabilities, and serious emotional disturbance. Policies/procedures for adapting assessment for English language learners. Using assessment results to plan and implement student goals and objectives and curricula. Twenty student/classroom/activity contact hours required. 3 seminar/discussion; 1 two-hour activity.

#### **TED 556/556A / GED 556/556A Curriculum for Students with Moderate/Severe Disabilities (2,1)**

Theory and application of curricula for students with moderate/ severe disabilities. Instructional strategies, curricular modification, and practices. Adaptations for English language learners. Theories and practices of inclusion. Strategies for meeting mobility, sensory, and specialized health care needs in the classroom. Twenty student/classroom/activity contact hours required. 2 seminar/discussion; one two-hour activity.

#### **TED 559/GED 559 Integrated Mathematics, Science and Computer Curricula for Students with Mild/Moderate Disabilities (4)**

Advanced seminar on the examination, evaluation, and implementation of math, science, computer curricula for students with mild/moderate disabilities. Application of learning principles to curriculum theories and educational considerations for the math, science, and computer technology areas. Twenty student/classroom/activity contact hours required. 4 seminar/discussion. Prerequisite: Level II standing.

#### **TED 582/GED 582 Introduction to Mild Handicaps (4)**

Study of learning disabilities, behavior disorders, and mild mental retardation. Concepts, significance, etiology, characteristics, and educational considerations of individuals with mild handicaps who present academic and social learning problems. 4 seminars. Prerequisites: TED 501/ GED 501 or TED 551/551A/GED 551, TED 532/GED, TED 581/ GED 581.

#### **TED 581/581A /GED 581/581A Positive Classroom Interventions (2,1)**

Theory and practice of organizing and managing classroom learning environments for diverse learners. Organizing and scheduling, behavior management techniques, relationships between learners, curriculum, and behavior. Developing and implementing learning environments that enable students to reach their full potential. Minimum 20 student/classroom/activity contact hours required. 2 seminar/discussion; one two-hour activity.

#### **TED 583/GED 583 Introduction to Resource Specialist Program (4)**

Functions of the resource specialist; collaborative consultation, inservice training, direct instruction with special education students. Resource specialist program models. 4 seminars. Prerequisites: Admission to Resource Specialist Program and either a Special Education credential or concurrent enrollment in special education credential program.

#### **TED 584/GED 584 Organization and Management of Special Education Programs (4)**

Legal compliance requirements in planning and financing special education programs. Conceptual framework and research in operation of special education procedures and programs. 4 seminars. Prerequisite: TED 583/GED 583.

#### **TED 585/GED 585 Current Education Issues for the Resource Specialist (4)**

Issues and trends in resource specialist service delivery models and programs. Examination and analysis of current problems, current curricular and instructional practices relevant to the resource specialist. 4 seminar. Prerequisite: TED 583/GED 583.

#### **TED 586/GED 586 Communicating with Parents of Student with Disabilities (4)**

Communication strategies for working with parents of handicapped students. Parent education, rights, due process, resource agencies, local and state parent organizations, counseling, and in-service training techniques and procedures. 4 seminars. Prerequisites: TED 501/GED 501 or TED 551/551A or GED 551, TED 532/GED 532, TED 581/GED 581.

#### **TED 587/GED 587 Current Issues and Research in Special Education (4)**

Study of educational research theory and methods in the context of a critical review of current literature that affects or involves special education. Investigation of issues and trends in special education

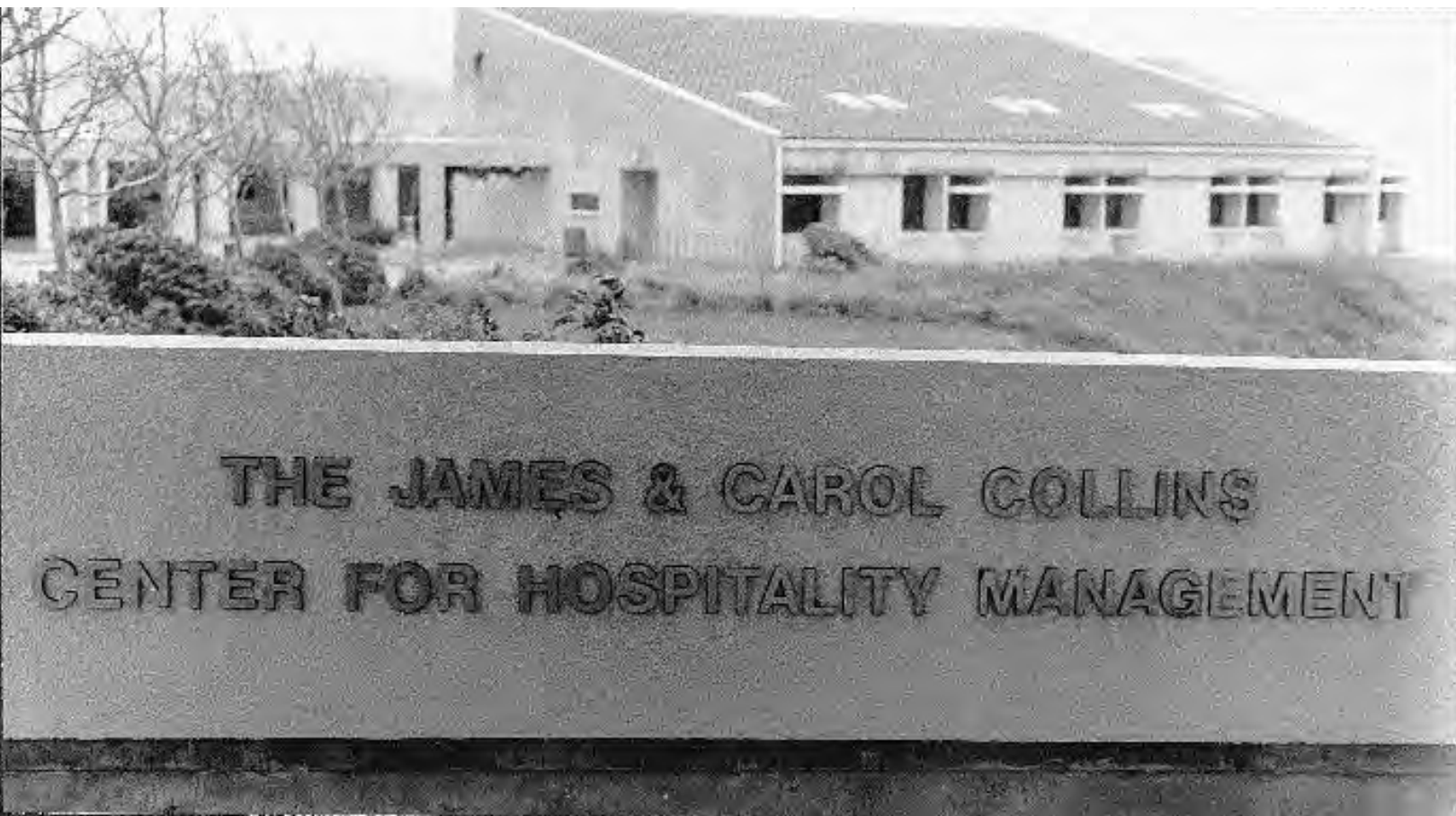
research. Twenty student/classroom/activity contact hours required. 4 seminar/discussion. Prerequisite: Level II status or permission of instructor.

**TED 588/GED 588 Introduction to Assistive Technology (4)**

Overview and introduction to assistive technology, adaptive computer hardware and software, and integration of adaptive devices into curricular activities for students with severe disabilities. Alternative and augmentative communication strategies in the context of language development. 4 seminar/discussion.

**TED 591/GED 591 Leadership in Special Education (4)**

Application of leadership techniques relevant to special education settings including organizational behavior, group culture, consultation and collaboration, communication skills, problem solving, and group dynamic theory. Preparation in coordination of special education placements and professional interactions. Twenty student/classroom/activity contact hours required. Seminar - discussion - 4 units.







## SCHOOL OF HOTEL AND RESTAURANT MANAGEMENT

James D. Burke, Dean  
Gil D. Brum, Interim Associate Dean

Gary A. Hamilton	Ardel A. Nelson
Sandra A. Kapoor	Robert A. Palmer
Tarun Kapoor	Robert W. Small
William B. Martin	Lea D. Wikoff

The School of Hotel and Restaurant Management offers a four-year curriculum that leads to a Bachelor of Science Degree in Hotel and Restaurant Management. The mission of the School of Hotel and Restaurant Management is to provide quality education for students entering management positions in the hospitality industry, to foster research of direct application and benefit to the hospitality industry, and to further the professional development of industry members.

The program provides students a combination of general education course work linked with a core of business and hospitality management courses designed (1) to facilitate an understanding of the economic, legal, and social forces which shape the hospitality industry and (2) to provide a practical base of hospitality knowledge and abilities. Major course work emphasizes human relations skills as well as qualitative and quantitative critical analysis.

A food and beverage practicum as well as additional laboratory experiences in food preparation, service, hotel operations, and property management are part of the course of study. Students are required to complete eight hundred (800) hours of work experience in hospitality-related employment prior to graduation.

The School of Hotel and Restaurant Management is housed in the James and Carol Collins Center for Hospitality Management. The Center is specifically designed for this program and houses a public, student-operated full-service restaurant as well as additional laboratory, classroom, and administration facilities.

The School is the recipient of major research funding to study energy usage, energy management, and food service equipment for the hospitality industry. This research is being conducted in conjunction with the Colleges of Engineering and Environmental Design. The School is endowed with the Richard N. Frank Distinguished Lectureship Series and the Richard A. and Nancy A. Murbach Endowment Scholarship in Free Enterprise, which is awarded quarterly to the outstanding student in catering management. A wide range of scholarships is available to eligible students each year.

### CORE COURSES FOR MAJOR

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

Legal Environment of Business Transactions . . . . .FRL	201	(4)
Principles of Management . . . . .MHR	301	(4)
Principles Marketing Management . . . . .IBM	301	(4)
Management Information Systems . . . . .CIS	310	(4)

### Required Courses

#### Foundation Series:

Introduction to Leisure Industry . . . . .HRT	101	(4)
Hotel and Restaurant Sanitation and Safety . . . . .HRT	225	(4)
Hotel and Restaurant Supervision . . . . .HRT	245	(4)

### Data Information Series

Computer Applications/Hospitality . . . . .HRT	338	(4)
Hotel and Restaurant Accounting . . . . .HRT	374	(4)
Food and Beverage Cost Control . . . . .HRT	375	(4)
Hosp. Ind. Financial Acct. I . . . . .HRT	274	(4)
Hosp. Ind. Financial Acct. II . . . . .HRT	275	(4)
Hosp. Ind. Finance . . . . .HRT	474	(4)

### Technical/Applied Management

Hotel and Restaurant Purchasing . . . . .HRT	300	(4)
Hospitality Marketing Management . . . . .HRT	302	(4)
Property Maintenance Management . . . . .HRT	305	(4)
Hotel and Restaurant Law . . . . .HRT	310	(4)

### Food & Beverage Series

Commercial Food Preparation . . . . .HRT	281 <sup>1</sup>	(4)
Food and Beverage Operations I . . . . .HRT	382	(4) <sup>1</sup>
Food and Beverage Operations II . . . . .HRT	383	(12) <sup>1</sup>

1=F&B Series courses must be taken in three consecutive quarters. When students sign up to start the F&B Series, they must select one of two options available. The lunch option will require students to take HRT 28101, 38201 and 38301. The dinner option will require students to take HRT 28102, 38202 and 38302.

### Critical Thinking/Problem Solving:

Hospitality Management Policy . . . . .HRT	410	(4)
Hospitality Operations Analysis Seminar . . . . .HRT	476	(4)
or Internship in Hospitality Management . . . . .HRT	441	(4)
or Senior Project . . . . .HRT	461	(2)
Senior Project . . . . .HRT	462	(2)

### SUPPORT AND DIRECTED ELECTIVES

#### Major Required Support Courses

Select 20 units from the following courses with advisor approval. Eight of the 20 units of major required support courses may be taken within the College of Business Administration, Nutrition and Consumer Science Department or in another discipline with approved petition. The Hotel Concentration requires a minimum of 12 credits from the courses listed within the concentration.

#### Hotel Concentration Elective

Hotel Rooms Management . . . . .HRT	304	(4)
Hotel Marketing, Sales, and Public Relations . . . . .HRT	390	(4)
Hotel Operations Seminar . . . . .HRT	425	(4)
Special Topics (with advisor approval) . . . . .HRT	499	(4)

#### Other Electives

Computer Basics-Hosp. . . . .HRT	108/L	(4)
Travel and Tourism Management . . . . .HRT	201	(4)
Quick Foodservice Management . . . . .HRT	235	(4)
Wines and Spirits . . . . .HRT	315	(4)
Club Management . . . . .HRT	320	(4)
Labor Law for the Hospitality Industry . . . . .HRT	340	(4)
Travel Geography . . . . .HRT	345	(4)
Hotel and Restaurant Layout . . . . .HRT	365	(4)
Beverage Management . . . . .HRT	385	(4)
Hospitality Property Development R/H . . . . .HRT	395	(4)
Catering and Banquet Management . . . . .HRT	401	(4)
International Travel and Tourism . . . . .HRT	415	(4)

Hospitality Information Systems	HRT	480	(4)
Meat Utilization	AS	327	(4)
Seafood Processing Technology	AS	328	(4)
Culinary Produce Technology	AGR	222	(4)
Principles of Economics	EC	202	(4)1
Principles of Economics	EC	201	(4)2
Microcomp. Proficiency	CIS	101	(4)

Consult advisor to determine under what category HRT 200, 299, 400, and 499 can be applied.

In addition to above course work, students must complete 800 hours of industry work experience required for graduation.

\*EC 201 is a prerequisite to HRT 275

\*EC 202 is a prerequisite to HRT.

## GENERAL EDUCATION COURSES

### Area 1:

Select one course from each area. (12)

### Area 2:

Select one course from each area. (16)

### Area 3:

Select one course from each area. (28)

### Area 4:

United States History	HST	202	(4)
Introduction to American Government	PLS	201	(4)

### Area 5: 8 units

Package A: (Select two): COM 314, COM 321, COM 337  
or Package B: (Select two): MHR 318; MHR 438; MHR 452

## COURSE DESCRIPTIONS

### HRT 101 Introduction to the Leisure Industry (4)

Overview of the leisure industry with emphasis on the hotel, restaurant and club fields. Brief history, description and interrelationships of leisure components. Social and economic forces influencing leisure industry development. Career opportunities and requirements for success in each field. 4 lectures.

### HRT 108/108L Computer Applications for the Hospitality Industry (3/1)

Review of hardware and software systems for the hospitality industry. Practical applications will be emphasized in the areas of word processing, spreadsheets, and databases for hospitality. 3 lectures/problem-solving, 1 three-hour laboratory. Corequisites: HRT 108 and HRT 108L.

### HRT 200 Special Problems for Lower Division Students (1-2)

Individual or group investigations, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

### HRT 201 Travel and Tourism Management (4)

Comprehensive study of travel management, its principles, practices, philosophies and systems. Examination of tourism as a developing industry; its travel modes, organizations, laws, and social and economic impact. 4 lectures.

### HRT 225 Hotel and Restaurant Sanitation and Safety (4)

Safety and sanitation as it affects the individual and the operation. Prevention and control of problems encountered in guest, customer, and employee safety and sanitation. Topics include accident and fire preven-

tion, security maintenance, and food-borne illness. 4 lecture discussions. Prerequisite: HRT 101.

### HRT 235 Quick Food Service (QFS) Management (4)

The quick food service industry (fast foods, limited menu restaurants, cafeterias) will be introduced using case studies, written analyses, student presentations, and operation development projects. Areas covered will include franchiser-franchisee relationships, menu development, and service systems. 4 lectures/problem-solving. Prerequisite: HRT 101.

### HRT 245 Hotel and Restaurant Supervision (4)

Management of personnel in the hospitality industry. Application of supervision concepts and techniques to restaurants and hotels including leadership, communication, selection, training, performance appraisal, motivation, coaching, delegation, decision-making and planning. Case studies. 4 lectures/problem-solving. Prerequisite: HRT 101.

### HRT 255 The Healthy American Gastronome (4)

Healthy and environmentally sound perspectives on culinary customs in America. 4 lecture discussions.

### HRT 274 Hospitality Industry Financial Accounting I

Introduction to financial accounting for the hospitality industry. Emphasis is on developing financial statements using the Uniform System of Accounts for Hotels, Restaurants, and clubs. 4 lectures/problem solving. Prerequisite: MAT 012 Intermediate Algebra or equivalent.

### HRT 275 Hospitality Industry Financial Accounting II

Financial accounting for the hospitality industry. Provides accounting practices for balance sheet data related to operating a hospitality firm. Also enables students to distinguish between accounting for sole proprietors, partnerships and corporations. 4 lecture/problem solving. Prerequisites: HRT 274 and EC 201

### HRT 281/281L Commercial Food Preparation (2/2) FWSp

Study of products and equipment used in food preparation. Kitchen safety emphasized with food preparation techniques. Analysis of menus and service subsystems. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: HRT 225 and consent of instructor. Lab fee required. HRT 281/281L must be taken prior to the quarter of HRT 382/382L. Corequisites: HRT 281 and HRT 281L.

### HRT 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor.

### HRT 300 Hotel and Restaurant Purchasing (4)

Policy, procedures, controls, and their implementation in purchasing hotel and restaurant merchandise and supplies: equipment, service ware, furniture, fixtures, art, contract services, food and beverage. Written analyses and evaluation of purchasing procedures, specification manuals, and receiving reports required. 4 lectures/problem-solving. Prerequisite: HRT 225.

### HRT 302 Hospitality Marketing Management (4)

Provides basic marketing knowledge and experience specific to the hospitality industry. Enables students to develop strategic marketing plans for restaurant and hotel properties. 4 lecture presentations. Prerequisite:

IBM 301.

#### **HRT 304 Hotel Rooms Management (4)**

Examines the techniques, issues, and problems of rooms management systems. Incorporates the examination of front office procedures and housekeeping operations. 4 lecture presentations. Prerequisite: HRT 101.

#### **HRT 305/305L Property Maintenance Management (3/1)**

Comprehensive application of basic science to operation and maintenance of electrical and mechanical equipment via prepared analyses and written reports. Problem-solving and solution techniques are emphasized. Includes refrigeration, heating, ventilation and air conditioning; kitchen and cleaning equipment; fire protection and safety. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisite: STA 120. Corequisites: HRT 305 and HRT 305L.

#### **HRT 310 Hotel and Restaurant Management Law (4)**

Fundamentals of law of particular importance to hotels, restaurants, resorts, and associated businesses; includes duties, rights and liabilities of the innkeeper-host and the guests. Cases. 4 lectures/problem-solving. Prerequisite: FRL 201.

#### **HRT 315 Wines and Spirits (4)**

Study of grapes, wine-making, spirits processing, storage and inventory, and control of spirits. History, economics, geography, evaluation, and comparative tasting of wines. Selection, storage, service of wines, wine lists, wine pricing, and wine sales promotion and profits. Wine and food evaluations. 4 lecture discussions. Prerequisite: minimum age of student must be 21 years. May be taken on a Credit/No Credit basis.

#### **HRT 320 Club Management (4)**

Prepares the student for operation of private clubs and tourist attractions. Selected topics including organization, personnel practices, controls, housekeeping, finance, marketing, program management, risk management, taxes and regulation are evaluated through case studies, written reports, and student analyses. 4 lecture presentations. Prerequisite: HRT 245.

#### **HRT 338 Computer Applications for the Hospitality Industry**

Introduction to technology-based systems that are used in the hospitality industry. Topic include global distribution systems, yield management, property management systems, food-service management systems, club management systems, and the use of the Internet as a management tool.

#### **HRT 340 Labor Law in the Hospitality Industry (4)**

An examination of current labor law and its impact on the operation of hotels and restaurants. Includes state and federal regulations, court decisions and legislative requirements as they relate to hiring/recruitment, affirmative action, equal employment, collective bargaining, union avoidance, employee relations, discrimination in the workplace, as well as workers' compensation and wages. Lecture and case studies. Prerequisite: HRT 310.

#### **HRT 345 Travel Geography (4)**

The geography of tourism and recreation in selected regions of the world. Aspects of physical and cultural geography that directly affect the tourist industry. 4 lecture discussions.

#### **HRT 365 Hotel and Restaurant Layout and Design (4)**

Evaluation of work analysis, design procedures, human engineering, and activity analysis. Project-based course analyzing and developing solutions to layout and design facilities for hotels and restaurants that address employee needs, productivity, and the guests' needs and comfort. 4 lectures/problem-solving. Prerequisites: HRT 304 or HRT 383.

#### **HRT 374 Hotel and Restaurant Accounting (4)**

Comprehensive application of accounting principles to the hospitality industry: accounting practices, financial statements, income/expense account and statements, and special purpose journals and ledgers. Problem-solving methods applied to managerial decisions. 4 lectures/problem-solving. Prerequisites: ACC 206 and HRT 108.

#### **HRT 375 Food and Beverage Cost Controls (4)**

Analyzing food, beverage, and labor cost controls. Problem-solving and solution techniques are applied by students in realistic operational situations. Areas covered include cost, volume, profit relationships, food cost determination, standard costs, forecasting, sales control, and menu pricing. 4 lectures/problem-solving. Prerequisites: ACC 206 and HRT 108.

#### **HRT 382/382L Food and Beverage Operations I (2/2) FWSp**

Comprehensive study of restaurant and food service management principles, practices, philosophies, and systems. Competency-based skills incorporating the practices of the School of Hotel Restaurant Management restaurant. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisites: HRT 281/281L, the preceding quarter, HRT 300, HRT 374, and HRT 375. Lab fee required. Corequisites: HRT 382 and 382L.

#### **HRT 383/383L Food and Beverage Operations II (4/8) FWSp**

Comprehensive application of food and beverage principles, practices, philosophies, and systems in operating a casual and fine dining restaurant. Analysis of daily operations with a focus on developing viable solutions to problems. 4 lectures/problem-solving, 8 three-hour laboratories. Prerequisites: HRT 382/382L which must be taken immediately prior to this course. Corequisites: HRT 383 and HRT 383L.

#### **HRT 385/385L Beverage Management (3/1)**

Planning, organizing and analysis of a beverage facility. Problem-solving methods and solution techniques are applied through written projects and an on-the-job laboratory. Topics include alcoholic beverage control regulations, examination of product, service methods and computerized control systems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: HRT 300, HRT 382 and HRT 108. Corequisites: HRT 385 and HRT 385L.

#### **HRT 390 Hotel Marketing, Sales, and Public Relations (4)**

Analysis and application of the principles of marketing to hotel operations. A project-based course that includes problem-solving and solution techniques applied to factors that impact the marketing and promotion of the hotel business. 4 lectures/problem-solving. Prerequisite: HRT 302.

#### **HRT 395 Hospitality Property Development R/H (4)**

Project-based course. Planning a restaurant or hotel from concept to opening: location and market analysis; competitor analysis; menu development and pricing; equipment selection; organizing and staffing; feasibility and forecasting income, costs and profits; employee training and management development; and promoting and advertising. 4 lectures/problem-solving. Prerequisites: HRT 375 and HRT 383.

#### **HRT 400 Special Problems for Upper Division Students (1-2)**



Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

#### **HRT 401/401L Catering and Banquet Management (2/2)**

Planning, marketing, financing, organizing and implementing a catered banquet function. As managers and crew, students produce a series of catered banquet meals. 2 lectures/problem-solving, and six hours laboratory. Prerequisites: HRT 375 and 383. Corequisites: HRT 401 and HRT 401L.

#### **HRT 410 Hospitality Management Policy (4)**

Integrated seminar in the application and development of policy matters for hospitality management. Case-problem analysis involving hospitality business functions and application of analytical techniques to this industry. 4 seminars. Prerequisites: HRT 375 and HRT 382.

#### **HRT 415 International Travel and Tourism (4)**

Description and analysis of international travel from the view of the American traveler and the travel entrepreneur. Communication of solu-

tions to problems of travel and tourism development; analysis of popular international travel destinations. 4 lectures/problem-solving. Prerequisite: HRT 201.

#### **HRT 425 Hotel Operation Seminar (4)**

Analysis and simulation of a hotel operation. Competency-based skills developed by student analyses, written reports, and on-the-job learning opportunities in the front office, guest services, maintenance and engineering, housekeeping, and function coordination. 4 seminars. Prerequisites: HRT 304 and senior standing.

#### **HRT 441 Internship in Hotel and Restaurant Management (1-4)**

On-the-job training in some phase of hotel, restaurant, or travel. The experience must be new to the student. Analytical reports are made periodically to the faculty coordinator. One unit of credit is granted for each 100 hours of training. Units of college credit are dependent upon departmental approval. Total credit limited to 4 units. Prerequisite: consent of advisor.





**HRT 461, 462 Senior Project (2) (2)**

Selection of a current development or problem in the hotel, restaurant, or travel industry. Completion of a written project under faculty supervision. Required minimum of 120 hours. Prerequisites: senior standing and HRT 410.

**HRT 474 Hospitality Industry Finance**

Comprehensive application of financial management for the hospitality industry: managerial finance approach to ratio analysis, risk and value, timing and value of cash flows, project valuation, capital expenditures, financial markets, and income taxes. Problem solving methods applied to managerial decisions. 4 lecture/problem solving. Prerequisite: HRT 374.

**HRT 476 Hospitality Operations Analysis Seminar (4)**

A capstone course to integrate various disciplines within the hospitality industry and utilize conceptual, analytical, and problem-solving skills. Problem identification, data collection, data analysis, and generation of viable solutions are emphasized. 4 seminars. Prerequisites: HRT 410.

**HRT 480 Hospitality Information Systems Seminar (4)**

An advanced seminar on hospitality information systems. Topics include optimal utilization of property management systems, yield management, system reliability/flaws, purchasing systems for large organizations, hospitality systems analysis, implementation, and training. 4 seminars. Prerequisite: HRT 108.

**HRT 499/499A/499L Special Topics for Upper Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: consent of instructor.



# ADMINISTRATIVE DIRECTORY

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- THACKER, ANDREW J. (1984) *Professor, International Business and Marketing*  
B.S., Virginia Military Institute, 1961; M.B.A., University of Houston, 1970; Ed.D., 1977.
- THEODOROPOULOS, CHRISTINE O. (1990) *Associate Professor, Architecture*  
B.S., Princeton University, 1979; M. Arch., Yale University, 1985.
- THIBODEAUX, D. MUZETTE (1973) *Coordinator, Articulation, Registrars Office*  
B.A., University of La Verne, 1970.
- THOMAS, CYNTHIA (1987) *Counselor, Career Center*  
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- THOMAS, FELICIA F. (1982) *Professor, Behavioral Sciences*  
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- THOMAS, PAUL B. (1990) *Head Women's Basketball Coach*  
B.S., Wayne State College, 1986; M.S., 1988.
- TICE, THOMAS O. (1985) *Associate Professor, Engineering Technology*  
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- TRONCALE, LENARD R. (1970) *Professor, Biological Sciences*  
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- TROW, RUBY L. (1968) *Professor, Nutrition and Consumer Sciences*  
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B.A., Heidelberg College, 1972; M. Ed., University of Arizona, 1974; Ph.D., University of California, Los Angeles, 1995.
- TURNBULL, HAROLD F. (1989) *Associate Professor, Geography and Anthropology*  
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- TURNER, HOWARD (1989) *Professor, Civil Engineering*  
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- UREY, GWENDOLYN (1994) *Assistant Professor, Urban and Regional Planning*  
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- VIERRA, KAY L. (1991) *Clinical Coordinator and Supervisor of Nurses, Student Health Services*  
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B.A., University of New Mexico, 1968; M.A., 1972; Ph.D., Indiana University, 1976.
- VIS, EUDELL G. (1980) *Chair and Professor, Agricultural Engineering and Irrigation Science*  
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- VON WODTKE, MARK J. (1969) *Professor, Landscape Architecture*  
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- WALN, KATHLEEN H. (1989) *Assistant Professor, Theatre*  
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- WALTON, EDWARD D. (1987) *Professor, Chemistry*  
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- WANDERMAN, WENDY K. (1978) *Professor, Electrical and Computer Engineering*  
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- WARD, ANN E. (1990) *Associate Librarian, Reference/Instruction/Collections Services*  
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- WATERS, GAIL R. (1992) *Professor, Management and Human Resources*, B.B.A., University of Texas at Austin, 1970; M.B.A., Sam Houston State University, 1974; Ph.D., University of Arkansas, 1982.
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- WEGRICH, ROSEANNE L. (1992) *Head Women's Volleyball Coach*  
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- WEGRZYN, VICTOR A. (1983) *Professor, Horticulture/Plant and Soil Science*  
B.S., Colorado State University, 1976; M.S., Colorado State University, 1978; Ph.D., The Pennsylvania State University, 1983.
- WEI, JULIE H. (1990) *Professor, Civil Engineering*  
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B.A., University of Redlands, 1967; M.A., University of California, Los Angeles, 1969; Ph.D., University of Hawaii, 1985.
- WELLS, DONALD G. (1970) *Professor, Civil Engineering*  
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- WESTALL, FREDERICK C. (1989) *Associate Professor, Chemistry*  
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- WEBSTER, REGINA A. (1995), *Director of Development College of Letters, Arts, and Social Sciences*  
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- WHALEY, STEPHEN V. (1970) *Professor, English and Foreign Languages*  
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B.A., University of California, Riverside, 1974; M.S. 1976, Ph.D. University of Michigan, 1979; DVM, University of California, Davis, 1986.
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- WRIGHT, JAMES E. (1990) *Associate Dean, Continuing Education*  
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- WRIGHT, WILL (1980) *Director, Developmental Outreach and Special Programs*  
B.A., California State Polytechnic University, Pomona, 1977.
- WU, HOFU (1990) *Professor, Architecture*  
B. Architecture, Tam Kang University, Taiwan, 1971; M. Architecture, University of Illinois, 1975; Architecture D., University of Michigan, 1988.
- WU, LIN (1992) *Associate Professor, Geography and Anthropology*  
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- WYATT III, JOHN B. (1990) *Professor, Finance, Real Estate and Law*  
B.A., Findlay College, 1975; J.D., University of Dayton, 1978; PDCM, Air Force Institute of Technology, 1988.
- WYRICK, CHERYL (1995) *Associate Professor, Management and Human Resources*  
B.A., University of California, Los Angeles, 1981; M.A., Fisk University, 1983; Ph.D., California School of Professional Psychology, 1992.

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B.Architecture, University of California, Berkeley, 1953; M.S.C.R.P., University of Southern California, 1969.

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# EMERITI

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- ADAIR, VIRGINIA H., *Professor, English and Foreign Languages* (1957-1979)
- AMBROSE, ETHEL, *Custodian, Physical Plant* (1977-1990)
- ANDERSON, KENNETH, *Professor, Chemistry* (1963-1992)
- ANOOSHIAN, V. BARNEY, *Professor, Health, Physical Education, Recreation, and Dance* (1958-1986)
- ANTHONY, HARRY A., *Professor, Urban Planning* (1972-1983)
- APPEL, EDWARD C., JR., *Professor, Agricultural Biology* (1946-1976)
- ARMSTRONG, ROY A., *Professor, School of Education* (1972-1991)
- ARMSTRONG, WILLIAM W., JR., *Assistant Coordinator, Media Resources Center* (1960-1982)
- ASBELL, CHARLES W., *Professor, Plant and Soil Science* (1978-1991)
- ASCHENBRENNER, ALBERT J., *Dean* (1947-1975)
- ATKINSON, RUSSELL H., *Lecturer, Chemical and Materials Engineering* (1982-1988)
- AXELSON, CHARLES F., *Lecturer, Accounting* (1985-1991)
- BAGWELL, CLAYTON, *Lecturer, Computer Information Systems* (1974-1991)
- BAKKEN, MICKEY, *Supervisor, University Information Center* (1969-1987)
- BARNETT, JAMES A., *Equipment Technician, Biological Sciences* (1961-1980)
- BATCHELLER, JOHN D., *Director, Orientation and Development Center* (1976-1992)
- BATCHELLER, OLIVER A., *Professor, Ornamental Horticulture* (1946-1978)
- BEARDMORE, ROBERT L., *Professor, Mechanical Engineering* (1958-1988)
- BEATON, JOSEPH P., *Associate Professor, Geography and Anthropology* (1989-1996)
- BEILBY, RUBY I., *Professor, Food, Nutrition & Consumer Sciences* (1972-1996)
- BELCHER, MELVIN B., *Professor, Electrical Engineering* (1958-1979)
- BELL, JAMES, *Vice President for Student Affairs* (1968-1989)
- BELLMAN, SAMUEL C., *Professor, English and Foreign Languages* (1957-1996)
- BERNE, JOHN R., *International Student Advisor, International Center* (1960-1997)
- BIRNBAUM, SIDNEY, *Professor, Mathematics* (1970-1997)
- BLACK, RICHARD T., *Professor, Electrical and Computer Engineering* (1960-1973)
- BLAKELY, LAWRENCE M., *Professor, Biological Science* (1963-1990)
- BOCHKOR, STEPHEN F., *Professor, Landscape Architecture* (1971-1995)
- BOLAND, GERTRUDE C., *Professor, Economics* (1957-1978)
- BOYKIN, EDWARD W., *TV Engineer, Distance Learning* (1984-1995)
- BRADY, MARY D., *Supervising Administrative Assistant, Student Health and Psychological Center* (1960-1991)
- BRAY, ROBERT S., *Professor, Chemical and Materials Engineering* (1980-1990)
- BRIGHT, BRATCHER L., *Professor, Industrial and Materials Engineering* (1964-1992)
- BROWN, HOWARD S., *Professor, Biological Sciences* (1948-1983)
- BROWNE, PHILIP R., *Professor, Music* (1963-1994)
- BRUNS, ROBERT A., *Professor, Electrical and Computer Engineering* (1966-1980)
- BURDICK, THOMAS A., *Professor, Communication* (1962-1986)
- BUHR, JOHN S., *Professor, Engineering Technology* (1975-1996)
- BURMA, JOHN H., *Professor, Behavioral Science* (1969-1982)
- BUTTERWORTH, JOHN R., *Professor, English and Modern Languages* (1961-1975)
- CAMP, RICHARD G., *Associate Professor, Engineering Technology* (1979-1988)
- CANHAM, ALBERT E., *Professor, Plant and Soil Science* (1948-1980)
- CARLBERG, GEORGE E., *Professor, Accounting* (1949-1975)
- CARLIN, SIDNEY, *Professor, Behavioral Science* (1969-1987)
- CARLSON, PAUL, *Livestock Technician, Animal Science* (1977-1989)
- CARLSTEDT, GEORGE C., *Assistant Professor, Mathematics* (1959-1972)
- CARTER, JOEL, *Professor, Horticulture/Plant and Soil Science* (1968-1992)
- CASTLEMAN, JACOB I., *Professor, Electrical and Computer Engineering* (1968-1989)
- CATHERS, MARY WHITLEY, *Professor, Human Resources and Small Business Management* (1961-1979)
- CATLETT, JOHN C., *Lecturer, Management and Human Resources* (1979-1992)
- CHRISTENSEN, ALLEN C., *Professor, Animal and Veterinary Sciences and Dean, College of Agriculture* (1964-1994)
- CHRISTIAN, KATHLEEN, *Registered Nurse, Student Health, Counseling and Psychological Services* (1977-1993)
- CHURCH, DAVIDA., *Professor, Communication* (1962-1997)
- CLANTON, HENRY M., *Professor, Electrical and Computer Engineering* (1964-1977)
- COLE, DAVID E., *Professor, Agricultural Business Management* (1962-1988)
- COLOMAN, DONNA S., *Director of Alumni Affairs* (1968-1994)
- COMER, JOHN W., *Professor, Civil Engineering* (1962-1976)
- COMPTON, MEL, *Associate Professor, Chemical and Materials Engineering* (1958-1973)
- CONARD, HAVEN QUIN, *Professor, Agricultural Engineering* (1946-1979)
- COOMBS, WALTER P., *Professor, Social Science* (1971-1992)
- COPPIN, VICTOR E., *Professor, Social Work* (1972-1991)
- COTA-ROBLES, SUAREZ, CECILIA, *Professor, School of Education* (1972-1992)
- COULTER, CHARLES, *Professor, Music* (1961-1981)
- COWAN, ARNOLD A., *Lecturer, Industrial and Manufacturing Engineering* (1984-1994)
- CULLEN, THEODORE J., *Professor, Mathematics* (1966-1990)
- CURRIE, MADELINE A., *Director, Graduate Studies, College of Business* (1969-1988)
- DALE, LEON, *Professor, Management and Human Resources* (1969-1991)
- DALE, WILLIAM R., *Professor, Urban and Regional Planning* (1964-1987)
- DAUGHERTY, RAYMOND C., *Professor, Kinesiology and Health Promotion* (1960-1996)
- DAVIS, RUTHANNA A., *Professor, Foods & Nutrition* (1971-1991)
- DAWSON, PETER D., *Professor, Management and Human Resources* (1970-1989)
- DAY, SARAH, *Professor, School of Education* (1976-1992)
- DEAN, FRANCIS H., *Professor, Landscape Architecture* (1976-1989)



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- DEGRAFFENREID, EDNA, *Library Assistant, Library* (1954-1979)
- DERFER, GEORGE E., *Associate Professor, Philosophy* (1983-1997)
- DEV, VASU, *Professor, Chemistry* (1965-1996)
- DeVILBISS, MARY LEE, *Librarian, University Library* (1972-1985)
- DIMITMAN, JEROME E., *Professor, Biological Sciences* (1949-1983)
- DIVELBESS, DIANE, *Professor, Art* (1963-1990)
- DOWELL, DOUGLAS C., *Professor, Mechanical Engineering* (1968-1986)
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- ENGLUND, CARL R., *Dean* (1948-1970)
- ERSPAMER, JACK L., *Professor, Biological Sciences* (1956-1988)
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- EVANS, WILLIAM M., *Professor, History* (1968-1988)
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- FAUSCH, HOMER D., *Professor, Animal Science* (1956-1982)
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- FRIEDMAN, STUART M., *Professor, Mathematics* (1967-1988)
- FROST, JACK B., *Professor, Health and Physical Education* (1967-1987)
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- GARRITY, RODMAN F., *Professor, School of Education* (1962-1988)
- GASSER, OTTO F. W., *Professor, Kinesiology and Health Promotion* (1966-1997)
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- GLASER, WALTER W., *Professor, Art* (1960-1988)
- GOEHLER, BRIGITTE H., *Professor, Biological Sciences* (1967-1991)
- GRAVES, GEORGE R., *Professor, Aerospace Engineering* (1958-1992)
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- GRIFFIN, JAMES M., *Professor, Ornamental Horticulture* (1949-1970)
- GRISELLE, SHERMAN W., *Professor, Urban and Regional Planning* (1966-1987)
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- STEELE, DONALD D., *Farm Supervisor, Plant and Soil Science* (1968-1991)
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- STEVENSON, WILLIAM, *Instructional Support Technican, Health, Physical Education, and Recreation* (1967-1989)
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- STULL, ROBERT B., *Professor, Health and Physical Education* (1947-1983)
- STYMELSKI, H. PAUL, *Professor, Engineering Technology* (1983-1991)
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- TOMLINSON, JOHN L., *Professor, Chemical and Materials Engineering* (1969-1994)
- TOTMAN, JANE M., *Professor, Social Work* (1979-1986)
- TUCKER, DOROTHY M., *Professor, School of Education* (1957-1976)
- TURNER, YVONNE, *Professor, School of Education and Integrative Studies* (1977-1997)
- TUUL, JOHANNES, *Professor, Physics* (1965-1991)
- VOGEN, BLAINE, *Professor, Civil Engineering* (1969-1984)
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- VOLSKI, CHESTER A. *Professor, Landscape Architecture* (1959-1991)  
 WANG, MARTIN I., *Professor, Communication* (1959-1987)  
 WAGNER, GERALD E., *Professor, Computer Information Systems* (1966-1995)  
 WASSERMAN, BARRY L., *Professor, Architecture* (1984-1997)  
 WEBER, WARREN C., *Professor, Management and Human Resources* (1969-1996)  
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 WELCH, JOHN C., *Director, Health Center* (1965-1987)  
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 WHITE, SYLVIA, *Professor, Urban and Regional Planning* (1977-1994)  
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 WILLIAMS, D. WAYNE, *Professor, Operations Management* (1967-1995)  
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 WILLARD, ROBERT, *Professor, Accounting* (1976-1992)  
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