

## Message from the Chancellor

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Dear Students,

It pleases me to know that you have chosen to join the highly diverse Bobcat community at UC Merced. We welcome you to a campus distinguished by our individual attention to students, research excellence and community engagement.

We are cognizant of our role as a much-needed economic engine of the San Joaquin Valley. We have made it our mission to raise the educational level, reduce poverty, and discover solutions to chronic health concerns among Valley residents. We live by sustainable principles, and are quite proud to be recognized for our environmentally sound facilities by the U.S. Green Building Council.

I often communicate my vision for UC Merced by using this acronym to help people remember:

M — Model university for the 21st century

E — Education

R — Research excellence

C — Community engagement/service

E — Economic development and environmental care

D — Diversity

What does this mean for you as a student? This vision reflects our values as a campus, and we encourage you to consider them a guide while you are a student and beyond.

During your academic career with us, you will benefit from the culture of success on campus. The professors and staff are committed to engaging you in discussions and activities—in and out of class, as well as on and off campus—designed to fine-tune your potential, deepen bonds and awaken your life's passions.

When you reach the end of your journey with us, we hope that what you gained here moves you to be our ambassadors. Tell the world about the unique experience that is UC Merced. For our part, we will continue to build a university worthy of your pride.



“EDUCATION  
IS THE BEST  
PROVISION FOR  
THE JOURNEY  
TO OLD AGE.”

—Aristotle, Greek critic, philosopher,  
physicist, & zoologist (384 BC - 322 BC)

Steve Kang  
Chancellor

# About the 2009-2011 Catalog

## CATALOG YEAR

Official degree and major requirements are listed in this catalog. Undergraduate and graduate students are subject to requirements based on a particular catalog, referred to as the student's "catalog year." The catalog year is determined for new students as the catalog in effect at the time of their initial enrollment in courses at UC Merced, provided there is no break of more than 3 consecutive terms (e.g., 2 semesters and 1 summer) in enrollment. It is campus policy to introduce changes in graduation requirements such that students who began their careers with UC Merced before the change will not be hindered substantially in the orderly pursuit of their degrees. Changes in requirements that increase the number or distribution of courses required normally will not be applied to students with earlier catalog years, provided there is no break in enrollment exceeding 3 terms. The student's catalog year determines both the major and general education requirements for degree completion. Students may elect to adhere to a different catalog year if they wish to follow the general education and major requirements listed in a catalog published subsequently to that which was in place at the time of their initial enrollment; the student must note this in a petition to his or her School.

Students transferring from other institutions may elect either (1) those major requirements in effect at the time of transfer to UC Merced; or (2) those in effect up to two years prior to matriculation, provided that their transcripts from earlier schools indicate commitment to the major within that period and that they have adequate preparation for upper-division coursework.

## INSTITUTIONAL RESPONSIBILITY

Undergraduate and graduate students who have made significant progress toward a degree in a specific major can assume that a degree will be granted if they meet all catalog degree requirements and maintain continuous enrollment and progress. Should UC Merced find it necessary to discontinue a specific major, every effort will be made to allow currently enrolled majors to complete their degrees within a reasonable period of time. This may include (1) movement to a similar or related degree track; (2) substitution of requirements; (3) development of an individual major proposal; or (4) completion of courses at another University of California campus through the Intercampus Visitor Program. Students with questions concerning this policy should contact their major and school advising offices. In all cases, any financial obligations are the responsibility of the individual student involved.

PLEASE NOTE: This catalog contains information about UC Merced. Because the UC Merced Catalog must be prepared well in advance of the years it covers, changes in some programs and courses inevitably will occur. The selection of courses to be offered each semester is subject to change without notice, and some courses are not offered each year. The Schedule of Classes, available on the Web shortly before registration begins, provides more current information on courses, instructors, enrollment procedures and restrictions, class hours, room assignments, and final examination schedules. Students should consult the appropriate School or campus unit for even more up-to-date information. Their contact information can be found in the contact information section of this catalog. It is the responsibility of the student to become familiar with the announcements and regulations of the university that are printed in this catalog and other campus publications. The catalog is the document of record for degree requirements and is updated in print form every two years. For the most up-to-date information on requirements, please visit: [www.ucmerced.edu/Editors](http://www.ucmerced.edu/Editors).

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## How To Obtain The Catalog

Copies of this catalog may be obtained from:

Bobcat Bookstore  
Phone: (209) 228-2665  
Web site: [bookstore.ucmerced.edu](http://bookstore.ucmerced.edu)

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# Contents

Message from the Chancellor . . . . .	1	Computer Science And Engineering Major . . . . .	65	Core . . . . .	158
About the 2009-2011 Catalog . . . . .	2	Environmental Engineering Major . . . . .	67	Computer Science And Engineering. . . . .	158
Academic Calendars . . . . .	4	Materials Science And Engineering Major . . . . .	70	Economics . . . . .	160
Offered Degrees. . . . .	5	Mechanical Engineering Major. . . . .	72	Education . . . . .	161
UC Merced Contact Directory. . . . .	6	School Of Natural Sciences . . . . .	74	Electrical Engineering And Computer Science . . . . .	161
Welcome To UC Merced . . . . .	7	Applied Mathematical Sciences Major . . . . .	76	Engineering . . . . .	162
<b>GENERAL INFORMATION</b>		Biological Sciences Major . . . . .	82	Environmental Engineering. . . . .	164
UC Merced On Campus And In The Valley . . . . .	8	Chemical Sciences Major. . . . .	89	Environmental Systems. . . . .	165
The University Of California . . . . .	9	Earth Systems Science Major. . . . .	94	Earth Systems Science . . . . .	166
Environmental Stewardship . . . . .	10	Physics Major . . . . .	96	French . . . . .	168
UC Merced Mission Statement . . . . .	12	Natural Sciences Minors . . . . .	101	Global Arts Studies Program . . . . .	168
Overview Of Undergraduate And Graduate Study . . . . .	13	School Of Social Sciences, Humanities And Arts. . . . .	103	Geography. . . . .	169
The UC Merced Library . . . . .	14	Anthropology Major . . . . .	105	Human Biology . . . . .	169
Information Technology. . . . .	15	Cognitive Science Major . . . . .	107	History. . . . .	170
Recreation and Athletics . . . . .	15	Economics Major. . . . .	110	Integrated Calculus And Physics . . . . .	172
Student Life . . . . .	17	History Major . . . . .	111	Japanese. . . . .	172
Student Housing . . . . .	18	Literatures and Cultures Major . . . . .	114	Literature . . . . .	172
Student Services. . . . .	19	Management Major . . . . .	117	Mathematics. . . . .	175
International Programs . . . . .	22	Political Science Major . . . . .	118	Mechanical Engineering . . . . .	177
Transportation and Parking Services (TAPS) . . . . .	24	Psychology Major . . . . .	120	Mechanical Engineering And Applied Mechanics . . . . .	177
<b>FEES AND EXPENSES</b>		Sociology Major . . . . .	122	Management . . . . .	178
Fees And Expenses . . . . .	25	SSHA Programs . . . . .	123	Materials Science And Engineering	179
<b>UNDERGRADUATE INFORMATION</b>		SSHA Minors. . . . .	126	Natural Sciences Education. . . . .	180
Undergraduate Admissions . . . . .	29	<b>GRADUATE EDUCATION AND RESEARCH</b>		Philosophy . . . . .	181
Application Process . . . . .	30	Graduate Studies . . . . .	131	Physics. . . . .	181
Freshman Admission . . . . .	32	<b>RESEARCH</b>		Political Science . . . . .	183
Transfer Admission . . . . .	34	Research At UC Merced. . . . .	144	Psychology. . . . .	184
<b>FINANCIAL AID AND SCHOLARSHIPS</b>		The Sierra Nevada Research Institute (SNRI) . . . . .	144	Public Policy . . . . .	187
Financial Aid And Scholarships . . . . .	39	Center For Nonimaging Optics . . . . .	145	Quantitative And Systems Biology	188
<b>ACADEMIC POLICIES AND PROCEDURES</b>		Biomedical and Systems Biology Research Institute (BSBR) . . . . .	145	Social And Cognitive Sciences . . . . .	189
Academic Policies And Procedures. . . . .	44	<b>COURSES</b>		Sociology . . . . .	190
Enrollment . . . . .	44	Course Descriptions . . . . .	146	Spanish . . . . .	191
Examinations . . . . .	49	Anthropology . . . . .	146	Undergraduate Studies. . . . .	192
Grades, Progress To Degree And Dismissal. . . . .	50	Arts . . . . .	148	World Cultures And History . . . . .	192
Graduation . . . . .	55	Biological Engineering And Small- Scale Technologies . . . . .	150	World History . . . . .	193
<b>GENERAL EDUCATION AND COLLEGE ONE</b>		Biological Sciences . . . . .	150	Writing . . . . .	194
General Education And College One . . . . .	56	Bioengineering. . . . .	153	<b>UNIVERSITY OFFICERS AND FACULTY</b>	
<b>SCHOOLS AND MAJORS</b>		Chemistry . . . . .	154	University Administrative Officers . . . . .	196
School of Engineering. . . . .	60	Chinese . . . . .	156	University Faculty . . . . .	198
Bioengineering Major . . . . .	63	Cognitive Science . . . . .	156	University Endowed Chairs . . . . .	204

# Academic Calendars

## FALL SEMESTER 2009

Housing Move-In	Friday	August 21, 2009
Instruction Begins	Tuesday	August 25, 2009
Labor Day Holiday	Monday	September 7, 2009
Veterans Day Holiday	Wednesday	November 11, 2009
Thanksgiving Holiday	Thursday - Friday	November 26 - 27, 2009
Instruction Ends	Wednesday	December 9, 2009
Final Exam Preparation	Thursday	December 10, 2009
Final Exams	Friday - Thursday	December 11 - 17, 2009
Semester Ends	Thursday	December 17, 2009
Housing Move-Out (Winter Break)	Friday	December 18, 2009
Winter Holiday	Thursday - Friday	December 24 - 25, 2009
New Years Holiday	Thursday - Friday	December 31, 2009 - January 1, 2010

## SPRING SEMESTER 2010

Martin Luther King Jr. Holiday	Monday	January 18, 2010
Housing Move-In	Monday	January 18, 2010
Instruction Begins	Tuesday	January 19, 2010
Presidents Day	Monday	February 15, 2010
Spring Recess	Monday - Thursday	March 22 - 25, 2010
Cesar Chavez Holiday	Friday	March 26, 2010
Instruction Ends	Friday	May 7, 2010
Final Exam Preparation	Saturday - Sunday	May 8 - 9, 2010
Final Exams	Monday - Friday	May 10 - 14, 2010
Semester Ends	Friday	May 14, 2010
Commencement	Saturday	May 15, 2010

## PROPOSED FALL SEMESTER 2010

Housing Move-In	Friday	August 20, 2010
Instruction Begins	Tuesday	August 24, 2010
Labor Day Holiday	Monday	September 6, 2010
Veterans Day Holiday	Thursday	November 11, 2010
Thanksgiving Holiday	Thursday - Friday	November 25 - 26, 2010
Instruction Ends	Wednesday	December 8, 2010
Final Exam Preparation	Thursday	December 9, 2010
Final Exams	Friday - Thursday	December 10 - 16, 2010
Semester Ends	Thursday	December 16, 2010
Housing Move-Out (Winter Break)	Friday	December 17, 2010

## PROPOSED SPRING SEMESTER 2011

Martin Luther King Jr. Holiday	Monday	January 17, 2011
Housing Move-In	Monday	January 17, 2011
Instruction Begins	Tuesday	January 18, 2011
Presidents Day	Monday	February 21, 2011
Spring Recess	Monday - Thursday	March 21 - 24, 2011
Cesar Chavez Holiday	Friday	March 25, 2011
Instruction Ends	Friday	May 6, 2011
Final Exam Preparation	Saturday - Sunday	May 7 - 8, 2011
Final Exams	Monday - Friday	May 9 - 13, 2011
Semester Ends	Friday	May 13, 2011

Additional information regarding the academic calendar including summer session dates, can be found at [registrar.ucmerced.edu](http://registrar.ucmerced.edu).

## Undergraduate Degrees

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### **Anthropology, B.A.\***

### **Applied Mathematical Sciences, B.S.**

Emphases: Computational Biology

Computer Science and  
Engineering

Economics

Engineering Mechanics

Physics

### **Bioengineering, B.S.**

### **Biological Sciences, B.S.**

Emphases: Molecular and Cell Biology

Human Biology

Ecology and Evolutionary  
Biology

Developmental Biology

Microbiology and Immunology

### **Chemical Sciences, B.S.**

Emphases: Biological Chemistry

Chemistry

Environmental Chemistry

Materials Chemistry

### **Cognitive Science, B.A. and B.S.**

### **Computer Science and Engineering, B.S.**

### **Economics, B.A.**

### **Earth Systems Science, B.S.**

### **Environmental Engineering, B.S.**

Emphases: Hydrology

Water Quality

Air Pollution and Sustainable  
Energy

### **History, B.A.**

Concentrations: World History

United States History

### **Literatures and Cultures, B.A.**

Concentrations: Literatures of the English  
Speaking World

Literatures of the Spanish  
Speaking World

### **Management, B.S.**

### **Materials Science and Engineering, B.S.**

### **Mechanical Engineering, B.S.**

### **Physics, B.S.**

Emphases: Atomic/Molecular/Optical

Physics

Biophysics

Mathematical Physics

### **Political Science, B.A.**

### **Psychology, B.A.**

### **Sociology, B.A.\***

### **MINORS**

Minor in American Studies

Minor in Anthropology

Minor in Applied Mathematics

Minor in Arts

Minor in Cognitive Science

Minor in Economics

Minor in History

Minor in Literatures and Cultures

Minor in Management

Minor in Natural Sciences Education

Minor in Philosophy

Minor in Physics

Minor in Political Science

Minor in Psychology

Minor in Services Science

Minor in Sociology

Minor in Spanish

Minor in Writing

### **PLANNED ENGINEERING MAJORS**

Chemical Engineering, B.S.

Civil Engineering, B.S.

Electrical Engineering, B.S.

Engineering Economics and Management, B.S.

### **PLANNED SOCIAL SCIENCES, HUMANITIES AND ARTS MAJORS**

Arts, B.A.

International Communications, B.A.

Law and Society, B.A.

Museum Studies, B.A.

Philosophy, B.A.

Spanish Language and Cultures, B.A.

### **PLANNED NATURAL SCIENCES MAJORS**

Biochemistry, B.S.

## Graduate Degrees

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### **Individual Graduate Programs and Groups M.A., M.S., Ph.D.**

*Graduate Group Emphases include:*

Applied Mathematics

Biological Engineering and Small-  
Scale Technologies

Electrical Engineering and  
Computer Science

Environmental Systems

Mechanical Engineering and  
Applied Mechanics

Physics and Chemistry

Quantitative and Systems Biology

Social and Cognitive Sciences

World Cultures

For updates and changes to program offerings, consult with the Graduate Division.

\*Pending WASC approval.

# UC Merced Contact Directory

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## UNIVERSITY OF CALIFORNIA, MERCED

5200 N. Lake Road  
Merced, CA 95343  
General information: (209) 228-4400  
www.ucmerced.edu

## ADMISSIONS-UNDERGRADUATE

Admissions  
Kolligian Library Room 108  
(209) 228-4682 (CAT-GoUC)  
Toll free in California (866) 270-7301  
E-mail: admissions@ucmerced.edu  
admissions.ucmerced.edu

## ADMISSIONS-GRADUATE DIVISION

Kolligian Library Room 227  
(209) 228-4723 (CAT-GRAD)  
E-mail: graddiv@ucmerced.edu  
graduatedivision.ucmerced.edu

## BOBCAT COLLEGE STORE

Kolligian Library Room 160  
(209) 228-2665 (CAT-BOOK)  
bookstore.ucmerced.edu

## CAMPUS TOURS

Campus Visitor Center  
(209) 228-6316  
Toll free in California (866) 270-7301  
E-mail: tours@ucmerced.edu

## CAREER SERVICES

Kolligian Library Room 127  
(209) 228-7272 (CATS-CSC)  
E-mail: careerservices@ucmerced.edu  
careerservices.ucmerced.edu

## COLLEGE ONE

Kolligian Library Room 167  
(209) 228-7458  
E-mail: collegeone@ucmerced.edu

## COUNSELING SERVICES

Joseph Edward Gallo Recreation  
and Wellness Center  
(209) 228-7337 (CAT-PEER)  
E-mail: counseling@ucmerced.edu  
counseling.ucmerced.edu

## DINING SERVICES

Dining Commons  
(209) 228-3463 (CAT-DINE)  
dining.ucmerced.edu

## DISABILITY SERVICES

Kolligian Library Room 109  
(209) 228-7884  
E-mail: disabilityservices@ucmerced.edu  
disability.ucmerced.edu

## FINANCIAL AID AND SCHOLARSHIPS

Kolligian Library Room 122  
(209) 228-4243 (CAT-4AID)  
E-mail: finaid@ucmerced.edu  
financialaid.ucmerced.edu

## HEALTH SERVICES

Joseph Edward Gallo Recreation  
and Wellness Center  
(209) 228-2273 (CAT-CARE)  
E-mail: health@ucmerced.edu  
health.ucmerced.edu

## HOUSING AND RESIDENCE LIFE

(209) 228-4663 (CAT-HOME)  
E-mail: housing@ucmerced.edu  
housing.ucmerced.edu

## INTERNATIONAL EDUCATION PROGRAM

Kolligian Library Room 101  
(209) 228-4722  
E-mail: General inquiries: international@  
ucmerced.edu  
EAP: eap@ucmerced.edu

## LIBRARY

Kolligian Library 2nd Floor  
(209) 228-4444  
E-mail: library@ucmerced.edu  
library.ucmerced.edu

## RECREATION AND ATHLETICS

Joseph Edward Gallo Recreation  
and Wellness Center  
(209) 228-7732 (CATS-REC)  
E-mail: recreation@ucmerced.edu  
recreation.ucmerced.edu

## OFFICE OF THE REGISTRAR

Kolligian Library Room 122  
(209) 228-2734 (CAT-2REG)  
E-mail: registrar@ucmerced.edu  
registrar.ucmerced.edu

## OFFICE OF RESEARCH

(209) 228-4429  
research.ucmerced.edu

## POLICE DEPARTMENT

(209) 228-2677 (CAT-COPS)  
E-mail: police@ucmerced.edu  
police.ucmerced.edu

## SCHOOL OF ENGINEERING

Science and Engineering Bldg. Room 270  
(209) 228-4411  
E-mail: engineering@ucmerced.edu  
engineering.ucmerced.edu

## SCHOOL OF NATURAL SCIENCES

Science and Engineering Bldg. Room 370  
(209) 228-4309  
E-mail: naturalsciences@ucmerced.edu  
naturalsciences.ucmerced.edu

## SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS

Classroom and Office Bldg. Room 241  
(209) 228-7742 (CAT-SSHA)  
E-mail: ssha@ucmerced.edu  
ssha.ucmerced.edu

## SIERRA NEVADA RESEARCH INSTITUTE

(209) 228-4429

## STUDENT ADVISING AND LEARNING CENTER

Kolligian Library Room 172  
(209) 228-7252 (CAT-SALC)  
E-mail: learning@ucmerced.edu  
learning.ucmerced.edu

## STUDENT BUSINESS SERVICES

Kolligian Library Room 122  
(209) 228-4114  
E-mail: sbs@ucmerced.edu  
sbs.ucmerced.edu

## STUDENT LIFE

Kolligian Library Room 184  
(209) 228-5433 (CAT-LIFE)  
E-mail: studentlife@ucmerced.edu  
students.ucmerced.edu

## STUDENTS FIRST CENTER

Kolligian Library Room 122  
(209) 228-7178 (CATS-1ST)  
E-mail: studentsfirst@ucmerced.edu  
studentsfirst.ucmerced.edu

## STUDENT GOVERNMENT

Kolligian Library Room 184  
(209) 228-4688 (CAT-GOVT)

## SUMMER SESSIONS

(209) 228-2736  
E-mail: summersession@ucmerced.edu  
summersession.ucmerced.edu

## VICE CHANCELLOR FOR STUDENT AFFAIRS

(209) 228-4482

## GREAT VALLEY CENTER

201 Needham Street  
Modesto, CA 95354  
(209) 522-5103  
E-mail: info@greatvalley.org  
www.greatvalley.org  
President: David Hosley

## UC MERCED CENTERS

### Bakersfield

2000 K Street, Suite 300  
Bakersfield, CA 93301  
(661) 861-7955

### Fresno

550 East Shaw Avenue  
Fresno, CA 93710  
(559) 241-7400

### Merced Tri-College Center

3600 M Street  
Merced, CA 95348  
(209) 381-6545

# Welcome To UC Merced

The University of California, Merced offers students the benefits of a major research university—the first to be built in the 21st century—with the personalized attention of an intimate campus setting. UC Merced is the tenth and newest campus of the University of California and is committed to excellence in teaching, research and public service.

“Innovative” and “hands-on” are central themes in the approach to learning at UC Merced, where students are invited to explore emerging areas of knowledge. Undergraduate and graduate students have unparalleled access to UC Merced’s distinguished faculty and state-of-the-art facilities. Working alongside these leading scholars, students can participate in ground-breaking research that crosses and links a wide array of disciplines. Research institutes created at UC Merced to conduct region- and state-wide research with national and international import include the Sierra Nevada Research Institute, the Center for Nonimaging Optics and the Systems Biology Institute. Campus partnerships with such organizations as the National Park Service and Lawrence Livermore National Laboratory offer additional intellectual and facilities resources, and expand opportunities for research on the cutting edge.

IT REALLY MADE ME A LEADER. LET’S FACE IT, COMING TO UC MERCED, THERE WERE CLEARLY MORE COWS THAN STUDENTS AT THE TIME OF ITS OPENING. I WOULD NEVER BE THE TYPE OF PERSON TO START OR LEAD ORGANIZATIONS, BUT UC MERCED HAS GIVEN ME THE OPPORTUNITY TO DEVELOP ORGANIZATIONS AND EVENTS. WE REALLY ARE GRADUATING FROM UC MERCED AS NOT ONLY FOUNDERS, BUT DRIVEN LEADERS.

— Heather Orrell, Biological Sciences

## THE CAMPUS

UC Merced’s three schools—the School of Engineering, School of Natural Sciences and School of Social Sciences, Humanities and Arts—offer both undergraduate and graduate degree programs, and emphasize links between disciplines. State-of-the-art library resources and laboratories further enrich students’ educational experience.

Adjacent to Lake Yosemite Park and just outside the city of Merced, UC Merced is continuing to develop in its convenient location at the center of California. Nestled between the Sierra Nevada range to the east and the Coast Ranges to the west, the over 800-acre campus is situated within a two-hour drive from San Francisco, the Pacific Ocean and Sacramento; less than two hours from Yosemite National Park and other Sierra Nevada destinations; and an hour from Fresno. Even closer to campus, the surrounding communities in Merced, Stanislaus and Mariposa Counties offer a unique selection of cultural, entertainment and recreational options for students to experience.

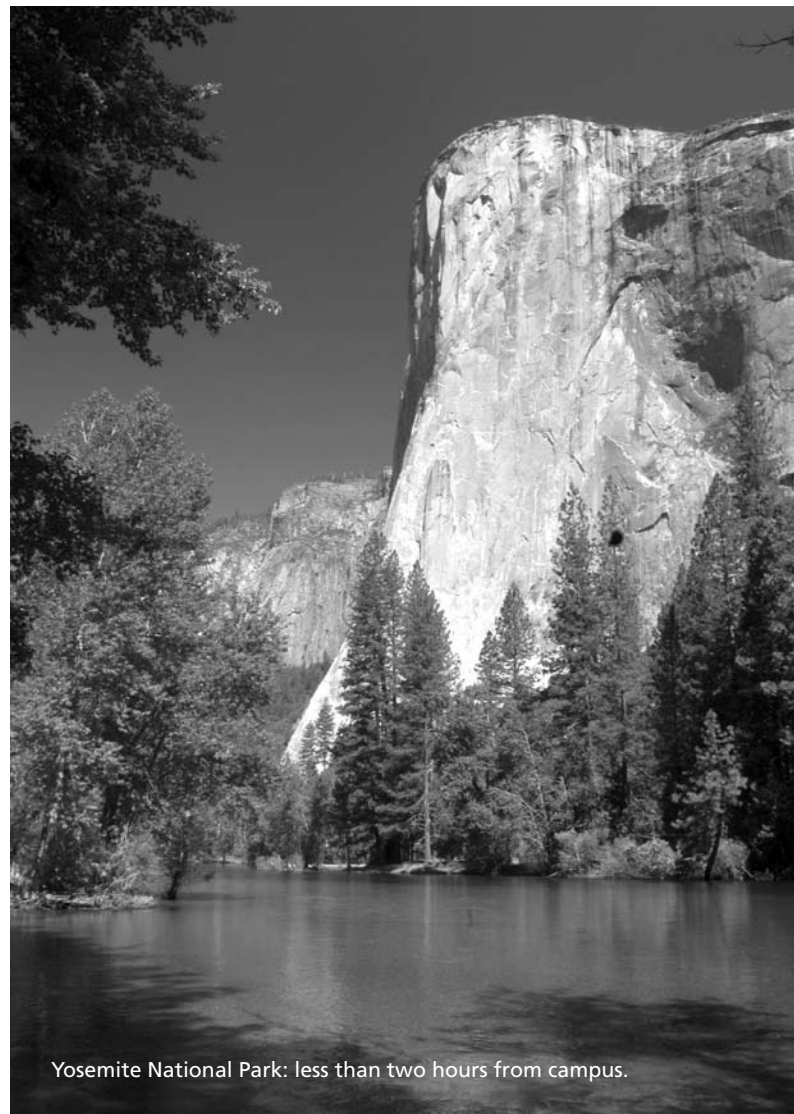
## AN INSTITUTION DESIGNED FOR STUDENTS

Full development of the campus is anticipated within about three decades, or around the year 2035, when UC Merced will serve an estimated 25,000 students.

UC Merced students have a once-in-a-lifetime chance to help create the student life experience for the UC Merced students who will follow. You are invited to add to campus traditions, create student organizations and activities, and offer your ideas on student services, planning priorities and university growth and development.

As a student at UC Merced, you can gain valuable skills through internships and service learning, expand your cultural and international awareness and understanding, develop your leadership potential and make lifelong friends through involvement in a variety of student programs. Student government, intercultural and residential programs, intramural and club sports, university events and a variety of clubs and organizations are among your many choices. Students also have access to a wide array of support services as well as academic, social, recreational and wellness activities.

You belong here!



Yosemite National Park: less than two hours from campus.



McFadden/Willis Reading Room in the Kolligian Library.

### ACADEMIC BUILDINGS

The first phase of campus development includes four academic buildings, in addition to housing and dining complexes, and the Joseph E. Gallo Recreation and Wellness Center. At the heart of the campus, featuring a library collection that blends books and bytes, the Leo and Dottie Kolligian Library is home to campus student services and administrative offices. It also is a welcoming meeting place for individual study, small group work and encounters with your friends. The majority of your classrooms and lecture halls are located in the Classroom Building, adjacent to the Carol Tomlinson-

MY FRESHMAN YEAR WAS THE GREATEST AS I FOUND TRUE FRIENDSHIP IN MY ROOMMATES, AN AWESOME JOB AT THE CAREER SERVICES CENTER, AND MET TONS OF PEOPLE WHO HAVE AIDED IN MY CONTINUING SUCCESS AS A STUDENT.

— Ashley Eagleson, Psychology

Keasey Quad. The Classroom Building features the 377-seat Lakireddy Auditorium, and other programmed space including teaching laboratories, and faculty and graduate student offices. The three-story Science and Engineering Building accommodates teaching in both wet and dry research laboratories and computing laboratories. A Social Sciences and Management Building is scheduled to open in 2010. Future buildings on the over 800 acre campus, include a second Science and Engineering Building and an Academic Services Building.

## UC Merced On Campus And In The Valley

### THE COMMUNITY

In the neighboring city of Merced, students will find a small, vibrant community. Currently home to more than 80,000 residents, the city retains the charm of a small town and boasts an average commute time of only 15 minutes.

Many educational, cultural and co-curricular activities connect students with the city of Merced and the surrounding region, and students are encouraged to experience the warmth of UC Merced's host community and discover its treasures. Wandering through the pedestrian-friendly downtown is a good place to start. Brick paved walking areas, alleys decorated with murals and Italian trellises, an award-winning multicultural arts center, a community playhouse and several historically significant buildings are among the features. Merced also is home to shops, restaurants, farmers markets and major retail stores, with additional choices available in the nearby cities of Modesto and Fresno.

### SERVING THE SAN JOAQUIN VALLEY THROUGH THE 10<sup>TH</sup> UNIVERSITY OF CALIFORNIA CAMPUS

UC Merced's history dates back to 1988, when the University of California Board of Regents first authorized planning for at least one additional campus based on projections of long-range enrollment demand.

The Regents targeted the San Joaquin Valley as the region where the tenth University of California campus should be located. As one of the fastest-growing regions in the state, the Valley population was one of the most distant from the nine existing UC campuses. The Regents wanted to encourage more Valley students to attend the University and to extend the University's role in contributing to the region. Locating UC Merced in the San Joaquin Valley has given the campus access to a rich natural laboratory for scientific and cultural research. UC Merced's proximity to the Sierra Nevada has also led to creation of a special relationship for education and research with three crown jewels of the U.S. National Park Service: Kings Canyon, Sequoia and Yosemite National Parks.





# The University Of California

## FIAT LUX. LET THERE BE LIGHT

Established in 1868, fewer than 20 years after California became a state, the University of California opened with 10 faculty members offering classes to 40 students the following year in Oakland. By 1873, the first academic buildings were completed on the UC Berkeley campus and the University moved to its new home. Today, the University of California serves more than 200,000 students and includes approximately 120,000 faculty and staff members. Encompassing 10 campuses, five medical centers, five law schools and a Statewide Division of Agriculture and Natural Resources, the University also manages three national laboratories for the U.S. Department of Energy. The University has awarded more than 1.5 million degrees and has more than 1.2 million living alumni.

## UC FACULTY

A leading center for innovation for more than a century, the University of California has responded to the needs of California through research, education and public service, and has helped to transform the world. University of California faculty members and researchers are pioneers in fields as diverse as agriculture, biological sciences, engineering, the environment, the arts, economics, medicine and technology, and approximately 50 have garnered Nobel Prizes for their pioneering discoveries and advances of knowledge. Among the University's current faculty are more members of the National Academy of Sciences than at any other university in the United States.

## UNIVERSITY OF CALIFORNIA: AN ECONOMIC FORCE IN CALIFORNIA

The University also fuels the state and national economies through the creation of thousands of California jobs and billions of dollars in revenues, countless discoveries that improve our quality of life and research to support innovation in fields critical to the future of our country. Technology developed by the University powers many of the state's top and emerging industries, and University of California faculty and alumni have founded or led such major companies as Chiron, Genentech, Intel Corp., Apple Inc. and Gap, Inc. A driving force in the daily life of Californians, the University is a critical source of civic leaders, social service programs and providers, and teachers at all levels of education.

## RESEARCH AND EDUCATION NETWORK

Teaching and research are strengthened within the University through an extensive network of laboratories, museums and galleries, UC Extension centers, and research and field stations, which provide valuable public service to the communities of California and the nation. The University of California further extends its resources to the public through its performing arts centers, athletic facilities and botanical gardens. With collections totaling more than 32 million volumes, the University's libraries are yet another valuable public asset and are surpassed in size on the North American continent only by the Library of Congress collection.

## UC ACADEMIC PREPARATION INITIATIVES TO K-12 AND COMMUNITY COLLEGE STUDENTS

Beyond its tripartite mission of teaching, research and public service, the University is committed to expanding the educational

horizons of California's students and is engaged in a growing number of initiatives to bolster achievement in the state's schools and better prepare students for college. UC Merced's academic preparation efforts, led by our Center for Educational Partnerships, connect with K-12 students through mentoring, tutoring, college advising and other academic programs, while community college students benefit from services that help them prepare for transfer to the University. The University of California's school partnerships offer curriculum development, direct instruction and community engagement, sophisticated data analysis of required student tests and additional assistance for many of California's lowest performing schools. For teachers and administrators, the University of California provides professional development opportunities designed to improve skills and effectiveness. Overall, the University of California's K-12 academic preparation initiatives directly affect hundreds of thousands of students and educators each year.

## GOVERNANCE OF THE UNIVERSITY OF CALIFORNIA

The University of California system is governed by the 26-member Board of Regents, including 18 general members appointed by the Governor. Charged with setting general policy and making budgetary decisions for the University, the Regents also appoint the UC President, the 10 campus chancellors and other top administrators for individual campuses and system wide divisions. Authority for University-wide academic matters is delegated to the Academic Senate, which is composed of faculty members and administrative officers from throughout the University of California system. For each campus, a division of the University of California Academic Senate guides academic policy. Students also have the opportunity to participate in policy-making at both the campus-wide and system-wide levels. For complete information about the University of California System, please visit [www.universityofcalifornia.edu](http://www.universityofcalifornia.edu).



# Environmental Stewardship

## ENVIRONMENTAL STEWARDSHIP: BUILDING

UC Merced is using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED™) system for all major campus development and construction. The LEED™ system provides a national standard for what constitutes a "green building." Using these stewardship elements in campus development will have the following environmental, economic, health and community benefits:

**Sustainable Sites** – 100% of the campus storm water flows into on site retention ponds that treat building and site contaminants.

**Recycling and Regional Materials** – Construction practices recycle and/or divert more than 90% of the job site waste from landfills, limit the distance that materials are transported to the site and incorporate recycled content materials and sustainable harvested wood products.

**Indoor Environment** – Buildings are designed to provide increased ventilation and use natural daylight, creating a more pleasant working environment inside.

**Water Conservation** – Water reduction in the buildings and landscape will lower the use of potable water up to 50% above minimum state standards by using fixtures that conserve wastewater, waterless urinals, drought-tolerant planting for landscaping and deep root tubes for trees, which direct water straight to the roots and eliminate excessive watering.

**Indoor Air Quality** – Paints, carpets and composite woods with low volatile organic compounds have been selected as a means to reduce indoor contaminants that might irritate or harm the comfort and wellbeing of building occupants.

**Energy** – Campus buildings are designed to energy performance targets that are significantly better (30-60%) than required by California law (Title 24) and than found at other University of California campuses. The campus also employs a centralized heating and cooling strategy that significantly improves efficiency and shifts the electricity used for cooling to nighttime hours. This minimizes UC Merced's impact on the state energy infrastructure.

**Living Laboratory** – UC Merced has installed an advanced building energy management and control system that allows centralized operation and monitoring of all building functions. This level of monitoring and control provides a unique opportunity to manage the campus efficiently and be a living laboratory for faculty and students to study and advance building energy science.

## ENVIRONMENTAL STEWARDSHIP: LANDSCAPE PRESERVATION

Thanks to support from the State of California, the Virginia Smith Trust and groups such as the David and Lucile Packard Foundation and The Nature Conservancy, the creation of UC Merced will help protect an important part of California's natural wetland and rangeland heritage. The Packard Foundation's historic gift to UC Merced preserves more than 5,000 acres of vernal pool habitat next to the new campus. Funding from the State of California has supported conservation easements, allowing continued grazing and preservation of thousands of acres of additional seasonal wetland habitat in eastern Merced County. As Founding Chancellor Carol Tomlinson-Keasey has observed, "The creation of UC Merced provides an unparalleled opportunity for environmental preservation. Vernal pool habitat in eastern Merced County has been disappearing for decades. The preservation efforts undertaken

as part of the creation of our campus will permanently protect thousands of acres of this sensitive habitat."

The campus is exploring opportunities to integrate education, research, conservation and recreation uses to promote the sustainability of UC Merced Conservation Land & Biological Resources.

## ENVIRONMENTAL STEWARDSHIP: RECYCLING PROGRAM

UC Merced has made a commitment to campus recycling and currently uses a "single stream" recycling methodology. This process is in place on the main campus, at the Castle Facility, and in the Mondo Building. All recyclable metal, glass, plastic and paper products are placed into containers positioned at each individual residence, workstation and throughout campus. Materials are collected by custodial and grounds staff and shipped to sorting stations by a contract waste hauler. The Environmental Health & Safety Office coordinates the recycling of all electronic waste, light bulbs, batteries, and cell phones per state and federal law. Campus green waste is sent to the local landfill for mulching and reuse. Facilities Management and Dining Services continue to work cooperatively to address food related waste and a pre-consumer food composting program is in the planning stages. The university is committed to increasing its percentage of recycled materials that are diverted away from the county landfill.

## ENVIRONMENTAL STEWARDSHIP: ENVIRONMENTAL PREFERABLE PURCHASING PROGRAM (EPP)

EPP considerations are incorporated into the qualitative analysis of competitive bids and contract awards. Campus furnishings, equipment, supplies and services are procured with a cradle-to-cradle focus on environmentally preferable characteristics from raw material acquisition in manufacturing through the entire life cycle. Some examples of campus EPP results include: wood furniture from renewable forests, campus office seating up to 99% recyclable with 44% recycled content, Energy Star office equipment, computers, water coolers; laundry equipment among the highest rated in energy and water efficiency; copy paper with a minimum of 30% recycled content, library stacks and dorm room bed frames are recycled steel; and locally grown food and food containers composed of sugar cane. UC Merced received the "Best Practices Award" for "Buy Recycled – Sustainable Operations" at the 2006 UC/CSU Sustainability Conference hosted by UC Santa Barbara.

## PLANNING AND DESIGNING FOR A SUSTAINABLE CAMPUS AND COMMUNITY

UC Merced is revising its Long Range Development Plan (LRDP) to create a development framework (land uses, circulation, and open space) to plan, design, build and operate the UC Merced campus at ever-increasing levels of sustainability. [1]

The LRDP establishes goals and policies that mandate the use of broad-based, innovative sustainable techniques in facility and infrastructure design and construction. It includes integration with the research initiatives and innovations that are part of the overall campus research program, particularly in the area of solar power and building energy management systems.

## PRINCIPLES OF COMMUNITY

*The University of California, Merced is committed to serving the people of the San Joaquin Valley, California, the nation and the world through excellence in education, research and public service. We strive to provide educational opportunities for all.*

*Our founding principles of community guide both the individual and collective behaviors of students, faculty and staff. The university expects that all of its members will emulate these fundamental principles as individuals and as a community.*

*We celebrate the spirit of academic excellence and strive to promote our University and its strengths through our daily interactions with students, staff, faculty and the community at large.*

*We maintain a working and learning environment based on integrity, fairness, cooperation, professionalism and respect.*

*We are a community comprised of individuals with multiple cultures, lifestyles and beliefs. We celebrate this diversity for the breadth of ideas and perspectives it brings.*

*We value the creativity of our students, staff and faculty, and acknowledge both their individual and collaborative achievements.*

*We encourage health and wellness and strive to develop a sense of environmental responsibility and stewardship among all the members of our community.*

*We are committed to achieving tolerance in our community. All persons – faculty, staff and students – regardless of background or lifestyle should participate and work together in a collegial atmosphere that we strive to make free of any and all acts of discrimination or harassment.*

*We respect, support and value the civil and respectful expression of individual beliefs and opinions.*

APPROVED: JANUARY 2003

Note: These are the Founding Principles of Community of the University of California, Merced. In the years ahead, they will undoubtedly be reviewed and modified by future UC Merced faculty, students and staff

### TRIPLE ZERO COMMITMENT BY 2020

- ZERO NET ENERGY: Through efficiency and renewable energy production.
- ZERO WASTE: Divert from landfill all campus waste by reducing excess consumption and recycling to the maximum extent feasible.
- ZERO CARBON FOOTPRINT: Produce zero net carbon emissions and prevent as much carbon emissions as it produces.

### ARCHITECTURE

Create a unique architectural identity for the campus by employing passive environmental system, such as shading, orientation and roof configuration, as design features on campus buildings; use of sustainable materials; and designing campus buildings to employ renewable energy production systems.

### LANDSCAPE

Design campus landscaping to emphasize regional natives, avoid invasive or allergenic species, and select plantings that are compatible with campus infrastructure, developing a palette of approved plant, ground cover and tree lists, as well as landscape design guidelines.

### DINING

Considering its location in the San Joaquin Valley, UC Merced has the opportunity to access many foods locally, avoiding the environmental impacts of long-distance shipping while promoting the local economy. Products that are fresh, locally grown and

produced, and environmentally friendly will be included in the campus' food offerings. Composting of food wastes will be explored as well.

UC Merced Dining is engaged in the campus' sustainable stewardship practices and committed to educate customers to enhance sustainability of our food resource and minimize waste.

Some practices at UC Merced dining include:

- Responsible Purchasing (Utilize local vendors, usage of green chemicals, biodegradable & compostable packaging, purchase from green businesses)
- Cooking Practices (Batch cooking, scratch cooking, utilization of leftovers)
- Waste Reduction (commingled recycling, trash compacting, zero waste catering, biofuel from grease waste, pre-consumer composting, coffee grind composting)

TAKE ADVANTAGE OF THE PROFESSORS  
HERE AT UC MERCED! EVERY SINGLE  
PROFESSOR HAS EXCEEDED MY  
EXPECTATIONS AND THEY ARE SO HELPFUL  
AND EAGER TO TALK TO THEIR STUDENTS.  
I ALSO ENCOURAGE EVERY STUDENT TO  
STUDY ABROAD.

— Erika Christine Maldonado, Social and Cognitive Sciences



I LEARNED THE VALUE OF HARD WORK AND BEING A LEADER. BEING ONE OF THE FIRST UNDERGRADUATE STUDENTS AT UC MERCED MADE ME UNAFRAID TO START SOMETHING NEW AND BE A LEADER.

— Claudia Zepeda, Psychology

## UC Merced Mission Statement

The University of California, Merced's mission is embodied in its proud claim of being the first American research university of the twenty-first century. As the tenth campus of the University of California, UC Merced will achieve excellence in carrying out the University's mission of teaching, research and service, benefiting society through discovering and transmitting new knowledge and functioning as an active repository of organized knowledge. As a key tenet in carrying out this mission, UC Merced promotes and celebrates the diversity of all members of its community.

A research university is a community bound by learning, discovery and engagement. As the first American student-centered research university of the twenty-first century, UC Merced's strong graduate and research programs will mesh with high quality undergraduate programs. New knowledge increasingly depends on links among the disciplines, working together on questions that transcend the traditional disciplines. UC Merced fosters and encourages cross-disciplinary inquiry and discovery. Interdisciplinary practice in research will nourish undergraduate learning, building a foundation to connect the ways that academic disciplines understand and grapple with society's problems. Undergraduates will experience education inside and outside the classroom, applying what they learn through undergraduate research, service learning and leadership development. As apprentice scholars, graduate students will build their understanding of and ability to do independent research in their chosen field, as the groundwork for entering professional life. Lifelong learners will continue to hone their knowledge and workplace skills.

The twenty-first century has opened with the promise of new ways of connecting people to new knowledge and to one another. UC Merced is a network, not simply a single place, linking its students, faculty and staff to the educational resources of the state, nation and world. The idea of network extends to UC Merced's relationships with neighboring institutions: educational, cultural and social. Born as a member of the distinguished network

Vice Chancellor Mary Miller helps students during Fall "move in" to the Valley Terraces.

known as the University of California, UC Merced seeks strong and mutually supportive relationships with a variety of collaborators in its region: public and private colleges and universities; federal and state organizations that share UC Merced's educational and research goals; and cultural and social institutions.

The idea of network will also be realized through the physical and intellectual integration between UC Merced and its surrounding community. The campus is planned as a model of physical sustainability for the twenty-first century, inviting all members of the campus and surrounding community to think and act as good stewards of the environment that they will convey to future generations.

UC Merced celebrates its location in the San Joaquin Valley, reflecting the poetry of its landscape, history, resources and diverse cultures, while capitalizing on and expanding the Valley's connections to the emerging global society. UC Merced recognizes that research that begins with the natural laboratory at home can extend what is known in the state, nation and world.



# Overview Of Undergraduate And Graduate Study

## COLLEGE ONE

College One is responsible for overseeing the general education experience at UC Merced, including the required Core Course sequence. College One provides a network to connect students with advising and coursework that meet the UC Merced faculty principles for a well-rounded education.

## SCHOOL OF ENGINEERING

Engineering combines scientific understanding with technical innovation to build things that determine our quality of life: new products and services, new technologies and methodologies, and new technological processes and industries. Engineering education at UC Merced provides students with the knowledge and know-how to solve societal problems and to become the technical leaders of tomorrow. The School of Engineering offers undergraduate majors in the fields of: Bioengineering, Computer Science and Engineering, Environmental Engineering, Materials Science and Engineering and Mechanical Engineering.

## SCHOOL OF NATURAL SCIENCES

The School of Natural Sciences encompasses fields of study that are devoted to understanding our physical and natural world: mathematics, biology, physics, chemistry and Earth and environmental sciences. Advances in these fields promise solutions to many of humankind's most pressing problems, from fighting new diseases to creating sustainable energy sources. Students will gain a deep understanding of physical, chemical and biological processes. Natural Sciences currently offers five undergraduate majors: Applied Mathematical Sciences, Biological Sciences, Chemical Sciences, Earth Systems Science and Physics; two minors are available: Physics and Natural Sciences Education.

## SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS

The educational mission of the School of Social Sciences, Humanities and Arts is to create a rich learning environment for looking at human nature through the lenses of the many disciplines represented within the School as well as the disciplinary intersections where the interesting questions lie. Social Sciences, Humanities and Arts offers nine undergraduate majors—Anthropology, Cognitive Science, Economics, History, Literatures and Cultures, Management, Psychology, Political Science, and Sociology—as well as many minors and a History Honors Program.

## GRADUATE EDUCATION AND RESEARCH

The UC Merced Division of Graduate Studies oversees masters and doctoral degree education. Society's most intractable problems are broad based and multifaceted. Viable solutions to these problems require multidisciplinary approaches that can benefit the people of California and the world beyond. UC Merced is committed to offering graduate students an opportunity to work on many of society's most pressing and important problems. UC Merced offers an individually tailored graduate program with emphases in nine areas: Applied Mathematics; Biological Engineering and Small-Scale Technologies; Electrical Engineering and Computer Science; Environmental Systems; Mechanical Engineering and Applied Mechanics; Quantitative and Systems Biology; Physics and Chemistry; Social and Cognitive Sciences; and World Cultures. Each of these is highly interdisciplinary in approach and designed

to facilitate interactions between faculty and students from a broad scope of traditional academic disciplines.

Research at UC Merced is integral to the educational experience. As apprentice scholars, graduate students join faculty in the work of discovery of new knowledge. Faculty research enriches undergraduate education through the continual updating of courses and curriculum, and special opportunities such as freshman seminars and undergraduate research programs. Interdisciplinary faculty research is fostered through research organizations such as the Sierra Nevada Research Institute, Center for Non-Imaging Optics and the Biomedical and Systems Biology Research Institute.

Professor Evan Heit meets with students.



# The UC Merced Library

## NOT WHAT RESEARCH LIBRARIES ARE...

## WHAT THEY WILL BE.

As a research library for the 21st century, the University of California, Merced Library is both a place on campus—in the form of the Leo and Dottie Kolligian Library—and an information nexus in the form of a digital presence on student and faculty computers.

The Kolligian Library houses a concentrated, highly dynamic collection of information resources and serves as a center for study, collaboration and research. The library's collections and services support undergraduate and graduate instructional programs as well as advanced research. Library resources and services are available throughout the campus as well as from remote computers connected to the campus virtual private network. Some library resources are in physical packages that sit on the shelves in such forms as books and DVDs. Others are in digital packages such as online journal articles, collections of sound recordings, data sets and geographic information systems.

In addition to library services and collections, the Kolligian Library houses many Student Affairs departments and campus administrative offices.

The main entrance to the building opens onto the Ed and Jeanne Kashian Floor, an open-air breezeway during fair weather and a lively focal point for social, educational and research activities on campus. The entrance way reading room has an adjacent coffee house and bookstore. Quieter spaces and collaborative workrooms

are found throughout the building. Wireless and hard-wired computer network access is available in all library spaces. Equipped with the latest instructional technologies, the Gonella Discovery Room on the second floor is the hub for teaching UC Merced students the retrieval, evaluation and application of information resources. UC Merced librarians also show up in classrooms where they collaborate with faculty to improve the information literacy of students. The magnificent McFadden/Willis reading room on the fourth floor is open to all for study and quiet reflection.

As an information nexus, the Kolligian Library works with California Digital Library to provide instant, around-the-clock access to an unequaled collection of more than:

- 24,200 online scholarly journals
- 300 reference databases
- 550,000 online books
- 92,000 U.S. government documents
- 300,000+ digital images representing works in architecture and the visual arts
- 4,500 online statistical files

In addition, the 35 million volumes held by the libraries of the University of California System surpass the number of volumes held by the Library of Congress and constitute one of the largest collections in the world.

Using the UC MELVYL catalog, members of the UC Merced community can request rapid delivery of books and articles from any UC system library. The UC Merced library is actively involved in creating digital access to research information and fine art as well, and works with faculty to digitize, manage, and preserve materials used for teaching and research. For further information, contact us at [library@ucmerced.edu](mailto:library@ucmerced.edu) or visit [ucmercedlibrary.info](http://ucmercedlibrary.info).

GO TO OFFICE HOURS!  
GET TO KNOW YOUR  
PROFESSORS. IT WILL  
LEAD TO POSSIBLE JOBS,  
RESEARCH POSITIONS  
AND GREAT LETTERS OF  
RECOMMENDATIONS.

—Kimberly Wilder, Literatures and  
Cultures of the English Speaking  
World



## Information Technology

The use of computers and networks has become pervasive in higher education. The UC Merced vision for information technology supports the campus commitment to deploying the best of current and emerging technologies and practices to help students make maximum use of information technology for academic purposes, administrative transactions and other activities. Students can reach virtually all applications and information, including e-mail, course software, registration materials and much more, via a single electronic ID and a customizable portal, myUCMerced ([my.ucmerced.edu](http://my.ucmerced.edu)).

From applying to UC Merced and tracking the application process to registering for courses and ultimately seeing grades, students use the Internet. For courses in which they are enrolled, the myUCMerced portal allows students to connect with a web site for each course. UC Merced's collaborative learning software puts students in touch with syllabi, course materials, library resources, assignments, grade books and course calendars; it lets students submit assignments and chat or send e-mail to other students and faculty in the course. The campus is laptop friendly, with wireless access common in

outdoor areas, as well as in classrooms. Inside the Library, wireless access is available in the stacks, with electrical outlets in carrels and other work areas.

Students living on campus have 10/100 MB Ethernet connectivity to the campus network and secure access to the campus network is available for those living off campus. In the Valley and Sierra Terraces, all residents have their own connection to the network, with additional ports in the common rooms and wireless access in residences and the Yablokoff –Wallace Dining Commons. Additional residence service includes a drop-in computer lab and group laptop study area.



All students are supported through online assistance and a Student Help Desk, open every weekday. Several computer labs on campus permit instructional and drop-in use. The Library is equipped with wireless and plug-in Ethernet ports for internal and Internet information access. Students can check out laptops for use within the Library.

In the classroom, too, students find a learning environment enriched by information technology. All rooms support projection of computer-based information, as well as video. Some rooms permit recording of lectures for streaming video on individual course web sites. Videoconferencing rooms support real-time interaction with remote sites via audio and video.

Because of the pervasive use of computer technology at UC Merced, it is strongly advised that students have their own personal computers, which should be capable of running typical Web and word processing applications. Students may find that their School has additional recommendations or requirements. Check the UC Merced web site for more specific School information.

### CHILD CARE

#### Early Childhood Education Center

(209) 228-5437 (CAT-KIDS)

E-mail: [ecec@ucmerced.edu](mailto:ecec@ucmerced.edu)

<http://ecec.ucmerced.edu/welcome/>

The UC Merced Early Childhood Education Center (ECEC) serves the young children of the students, staff, and faculty of UC Merced and a number of community children with high quality early care and education. The ECEC follows the campus calendar and is open year-round Monday-Friday from 7:30 a.m. to 5:30 p.m. The center serves infants (6 weeks – 17 months), toddlers (18-30 months) and preschoolers (31 months to Kindergarten entry).

For more information, including waiting list information, center curriculum, tuition rates and low-income assistance, please refer to the website ([ecec.ucmerced.edu](http://ecec.ucmerced.edu)). If you are interested in a tour, please call the center (209) 228-5437 to schedule an appointment.



## Recreation and Athletics

The Recreation and Athletics Program provides a wide variety of sports and recreational activities ranging from aerobics and other group fitness classes, to diverse intramural sports, sport clubs and comprehensive outdoor adventure trips.

The Joseph Edward Gallo Recreation and Wellness Center features a full complement of fitness classes, cardiovascular machines, weights and drop-in recreation such as basketball and volleyball. The Recreation Program also provides structured recreational opportunities in intramural sports such as flag football, basketball, volleyball and many more.

For those students who are looking for more competition, the Club Sports Program offers students the opportunity to be a part of teams that compete against other colleges and universities. Our current list of competitive sport club teams includes Men's and Women's Volleyball, Men's and Women's Soccer, Baseball, Softball, Men's Lacrosse, Badminton, Archery, table tennis, cheer and dance. For complete information on all Recreation activities, visit [recreation.ucmerced.edu](http://recreation.ucmerced.edu).

Recreation & Athletics also offers a full range of group fitness classes for students. These classes range from group cycling and yoga, to



Bobcat leads 2008 new students in the traditional "Walk across Scholars Lane Bridge" following the University's Convocation.

cardio and core stability classes. There is a class to fit everyone's interest and ability. In addition to group fitness classes, the Campus Recreation Fitness Program also offers one-on-one personal training sessions and "Ask the Trainer" sessions in the weight room to answer any fitness related question you may have.

Also making its home in the Joseph Edward Gallo Recreation Center is the Wilderness Center. The Wilderness Center serves as the "portal to the outdoors" for UC Merced students. The Wilderness Center has resources in Yosemite National Park, Sequoia and Kings Canyon National Parks and California State Parks. Equipment rental is also available from the Wilderness Center.

Recreational opportunities are plentiful at UC Merced. Immediately adjacent to the campus, Lake Yosemite offers swimming, boating and other outdoor activities. The City of Merced has an extensive network of biking and running paths, as well as city parks including a zoo and children's amusement area. The nearby Yosemite, Sequoia and Kings Canyon National Parks and other Sierra recreation areas provide easy access to a broad range of outdoor sports such as skiing and snow boarding, hiking and backpacking, boating, whitewater rafting and kayaking, fishing, horseback riding and much more.

Once in a while a four-legged Bobcat is spotted around campus!

MAKE THE MOST OF YOUR TIME HERE. WE HAVE SOME OF THE BEST NETWORKS AND OPPORTUNITIES TO MAKE A CHANGE IN THE WORLD AT OUR FINGERTIPS AND YOU SHOULD JUMP AT THE CHANCE TO BE A PART OF IT. YOU SHOULD OPEN YOURSELF TO NEW ADVENTURES AND JOURNEYS, AS IT WILL ONLY HELP YOU TO EVOLVE INTO A WELL-ROUNDED PERSON IN THE LONG RUN.

— Ashley Eagleson, Psychology





## Student Life

### ARTS AND ENTERTAINMENT

UC Merced is part of a vibrant community in the San Joaquin Valley and is located close to the city of Merced. The city has a population of over 80,000 and offers restaurants, parks, a weekly farmers' market and an active multicultural arts center. In addition to the local cinemas, Playhouse Merced has a full calendar of live performances. A variety of speakers and shows make appearances in town, and UC Merced works with faculty, staff and student clubs and organizations to add to those events.

In addition, Modesto (45 minutes to the north of Merced), Fresno (one hour to the south of Merced) and the San Francisco Bay area (two hours to the west of Merced) have an abundance of museums, theaters, arts centers and events. The San Joaquin Valley region is home to a variety of attractions such as the Lee Institute for Japanese Art in Hanford, Gallo Art Center in Modesto, Hilmar Cheese Factory, Castle Air Museum, and Mariposa Museum and History Center, with many other destinations to be found on the Merced Conference and Visitors Bureau web site at [www.yosemitegateway.org/attractions/index.php](http://www.yosemitegateway.org/attractions/index.php).

### STUDENT LIFE ACTIVITIES AND SPECIAL EVENTS

UC Merced is a place where our students have the desire and opportunity to create traditions and leave legacies that will carry forward for years to come. For students looking to get involved on campus, student activities opportunities abound. On a weekly basis activities and events are provided for students to enhance their out of the classroom experience. UC Merced activities and events range from concerts to carnivals, fashion shows to festivals, and also include off campus adventures to places like San Francisco, Fresno, and Modesto for shopping sprees, cultural activities, and athletic events like attending a Modesto Nuts Baseball Game.

The Office of Student Life also partners with faculty, staff, and students to organize large campus events such as Welcome Week, Family Weekend, Winter Masquerade Ball, the Cinco de Mayo Fiesta, New Student Convocation, Asian Fest, and the Gauntlet Games. If planning events and bringing spirit to campus is your joy, then joining the Campus Activities Board (CAB) may be just what you're looking for. The Campus Activities Board leads the way in coordinating and sponsoring exciting activities for UC Merced students, and is a great way to get involved in campus life.

### STUDENT GOVERNMENT, CLUBS AND ORGANIZATIONS

UC Merced students have the unique opportunity to establish UC Merced's Associated Student Government (<http://asucm.ucmerced.edu>), as well as the first clubs and organizations that enrich campus life. These organizations provide opportunities for students with common interests to help shape the direction of the new campus, build friendships, learn from each other and provide opportunities for social and academic networking. Over 100 clubs and organizations have been formed and fall into the following categories: cultural, special interest, community service, religious, academic/professional, wellness and art/music/dance. Sorority and Fraternity life is also underway at UC Merced. UCM students have established the first Greek letter organizations for the campus, furthering opportunities for student leadership and involvement.



### LEADERSHIP AND INTERCULTURAL PROGRAMS

Leadership development is an exciting part of student life at UC Merced. Whether you are a new, emerging, or seasoned student leader, with options that include conferences, mentor programs, workshops, lecture series, and participation in programs such as the Bobcat Leadership Series, and the Yosemite Leadership Program, there are learning and leadership opportunities for everyone.

Not to be overlooked is the wonderfully rich diversity of cultures at UC Merced. Through Intercultural Programs, students, staff, faculty, and the local community are exposed to film series, festivals, guest speakers and workshops that examine and celebrate the diversity of our world. Annual events like the Rainbow Festival, Pride Week, Women's History Month, Taste the World Food Festival and the Clothesline Project, provide UCM students an opportunity to learn, share and celebrate the rich fabric of diversity and culture evident both on campus and beyond.

For a list of registered clubs and organizations, or for more information on student life activities, visit the Student Life web site at [studentlife.ucmerced.edu](http://studentlife.ucmerced.edu) or e-mail: [studentlife@ucmerced.edu](mailto:studentlife@ucmerced.edu).

### CAMPUS AND STUDENT CONDUCT POLICIES

UC Merced strives to create an environment that fosters individual growth, freedom of expression and sense of community. The viability of this community depends on a common understanding among its members regarding their rights and responsibilities.

*The Student Handbook: Policies Applying to Campus Activities, Organizations and Students* ([http://studentlife.ucmerced.edu/docs/campus\\_regs\\_082607.pdf](http://studentlife.ucmerced.edu/docs/campus_regs_082607.pdf)) lays the foundation for that understanding and governs the conduct of all University of California, Merced students. It articulates the University's expectations regarding standards of conduct—in both academic and non-academic settings. In addition, the campus' Principles of Community, located toward the beginning of this catalog, further reinforce the expectations, obligations and privileges of participating as a member of the UC Merced community.

# Student Housing

## New students

New students who meet the contract deadline are guaranteed housing on campus within the safe and comfortable Sierra and Valley Terraces communities. The Sierra Terraces facility, which opened in 2007, was intentionally designed to promote interaction among residents, making it an ideal community for freshmen. New transfers, continuing students, and some freshmen make their home-away-from-home in the apartment-style suites at the Valley Terraces. Serving up a range of healthy and satisfying cuisine for breakfast, lunch and dinner, the Yablokoff-Wallace Dining Center caters to on-campus and commuter students, faculty, and staff. Visitors and members of the campus community seeking a quick meal on the run, a light snack or a cup of coffee can find what they're looking for as well. The Lantern Café, located in the Kolligian library, offers café beverages, pastries, and a wide variety of grab-and-go options for the student on the run.

## OFF-CAMPUS HOUSING OPPORTUNITIES

A variety of off-campus housing options are highlighted on the UC Merced Housing and Residence Life Office's web site, where information about local apartment complexes and an active property search database are available. The site includes valuable information that students should know before deciding to live off-campus. Please go to our web site at [housing.ucmerced.edu](http://housing.ucmerced.edu) or contact the Student Housing and Residence Life Office for more information about living off campus in Merced and Atwater.

## ON-CAMPUS HOUSING

Housing is guaranteed to incoming freshmen and transfer students who meet their respective contract submission deadlines. A limited number of continuing students who apply to live on campus are also guaranteed housing. Living on campus helps you to make friends and become familiar with our growing campus. Student and full-time residential life staff live on campus, providing the resources, programs and services that are essential to a safe and comfortable living environment.

The Sierra Terraces was designed to accommodate first-year students in this interactive community. Students living here enjoy two bedrooms that share a private bathroom. UC Merced's first residential community, the Valley Terraces, offers apartment-style suites located in nine, two-story buildings. Each suite has two or three bedrooms attached to a furnished living room. All residence halls offer workshops and events for getting to know faculty better. Bedrooms have a bed, desk, drawer and closet space for each resident. A limited number of singles also are available, with priority given to continuing students. Study, recreation, laundry, meeting rooms and mail facilities are located in the Terrace Center near the Student Housing and Residence Life administrative offices.

STUDENT HOUSING IS AN AWESOME  
COMMUNITY TO BE A PART OF.

— Samuel Kim, student

WHILE EVERYTHING REALLY WAS NEW AND STRANGE AT FIRST, THAT QUICKLY WORE AWAY AS UC MERCED BECAME A HOME AWAY FROM HOME. CLASSES CAN BE HARD SOMETIMES, BUT YOU ARE REWARDED IN THE END WITH NEW KNOWLEDGE AND EXPERIENCE.

— Emily DeCremer, Psychology

Room and board rates are posted on the UC Merced web site at [housing.ucmerced.edu](http://housing.ucmerced.edu). All freshmen and transfer students are strongly encouraged to consider on-campus housing. Nothing compares to the convenience and experience of living on campus.

For further information about housing, on- or off-campus, contact Student Housing and Residence Life at [housing@ucmerced.edu](mailto:housing@ucmerced.edu) or check our web site at [housing.ucmerced.edu](http://housing.ucmerced.edu).

## THE BOBCAT COLLEGE STORE

The UC Merced College Store is your first choice for textbooks, electronics and computer accessories, Bobcat apparel, school supplies and snacks.

### Books and Class Materials

We are your on-campus resource for new or used textbooks! They can be purchased through our online reservation system or by coming by the College Store. By reserving your textbooks, they will be delivered to campus, bundled together by our staff and marked with your name and ID for pickup in the Textbook Annex. This is your best chance at saving up to 25% off the new price. At the end of the semester, the bookstore buys back used textbooks for cash.

### UC Merced College Store is an Authorized Apple Campus Store

As a college student, you are eligible for academic discounts on Apple Computers and software. We provide excellent service and support for your computer on campus, and we carry all of the necessary peripherals to assist in your academic success at UC Merced.

Your purchases made at the Bobcat College Store help the University grow! Visit our website at [bookstore.ucmerced.edu](http://bookstore.ucmerced.edu) for more information.

UC Merced College Store  
P.O. Box 2039  
Merced, CA 95344  
Phone (209) 228-2665  
Fax (209) 228-4284  
Website: [bookstore.ucmerced.edu](http://bookstore.ucmerced.edu)

# Student Services

WHEN HEALTH IS ABSENT, WISDOM  
CANNOT REVEAL ITSELF, ART CANNOT  
MANIFEST, STRENGTH CANNOT FIGHT,  
WEALTH BECOMES USELESS, AND  
INTELLIGENCE CANNOT BE APPLIED.

—Herophilus

## HEALTH PROMOTION

The above quote illustrates the significant impact of health on many aspects of our lives. In higher education, students strive for academic excellence, and health directly influences such achievements. Health Promotion is comprised of a team of staff and peer volunteers who work together to encourage undergraduate and graduate students to make healthy choices that will enhance their academic performance.

The mission of Health Promotion is to develop programs that:

- provide students with accurate and current information on a variety of health topics;
- encourage students to make informed decisions about their health;
- connect students to resources such as medical providers, counselors, health educators, dietitians and peer organizations; and
- assist the campus in assessing and addressing health related issues through the use of surveys and evidence-based programs.

The department offers individual and group support for students with concerns about various health topics, including nutrition, physical activity, body image, sexual health, alcohol, tobacco, other drugs, depression, stress, relationships and sleep. Staff and peer volunteers are also available for campus presentations.

## Health Services

The Health Center provides basic treatment and prevention services provided by board-certified physicians and certified nurse practitioners and physician assistants. Staff and peer health educators also provide information on alcohol, tobacco and other drugs, sexual health, stress management, nutrition, body image and smoking cessation. We encourage students to become active partners in promoting their own health and well-being.

Services include: consultation with medical service providers for injury, illness, or chronic health conditions; laboratory testing; medications, immunizations and injections; and health and wellness education. Most core services are covered by registration and health fees and are provided at no cost. There may be a cost for some laboratory work and for radiology, pharmaceutical medication and some immunizations.

## Eligibility for Services

All registered graduate and undergraduate students may use Health Services and Health Promotion even if they opt out of the Student Health Insurance Plan. All services are confidential and offered at no charge to registered students. The H. Rajender Reddy Health Center houses Health Services, Health Promotion, and Counseling and Psychological Services on the 2nd floor of the Joseph Edward Gallo Recreation and Wellness Center.

## Medical Insurance

All registered graduate and undergraduate students attending the UC are required to have major medical health insurance as a condition of enrollment. Unless a student shows proof of prior insurance coverage and requests a waiver, the student is automatically enrolled in UC Merced's Student Health Insurance Plan (SHIP) and billed through the student's account. SHIP offers comprehensive and affordable health insurance: it supplements the Health Center's medical services and provides for extended medical care, emergency services, hospitalization, specialty care and out-of-area care while you are traveling. The program fee covers the cost of the UC Merced group insurance plan and program administration.

A student who is covered by another health insurance may waive SHIP by demonstrating that the coverage is comparable to that provided under SHIP. The student must apply for a waiver of



UC Merced's Dining Services grows many of its own herbs in "Elizabeth's Garden" part of the Yablokoff-Wallace Dining Commons.

SHIP by the specified deadline. All registered students are eligible to utilize the campus health center even if SHIP is waived. For information on insurance, including the waiver process and deadline, refer to the Health Services web page at [health.ucmerced.edu](http://health.ucmerced.edu) or contact [insurance@ucmerced.edu](mailto:insurance@ucmerced.edu).

### **Mandatory Hepatitis B and MMR Requirement and Optional Immunizations**

The California State Health & Safety Code mandates that all students entering the University of California who are under the age of 19 years old must be immunized against or provide proof of immunity from the Hepatitis B virus prior to enrollment. In addition to the Hepatitis B requirement, UC Merced requires that all entering students have received the MMR (measles, mumps and rubella) vaccine. Students must provide Health Services with documentation demonstrating compliance with these immunization requirements prior to registration.

The Center for Disease Control's Advisory Committee on Immunization Practices ([www.cdc.gov](http://www.cdc.gov)) and the American College Health Association ([www.acha.org](http://www.acha.org)) recommend the following additional immunizations for college students. They are not required but are strongly recommended:

- Menactra vaccine (for meningitis). Recommended for high risk students and as a consideration for all college students.
- Tetanus (Td). Booster at age 11-12 years old and every 10 years.
- Varicella (chickenpox). Two doses one month apart for those who never had chickenpox or if a blood test does not show immunity.

For information regarding immunizations, visit the H. Rajender Reddy Health Center, call 209 CAT-CARE (209-228-2273) or review information at <http://health.ucmerced.edu>.

## **CAREER SERVICES**

### **Career Services Center**

The UC Merced Career Services Center, located in Kolligian Library, Suite 127, assists students with a wide range of career-related programs and services, and connects students with on- and off-campus part time jobs, internships, research opportunities and career positions. The Career Services Center staff helps students to learn about their unique interests and abilities, explore career options, determine career goals and develop skills to conduct a successful job search. The Center also assists students interested in pursuing graduate or professional education following graduation from UC Merced. To schedule an appointment with one of the Career Services Center staff, please contact us at [careerservices@ucmerced.edu](mailto:careerservices@ucmerced.edu).

### **On-Campus Student Employment**

The Career Services Center coordinates all on-campus, part-time student employment. Students can view current listings and apply for on-campus positions online at the Career Services Center web site at [careerservices.ucmerced.edu](http://careerservices.ucmerced.edu): just click on "Jobs."

### **Internship Programs**

Internship programs provide students with the opportunity to obtain career-related work experience in local, regional and national, profit and nonprofit organizations. Students may complete

## **STUDENTS FIRST CENTER**

### **What is the Students First Center?**

UC Merced is one of the few schools in the country that offers the convenience of a "one stop shop" for student services. The Students First Center (SFC) is the gateway to the offices of Admissions, Financial Aid, and the Registrar. It should be your first stop for questions about admissions, financial aid, scholarships, student records, student billing and registration.

### **How Can I Access Students First Center Services?**

You can reach the SFC by phone at (209) 228-7178 (CATS-1ST), by email at [studentsfirst@ucmerced.edu](mailto:studentsfirst@ucmerced.edu), in person in Kolligian Library 122, or at our web site [studentsfirst.ucmerced.edu](http://studentsfirst.ucmerced.edu). Voicemail and email are responded to within 24 hours (unless it is a weekend or the campus is closed).

For your convenience the SFC web site can answer almost all of your questions about being a student at UC Merced. Some of the topics featured on the SFC web site include: campus services hours of operation, important announcements, upcoming dates and deadlines, FAQs for some of your more complex inquiries and a comprehensive UC Merced calendar of events.

Students come first at UC Merced and at the SFC. Stop by and see how easy it can be to get the assistance you need!

internships, some of which may be paid, during the academic year or during the summer. Employers from all fields are increasingly expecting students to have internship experience in addition to their academic preparation. To take advantage of internship opportunities related to any area of academic study, contact the Career Services Center at [careerservices@ucmerced.edu](mailto:careerservices@ucmerced.edu).

### **UC Center Sacramento (UCCS)**

The UCCS Academic Program gives undergraduate and graduate students a rare opportunity to learn about California's public policy and journalistic processes firsthand. The program includes rigorous coursework as well as professional experiences built while living, interning and conducting research in the State Capitol.

Offered during academic and summer terms, students enroll in classes while working 24-40 hours per week in internship placements. For more information, please visit <http://uccs.universityofcalifornia.edu/> or e-mail [careerservices@ucmerced.edu](mailto:careerservices@ucmerced.edu).

## **COUNSELING AND PSYCHOLOGICAL SERVICES**

UC Merced's Counseling and Psychological Services (CAPS) promotes the academic and personal success of all students at UC Merced. CAPS has a diverse staff of doctoral level, licensed psychologists and supervised pre-doctoral interns and practicum students who have experience working with college students. Staff members reflect the diversity that is found on the UC Merced campus and strive to meet the needs of the campus community. All registered UC Merced students (undergraduate and graduate) may access CAPS services, which include confidential psychological assessment, group therapy, walk-in crisis counseling, and short-term individual counseling. In addition, CAPS staff delivers outreach presentations across campus throughout the academic year on topics such as developing effective coping skills, eating disorders, and partner/relational violence. Individual consultation is available to UC Merced students, faculty and staff who have concerns about

a UC Merced student. Counseling and Psychological Services is located on the second floor of the Joseph E Gallo Recreation and Wellness Center. To make an appointment call (209) 228-4266.

## DISABILITY SERVICES

The Disability Services Office, located in the Kolligian Library, Suite 109, supports students with disabilities by providing them with opportunities to participate fully in the academic community at UC Merced. Students with varying types of disabilities, including those with mobility, visual, hearing, learning, psychological and other medical conditions may be eligible for the provision of reasonable disability accommodations through this program.

Students must take the initiative and contact Disability Services (DS) for a student intake appointment to begin the DS registration process. It also is recommended that, when possible, students be prepared to provide documentation of disability in support of their request for DS accommodation services. Documentation provided to the office is confidential and is used solely for purposes of determining the student's eligibility and the appropriate accommodations to be made. It is the responsibility of the student to provide this documentation and, if necessary, to pay for the cost of the documentation provided, including the cost for professional assessments for disabilities.

Academic accommodations are developed with the student and Disability Services as part of the interactive services planning process. Accommodation ensures that students have a fair and equal opportunity to learn and to demonstrate that learning in a way that respects individual learning styles, differences, and needs. Accommodations are highly individualized and are determined on a case by case basis, based on the specific individual needs and recommendations included in each student's documentation. An appropriate accommodation does not provide an unfair advantage, but rather minimizes the barriers caused by the disability. The most



OUR UNIVERSITY REPRESENTS THE BEST OF WHAT THE UC SYSTEM HAS TO OFFER. OUR EDUCATION AT UC MERCED WAS NOT CONFINED TO THE CLASSROOM, BUT INSTEAD WAS BROADENED TO INCLUDE THE ENHANCEMENT OF OUR LEADERSHIP AND PERSONAL CAPABILITIES.

WE HAVE AMAZING PROFESSORS, ADMINISTRATORS, AND STAFF WHO HAVE WELCOMED US INTO THEIR OFFICES LATE IN THE NIGHT AND ON WEEKENDS AND HAVE BEEN AVAILABLE BY EMAIL OR PHONE TO ENSURE THAT OUR COLLEGIATE EDUCATION HAS BEEN SUPERB. WE HAVE BEEN VERY FORTUNATE TO HAVE RECEIVED A PRIVATE SCHOOL EXPERIENCE... AT A PUBLIC INSTITUTION.

— Jason Castillo, Biology Major

common types of accommodation services accessed by eligible students with disabilities may be one or a combination of alternative media services, communication services, mobility services, note taking services, proctoring and/or priority registration.

The provision or use of a disability accommodation does not guarantee or ensure a certain level of academic achievement for the students. Students with disabilities must meet the same standards as all other students. Depending on the type of academic accommodation requested by the student, the approval of the appropriate School Dean may be required.

Students with disabilities who need staff or time-intensive accommodations, alternative media services, communication services, interpreting, CART, Remote Time Captioning etc., should contact the Disability Services Office as soon as possible to make necessary arrangements for these services. It is the student's responsibility that such notification occurs in a timely fashion.

For further information, contact Disability Services by phone at (209) 228-6996, email: [disabilyservices@ucmerced.edu](mailto:disabilyservices@ucmerced.edu), TTY: (209) 228-TTY0 (8890) and/or Fax: (209) 228-4542.

## STUDENT ADVISING AND LEARNING CENTER (SALC)

UC Merced faculty and staff are committed to the academic success of every student. The Student Advising and Learning Center, located in Kolligian Library 172, is responsible for advising students who are undecided about their majors, students who are interested in pursuing law careers following graduation and any student who has questions about degree or University requirements. The advisors in the Schools and the Student Advising and Learning Center work closely with the faculty to ensure that students receive accurate and timely advising. The Student Advising and Learning Center also assists students to acquire the skills they need to develop intellectually, become successful learners and achieve their academic goals. The Peer Academic Advisors work in collaboration with Residence Life and many other support services to help students

## VETERAN SERVICES

The UC Merced Veteran Services staff acts as a liaison between students and the Department of Veterans' Affairs. This includes providing educational certifications for veterans, reservists, active duty military and dependents of veterans. The California Department of Veterans' Affairs college fee-waiver program is available for children and spouses of veterans who have service-related disabilities or who have died from service-related causes. To ascertain eligibility, the students must be California residents and apply for the college fee-waiver program through a county Veterans' Services Office. Once approved by the County Veterans' Services Office, the UC Merced Veterans' Services staff will process the paperwork associated with administering the program and reducing the fees. More information on the documentation required to initiate Veterans' benefits may be found at the UC Merced Veterans' Services web site located at [veteranservices.ucmerced.edu](http://veteranservices.ucmerced.edu).

Students who are veterans or dependents of veterans should contact the UC Merced Veteran Services staff if they have any questions or as soon as they receive notification of admission to UC Merced. Veterans' Services is located in the Students First Center in Kolligian Library 122. An appointment may be arranged by calling (209) 228-2734 or by e-mail at [registrar@ucmerced.edu](mailto:registrar@ucmerced.edu).

make the best use of the resources on campus that promote their success.

Center staff members offer programs focusing on effective study skills, critical reading, and analytical writing that help all students, regardless of major. Mathematics, science, writing and many other classes often present difficulties for students. Individual tutoring

and group study sessions, led by peer tutors, are available through the SALC to provide assistance to students of all levels of ability and preparation. Additional programs and workshops also help students adapt to the demands of college. It is common for college students to find that they need to explore new methods for reading, note-taking, time management and other skills in order to meet the demands and pace of college learning. The Student Advising and Learning Center, working closely with Career Services, Counseling and Psychological Services, Residence Life and many other areas, ensures that students receive the support they need to plan and succeed in their chosen course of study and beyond. Students with advanced skills in science, math or writing should speak to their professors or staff at the Center to find out how to become a trained, paid tutor on campus.

The SALC is headquarters for New Student Orientation, and this includes an orientation program offered to parents and family members of new students, as well. The Center also produces the Partners in Success parents' and families' newsletter each semester. Student Success is made possible by a combined, unified effort on the part of all who play a role in influencing students' lives, and therefore the SALC makes constant efforts to collaborate with as many constituencies as possible in promoting an effective learning environment.

The SALC also provides guidance to academically elite students interested in participating in prestigious academic competitions. Contact the Student Advising and Learning Center for more information or visit our web site at [learning.ucmerced.edu](http://learning.ucmerced.edu).

## International Programs

International Programs serves as UC Merced's gateway to international education, research, exchange opportunities and global initiatives. Our goal is to foster global perspectives and support the cross-cultural community at UC Merced. In support of this mission, International Programs provides study abroad opportunities, facilitates international agreements and serves the visa needs of international students and scholars.

### EDUCATION ABROAD PROGRAM

The University of California Education Abroad Program (EAP) offers international study programs in cooperation with about 140 host universities and colleges in 33 countries throughout the world. Participating students remain registered at UC Merced while studying abroad and receive full academic credit for their work.

UC Merced students have access to all of the University of California EAP options. These include yearlong, semester-length and several summer programs. Students in every discipline are encouraged to consider fulfilling a portion of their degree requirements abroad, as every career path intersects with global issues in some way. Students may participate as early as the sophomore year, and as late as the senior year. Transfer students may also begin the application process before enrolling in UC courses to participate during their second term at UC Merced.

The personal growth that students experience while living in a different country cannot be matched by any learning adventure that they engage in on their home campus or in their own community. Many of the curricula in the several dozen participating countries are offered in English, and there are opportunities to take courses that fulfill general education requirements, major and minor requirements or electives.

Selection of UC undergraduate students requires the following: serious academic goals and a clear plan for integrating EAP studies into the student's UC degree program; maturity, flexibility, and the ability to succeed within the host culture; willingness to abide by program regulations; endorsement by the UC Merced International Programs Office; and completion of language or any other specific requirements. Language prerequisites and GPA requirements vary by program.

EAP opportunities are also open to qualified graduate students who have completed at least one full year of graduate work and have the support of their academic department and graduate dean. A detailed statement of the projected program of study is required.

The cost of studying on EAP is comparable to the cost of studying at UC Merced. In some cases, EAP may cost less. While on EAP, students are eligible for financial assistance. Those already receiving

UC financial aid continue to receive grants, loans, and scholarships while abroad. Aid is based on the cost of studying at each EAP location and on individual need. Students who do not currently receive UC financial support may qualify for financial aid while on EAP.

In addition to UC financial aid, EAP provides support through various scholarships and grants. Students should contact the UC Merced International Programs Office and Financial Aid Office for additional information.

Students may also study abroad through non-UC providers and earn transfer credit for qualified programs. By taking a Non-UC Study Abroad (NUCSA) leave, students are able to maintain their UC student status and their UC e-mail addresses.

Please visit [studyabroad.ucmerced.edu](http://studyabroad.ucmerced.edu) to learn about study abroad opportunities, and contact International Programs staff in Kolligian Library 101 or at (209) 228-4722 to find out about the application process. Applications may be due as early as 10 months in advance of the program, but students are encouraged to visit the International Programs office and their academic advisor(s) even earlier to begin planning for study abroad.

For information regarding participation in non-UC programs, please visit [studyabroad.ucmerced.edu](http://studyabroad.ucmerced.edu).

## INTERNATIONAL STUDENTS AND SCHOLARS

UC Merced enjoys a global community with international students, researchers, and professors who represent more than 60 nations throughout the world.

For the increasing number of students from different cultures, nations and educational systems choosing to pursue higher education opportunities at UC Merced, the International Students and Scholars Office (ISS) offers services to support their unique needs.

One of the most important responsibilities of ISS staff is to assist international students with maintenance of their legal, non-immigrant status and assistance in understanding related government regulations. Students are always encouraged to contact an ISS advisor for reliable information about visa and immigration issues. ISS also is UC Merced's primary liaison with U.S. government agencies that interface with international students.

To start, it is important for international students to have a valid passport and to apply for an appropriate visa stamp in that passport that allows entry to the United States and enrollment in a university degree program. Applications for visa stamps must be made at a U.S. embassy or consulate office outside of the United States.

International students already enrolled in a university or school program within the United States should contact the ISS Office at UC Merced to discuss their visa options. These students may be eligible for a transfer of their visa status (if the student is in F-1 status) to UC Merced or to apply for a change of visa status that will permit their enrollment in a UC Merced degree program.

Beyond issuing I-20 forms and hosting orientation programs, the ISS Office offers services to international students that include the following:

- Advice for international students and their dependents on compliance with United States immigration regulations
- Support for University personnel bringing international students to UC Merced for study and research
- Counseling of students and dependents for visa applications and changes in visa category, including non-immigrant and immigrant petitions
- Guidance, document preparation and authorization for employment and travel
- Resources and programming to assist students and dependents with adjustment to life in the United States
- Maintenance and update of F-1 student SEVIS records
- Referrals to UC Merced campus and community resources
- Walk-in office hours and one-on-one appointments

For additional information, instructions, forms and resources regarding student visas and the ISS Office, please visit <http://iss.ucmerced.edu>. General information also can be requested by e-mail at [international@ucmerced.edu](mailto:international@ucmerced.edu). To make an appointment with an ISS advisor and for more detailed inquiries, please write to [arrivals@ucmerced.edu](mailto:arrivals@ucmerced.edu) or call (209) 228-2722.

Students also are welcome to visit the International Programs Center in Kolligian Library Room 101.



The suite-style Valley Terraces are a very popular on-campus option for UC Merced students.

# Transportation and Parking Services (TAPS)

## BICYCLES

Bicycles are welcomed and encouraged at UC Merced. With a flat terrain and mild climate, the city and county of Merced offer excellent conditions for bicycle riding. In addition, the city of Merced boasts over 12 miles of class one, grade-separated bike paths, which, along with the city's other bike lanes, connect to most of Merced's open-space park system. Special areas have been set aside near UC Merced's academic buildings for bicycle parking. Please do not bring bicycles into buildings or secure them to anything but a bike rack. If you plan to bring your bicycle to campus, you are encouraged to register it. The process is quick and simple, and the cost is \$5.00 for a three year license. Bicycles may be registered between 8:00 a.m.-12:00 Noon & 1:00 p.m.-4:00 p.m. in Merced at:

The City of Merced Police Department  
611 West 22nd Street  
Merced, CA 95340

## PUBLIC TRANSIT

As parking is limited on campus, UC Merced encourages students, faculty and staff to use alternative public transit. Merced County boasts a full service, comprehensive transit system known as "THE BUS." UC Merced continues to work with the public transit authority to provide routes between the campus and various locations in Merced County and the surrounding areas. As part of the students' UCM transit fee, students can receive "THE BUS" passes at no additional charge to ride. Please visit [www.mercedthebus.com](http://www.mercedthebus.com) and choose Bus Routes for information on all current "THE BUS" routes or you may call: (209) 384-3111 or (800) 345-3111. Please also visit our UCM Transportation and Parking Services website at <http://taps.ucmerced.edu> for further information on "THE BUS" or other alternative transit options.

## CAMPUS TRANSIT

### CatTracks

UC Merced offers a campus-based shuttle service called CatTracks, which provides transportation services to retail, entertainment and some apartment complexes in the local community. In addition, we offer a shuttle service called NiteCat, sponsored by Riggs Ambulance Service (RAS). The NiteCat shuttle provides safe rides to and from local entertainment centers between the hours of 10:00 p.m. and 2:00 a.m. on Friday and Saturday nights while school is in session.

You may view our current shuttle schedules by visiting our UCM Transportation and Parking Services website: <http://taps.ucmerced.edu> and selecting the CatTracks Shuttle option or by visiting [www.cattracks.org](http://www.cattracks.org).

DON'T BE AFRAID OF BECOMING A PART OF  
CAMPUS LIFE. IF YOU'RE HAVING TROUBLE  
AT FIRST, THERE ARE PEOPLE HERE  
TO HELP YOU PAVE THE WAY TO YOUR  
SUCCESS.

—Daniel Titcher, Psychology



CatTracks buses take students all over Merced: downtown, some apartment complexes, shopping and to Amtrak.

## VEHICLE PARKING

Parking, while limited, is available on campus. Traffic is restricted within the academic core of the main campus. All vehicles parking in designated parking lots on campus must display a valid regular or visitor UC Merced parking permit from 7 a.m. through 6 p.m. daily, Monday through Friday. Specific parking lots are reserved for students living on campus in the residence halls as well as for students commuting to campus. Resident and commuter students will have an opportunity to purchase parking permits prior to the start of classes. We encourage all students to complete the permit application and purchase parking permits through the e-Pay system at <https://epay.ucmerced.edu>. You may also complete your permit application and purchase your parking permit at the Cashier's Office located on the first floor of the Kolligian Library next to the Students First Center. Please note that carpool permits are also available and offer prime parking locations to carpool permit holders. To be eligible for a carpool permit, you must have two or more people in the vehicle driving to campus at least three days of the week. Information on permits, fees and campus parking regulations can be obtained from the TAPS website at <http://taps.ucmerced.edu>. Please be sure to read the parking regulations before you park on campus.

### UC Merced - Transportation and Parking Services (TAPS)

Email - [taps@ucmerced.edu](mailto:taps@ucmerced.edu)

Helpdesk - (209) 228-8277 (Cat-TAPS)



# Fees And Expenses

## AVERAGE ANNUAL EXPENSES

The range of estimated nine-month expenses, including fees, for students attending UC Merced during the 2009-10 academic year is shown below. Cost-of-living expenses are adjusted annually and fees are subject to change. These figures are only a guide in computing average expenses, and your own living expenses may differ somewhat from these. If you will need funds beyond those that you and your family can provide, you should apply for financial aid well in advance of enrollment. Please see the appropriate Undergraduate or Graduate sections on Financial Aid and Scholarships for more information.

## AVERAGE ANNUAL EXPENSES (ESTIMATES ONLY)

Student Status	Living Arrangement	9-Month Expenses
Undergraduate (CA resident*)	On-campus	\$25,840.00
	Off-campus	\$22,700.00
	At home	\$19,007.00

Nonresident undergraduate students should add \$22,669 and nonresident graduate students should add \$15,036 for additional fees and nonresident tuition.

## 2009-10 FEE SCHEDULE

Note: Fees shown are per semester

Undergraduates	Residents	Nonresidents
Educational Fee	\$3,444.00	\$3,768.00
University Registration Fee	\$450.00	\$450.00
Health Services fee	\$50.00	\$50.00
Transportation fee	\$87.50	\$87.50
Student Life fee	\$15.00	\$15.00
Associated Students fee	\$65.68	\$65.68
Recreation fee	\$146.00	\$146.00
Student Health Insurance*	\$350.00	\$350.00
Non-Resident Tuition	N/A	\$11,010.00
<b>TOTAL</b>	<b>\$4,608.18</b>	<b>\$15,942.18</b>

Graduates	Residents	Nonresidents
Educational Fee	\$3,918.00	\$4,089.00
University Registration Fee	\$450.00	\$450.00
Health Services fee	\$50.00	\$50.00
Transportation fee	\$35.00	\$35.00
Student Life fee	\$15.00	\$15.00
Graduate Student Association fee	\$10.00	\$10.00
Recreation fee	\$146.00	\$146.00
Mandatory Health Insurance*	\$637.00	\$637.00
Non-Resident Tuition	N/A	\$7,347.00
<b>TOTAL</b>	<b>\$5,261.00</b>	<b>\$12,779.00</b>

\*As a non-academic condition of enrollment, undergraduate and graduate students must purchase the Student Health Insurance Plan (SHIP) or request a waiver of this fee. The Fall undergraduate health insurance fee provides coverage from August through December; the Spring fee provides coverage from January through August. The Spring undergraduate health insurance fee is \$468, for graduate students the rate is \$848. Graduate students who wish to cover spouses, domestic partners or children should contact Health Services at health@ucmerced.edu for rates.

## Fee Disclaimer

The amounts shown in this document represent fees as currently approved. However, all University fees are subject to change, and the fee amounts billed for this period may be adjusted at a future date. Detailed information regarding on campus room and board charges is available at housing.ucmerced.edu. Detailed information regarding parking fees, regulations and rules is available at taps.ucmerced.edu.

## COURSE MATERIALS FEES

Students may be charged fees in some courses for the use, rental or consumption of materials, tools or equipment, or for the costs of materials or services necessary to provide a special supplemental educational experience. For example, course materials fees may cover the cost of chemicals and glassware for a science laboratory or art supplies for a studio class. They also might cover film rentals, field trips or the purchase/rental of specific equipment.

## UC EMPLOYEE-STUDENT FEES

Reduced fees are available to UC career employees who have completed their probationary period and certain UC retirees who are eligible for admission to the university. Once admitted as a regular session student, the employee-student must file a petition for the reduction in fees before each semester of enrollment. Employee-students pay one-third of the full-time registration fee and one-third of the full-time educational fee. Employee students may enroll for



Advisor Cynthia Donahue prepares to greet prospective students and their families at Bobcat Day.

BEING AT UC MERCED OPENED UP OPPORTUNITIES FOR ME THAT STUDENTS IN OTHER UNIVERSITIES CAN'T GET: MORE INTIMATE STUDENT-FACULTY COMMUNICATION/RELATIONSHIPS, UNDERGRADUATE RESEARCH OPPORTUNITIES, AND INITIATING AND FOUNDING CLUBS AND ORGANIZATIONS. ALSO, I HAVE THE PRIVILEGE OF BEING IN WHAT FEELS LIKE A PRIVATE UNIVERSITY, WITHOUT PAYING THE PRIVATE UNIVERSITY TUITION/COSTS!

—Janice Cosio, student, peer tutor

up to nine (9) units or three (3) courses per semester, whichever is greater. Employee-students may not be eligible for some services, such as those provided by the Student Health Center, Gymnasium, and Counseling Center. Contact the Office of Human Resources for further information.

**PART-TIME STUDY**

Students approved for enrollment on a part-time basis pay the same registration fees as full-time students, but pay only one-half of the Educational Fee. Part-time, non-resident students pay full registration fees, one-half of the Educational Fee and one-half of the nonresident tuition fee. Undergraduate students must file their petition for part-time study with the Office of the Registrar. Graduate students must file their petition with the Division of Graduate Studies. For more information on the eligibility requirements for part-time study, please see the Academic Policies section of this catalog.

**PAYMENT OF REGISTRATION FEES**

Registration at UC Merced is a two-step process: (1) enrollment in classes and (2) payment of fees. You must enroll first so that your fees can be assessed. You can pay fees at any time after you enroll in classes, but a failure to pay fees in full by the 10th day of instruction will result in you being dropped from your courses for non-payment and officially withdrawn from the university. Note: the Student Health Insurance Plan (SHIP) fee is part of registration fees and is due and payable, unless waived, at the time registration fees are paid. An electronic billing statement will be available to you after enrollment; however, if you wait to enroll just prior to the enrollment deadline, do not wait for a billing statement to pay your fees. Fees are due and payable by the published deadline whether or not a billing statement is available.

Your billing statement from the University will list charges and credits. Charges include registration fees, housing charges and any additional billable services. Credits include all payments, as well as financial aid disbursements. If you are a financial aid recipient, the aid will be applied to allowable charges on your account. Eligible financial aid, less allowable charges, will be refunded to you. You are responsible for the timely payment of any charges not covered by your financial aid.

**METHODS OF PAYMENT**

**MyBill.ucmerced.edu**

Monthly financial activity is displayed for the current month, as well as account activity for the prior semester(s) at MyBill.ucmerced.edu. Students may pay their account balance electronically using MasterCard, American Express, Discover or E-Check.

**In-Person Payment**

Students can also print a remittance document and mail in payments with a check or money order. Students may make payments in person at the Campus Cashiering Office located in Kolligian Library next to the Students First Center, 10 a.m. to 4 p.m., Monday through Friday, except holidays.

**Continuous Deferred Payment Plan (DPP)**

The Deferred Payment Plan (DPP) offers students the option to pay their registration fees and student housing contract amount (if applicable) in three monthly installments per semester. Students receiving sufficient financial aid to cover their registration fees and room and board costs do not qualify for the plan. To qualify for the UC Merced DPP, you must have a semester account balance of \$1,000.00 or greater, after any authorized financial aid has been posted to your student account. If eligible, your first installment payment amount will be 40% of the semester account balance. The second and third installments will be 30% each of the remainder. There will be a non-refundable participation fee of \$40.00 per semester, which will be billed to your student account upon enrollment in the DPP. If you enroll for the Fall semester, you will automatically be enrolled for the Spring semester.

Enrollment in the DPP is available on MyBill. To finalize enrollment in the DPP, students must make the first installment payment of 40% of the semester fees by the semester payment deadline. Students must remember to pay any previous account balance due along with the first installment payment. Eligible students who wish to enroll in the plan must do so no later than the semester payment deadline. The deadlines for DPP enrollment are:

Fall 2009:	Tuesday, August 18, 2009
Spring 2010:	Tuesday, January 12, 2010
Fall 2010:	Tuesday, August 17, 2010
Spring 2011:	Tuesday, January 11, 2011

**Due dates for the installment payments are:**

	Fall 2009 Semester	Spring 2010 Semester
First Installment	August 18, 2009	January 12, 2010
Second Installment	September 21, 2009	February 22, 2010
Third Installment	October 20, 2009	March 22, 2010

	Fall 2010 Semester	Spring 2011 Semester
First Installment	August 17, 2010	January 11, 2011
Second Installment	September 20, 2010	February 21, 2011
Third Installment	October 20, 2010	March 21, 2011

**What if I am late with a DPP payment?**

If installment payments are not credited to the account by the required due date, the following may result:

- A late fee of \$50.00 will be charged for the late receipt of an installment payment;

- A hold may be placed on your registration for future semesters;
- You may be dropped from the rolls of the University, i.e. grades will not post to your transcript until all DPP installment payments have been paid in full;
- You may be ineligible for future DPP enrollment;
- Per section 15 of the Housing contract, the following administrative actions may result against the student's status in the University:
  - A hold on records
  - Initiation of termination of tenancy proceedings
  - Eviction

For more information about the DPP, please visit the DPP page of the SBS website at [sbs.ucmerced.edu](http://sbs.ucmerced.edu).

### DEADLINES AND PENALTY FINES

You must pay all prior delinquent debts prior to registering. An additional charge will be made for failure to pay required fees or deposits by the dates announced. If you enroll in courses after the enrollment deadline, you may be assessed a late enrollment fee and possibly, a late payment fee.

### Returned Check Policy

The campus cashiering services walk-up windows accept personal checks as well as cash payments, but no credit cards. There is a Returned Check Fee of \$20.00. A cash-only policy is followed for Returned Check writers. Any person who has more than two unpaid checks returned to the University is placed on a cash-only basis for all future transactions (i.e. cash, cashier's check, money order, or payment via the web). A letter will be mailed to the current mailing/billing address on file, that no future personal checks will be accepted.

### Cancellation, Withdrawal And Fee Refunds

To cancel registration before the first day of instruction or to withdraw from the University on or after the first day of instruction, you must complete a Cancellation/Withdrawal form and return the form to the Office of the Registrar. If you do not submit a Cancellation/Withdrawal form, you will be liable for fees according to University policy (below). It is very important that you contact the Office of the Registrar and initiate withdrawal/leave of absence procedures even if your fees are fully paid by financial aid or other programs. Failing to do so may result in you owing money to the University.

The effective date for determining a refund of fees is the date a completed Cancellation/Withdrawal form is received by the Office of the Registrar. It is presumed that no University services will be provided to the student after that date. If a student is enrolled in classes, he or she will be dropped from all courses automatically when the Cancellation/Withdrawal form is processed.

The percentage of fees that may be refunded is determined by the number of calendar days (not school days) elapsed, beginning with the first day of instruction of the semester. For students who paid fees and then canceled or withdrew by filing with the Office of the Registrar, fees may be refunded according to the Schedule of Refunds.

**New undergraduate students:** The \$100 deposit paid with the Statement of Intent to Register (SIR) is not refundable. Because it is not refundable, it is not included in the balance when applying the Schedule of Refunds. Thus, before or on the first day of instruction, registration fees paid are refunded in full minus \$100.

**All continuing students, readmitted students and new graduate students:** On or before the first day of instruction, registration fees are refunded in full for cancellation/withdrawal. After the first day



UC Merced cheerleaders perform at many campus events.

**BEST PART OF BEING AT UC MERCED:  
BEING ON THE GROUND FLOOR OF AN  
UPSTART STARTUP CAMPUS!**

— Professor Gregg Herken, History

of instruction, the Schedule of Refunds is applied to the total of fees assessed.

**Failure to submit a Cancellation/Withdrawal form:** If you are not a financial aid recipient and you fail to submit a Cancellation/Withdrawal form to the Office of the Registrar, you will be presumed to have left at the end of the semester and will not be eligible for a fee refund. If you are a financial aid recipient, you must contact the Office of Financial Aid and Scholarships for information on how this will affect your refund.

### SCHEDULE OF FEE REFUNDS

The Schedule of Fee Refunds applies to all new students who do not receive federal financial aid and continuing and readmitted students. New students who receive federal financial aid and withdraw during their first academic term may be refunded fees according to the Modified Fee Refund Schedule listed below.

The Schedule of Refunds refers to calendar days beginning with the first day of instruction of the semester. The number of days elapsed is determined from the date the completed Notice of Cancellation/Withdrawal form is received in the Office of the Registrar. Percentages listed should be applied respectively to the University registration fee, educational fee, nonresident tuition and other student fees.

### UNIVERSITY REGISTRATION FEE, EDUCATIONAL FEE, NONRESIDENT TUITION, FEE FOR SELECTED PROFESSIONAL STUDENTS AND OTHER STUDENT FEES:

#### New Students Who Receive Title IV Federal Financial Assistance and Withdraw During their First Academic Term

CALENDAR DAYS ELAPSED	PERCENTAGE OF FEES REFUNDED
0-7 days	100% less any applicable fees
8-14 days	90%
15-28 days	80%
29-35 days	70%
36-49 days	60%
50-56 days	50%
57-63 days	40%
64 days or more	0%

#### All Continuing and Readmitted Students and New Students Who Do Not Receive Federal Financial Aid

CALENDAR DAYS ELAPSED	PERCENTAGE OF FEES REFUNDED
0-1 days	100% less any applicable fees
2-11 days	90%
12-27 days	50%
28-53 days	25%
54 days or more	0%

Federal regulations require UC Merced to calculate the amount of federal financial aid that has been “earned” for all students who are receiving financial aid and withdraw from UC Merced during a semester. If the student withdraws prior to completing 60 percent of the semester, a pro rata portion of the aid must be returned to the federal government. Any portion of unearned aid that must be returned to federal aid programs by UC Merced will be deducted from the amount of the tuition and fee refund. If the amount UC Merced must return to federal aid programs exceeds the amount of the student’s institutional refund, the student’s account may be billed for the balance.

### REFUND OF HEALTH INSURANCE FEE

Health insurance is mandatory for all students, both graduate and undergraduate, as a non-academic condition of enrollment. All students will be assessed the health insurance fee; however, students who already have adequate health insurance should request a waiver of this fee. If you have paid the health insurance fee and cancel your registration on or before the first day of instruction, you are entitled to a full refund of this fee. Insurance fees are not refundable after the first day of instruction and coverage remains in effect until the date specified by the insurance plan.

### OTHER REFUNDS

Charges other than the registration fee, the educational fee, nonresident tuition and campus-based fees are refunded according to guidelines and schedules published by the appropriate department.

# Undergraduate Admissions

## UNDERGRADUATE ADMISSION

Prospective students interested in attending the University of California, Merced are encouraged to contact the Office of Admissions well in advance of their intended entrance. The office provides information and advice for prospective students as they prepare for university work. Future UC Merced students planning to enroll as freshmen or transfer students can get assistance in planning their pre-university course work and with the application process. If you are interested in enrolling at UC Merced, Admissions staff members are available to assist you via e-mail, telephone or in person.

## OFFICE OF ADMISSIONS

5200 N. Lake Road  
Merced, CA 95343-5603  
(209) 228-4682  
(866) 270-7301 (toll-free in California)  
Web site: [admissions.ucmerced.edu](http://admissions.ucmerced.edu)  
E-mail: [admissions@ucmerced.edu](mailto:admissions@ucmerced.edu)  
E-mail: [transfer@ucmerced.edu](mailto:transfer@ucmerced.edu)

- Campus tours
- Admissions presentations
- Pre-application advising
- Transfer advising
- Transfer Admission Guarantees (TAG)

## FINANCIAL AID AND SCHOLARSHIPS

See the Financial Aid section of this catalog.

Financial Aid code for UC Merced: 041271

## UNIVERSITY OF CALIFORNIA ONLINE RESOURCES

Admissions information:  
[www.ucop.edu/pathways](http://www.ucop.edu/pathways)

Examination and Subject requirements:  
[www.universityofcalifornia.edu/admissions/undergrad\\_adm/pathstoadm.html](http://www.universityofcalifornia.edu/admissions/undergrad_adm/pathstoadm.html)

Online application:  
[www.universityofcalifornia.edu/apply](http://www.universityofcalifornia.edu/apply)

Approved high school courses:  
[www.ucop.edu/doorways/list](http://www.ucop.edu/doorways/list)

Transferable California Community College courses:  
[www.assist.org](http://www.assist.org)

Financial Aid information:  
[www.universityofcalifornia.edu/admissions/paying.html](http://www.universityofcalifornia.edu/admissions/paying.html)

## REGISTRATION INFORMATION FOR REQUIRED EXAMINATIONS:

[www.act.org](http://www.act.org)  
ACT code for UC Merced: 0450

[www.collegeboard.com](http://www.collegeboard.com)  
College Board code for UC Merced: 4129



I THINK THE KEY TO MAKING THE MOST OF ONE'S TIME AT UC MERCED IS TO ACKNOWLEDGE ALL OF THE AVAILABLE RESOURCES SUCH AS ALL THE CLUBS AND SOCIETIES THAT ARE ESTABLISHED ON CAMPUS, AND THE TUTORING AND CAREER SERVICES.

— Albert Shih, Bioengineering

UC Merced's Taiko Drummers.

# Application Process

## HOW TO APPLY

The University of California Undergraduate Application for Admission & Scholarships is available online at [www.universityofcalifornia.edu/apply](http://www.universityofcalifornia.edu/apply). Students may apply to UC Merced and any number of the additional eight general campuses of the University of California with one application. The San Francisco campus, which is devoted to the health sciences, has its own application and filing procedures. Students who cannot apply online at their home, school or local library may contact the Office of Admissions for assistance.

## When To Apply

To ensure that applicants are considered for admission, the completed application and the application fee should be electronically filed or postmarked during the priority filing period shown below.

Semester of Attendance	Priority Filing Period
Fall	November 1 – 30
Spring	July 1 – 31

The online application center opens for fall applications prior to November 1, usually during early October, and in July for spring applications. Students can begin the application, save their information on the secure site and continue filling out the application at their convenience up to the filing deadline. Applicants must meet the deadline (last day of the application filing month). Students who miss the November 30 deadline for fall or the July 31 deadline for spring should contact the Office of Admissions for assistance.

## NOTIFICATION AND ENROLLMENT

On-time applicants for admission to a fall semester will be notified of their admission decision between March 1 and 31 (freshman applicants) and March 15 through April 30 (transfer applicants). To reserve your space after being admitted to the entering class, you must submit the Statement of Intent to Register (SIR) along with a non-refundable \$100 deposit by May 1 for freshmen and June 1 for transfer students. If you cannot afford the \$100 deposit, contact the Office of Admissions immediately. Applicants for spring semester will be notified of their admission decision between September 1 and October 7. The SIR deadline for spring semester is typically November 1.

**Admission is specific to a particular semester.** If you have questions about deferring your admission to a future term, contact us for assistance at (209) 228-6994 or E-mail [admissions@ucmerced.edu](mailto:admissions@ucmerced.edu). If you plan to attend another college or university before enrolling at UC Merced, you must apply again for admission to the term in which you will enroll.

## APPLICATION ADVICE

All applicants are asked to provide self-reported academic records on the application. Obtain copies of your grades and test scores prior to completing the application. Do not rely on memory. Your admission to UC Merced is provisional, based on verification of the information you provide. If admitted, you will be asked to submit final, official transcripts from all schools and colleges attended and official test score reports for the purpose of verifying the information you provided on your application.

## APPLICATION ACKNOWLEDGMENT

After you submit your application for admission you will be notified that it was received. If you do not receive notification that UC Merced received your application within six weeks of submitting it, contact the Office of Admissions immediately by calling (209) 228-4682 or toll-free in California: (866) 270-7301, or send an e-mail message to [admissions@ucmerced.edu](mailto:admissions@ucmerced.edu).

## APPLICATION FEES / FEE WAIVER

Students applying to UC Merced must submit the application fee following the submission of the online application or along with the paper application. If you apply to more than one campus, a per-campus fee must be submitted. Application fees are not refundable.

If you cannot afford the application fee and you are a U.S. citizen or permanent resident, you may request a fee waiver in advance or at the time of submitting the online or paper application. If your family income and the number of dependents in your household meet specifications of the University of California fee waiver guidelines, the fee will be waived for a maximum of four campus choices. Students who qualify for fee waivers and who wish to apply to more than four campuses must pay a fee for each additional campus choice.

## How to Obtain a Fee Waiver

High school students may use the College Board fee waiver, available from your school counselor, or may obtain a fee waiver authorization from any UC campus Admissions and Relations with Schools or Educational Opportunity Program office. California community college students enrolled in Extended Opportunity Programs and Service (EOPS) can obtain a fee waiver authorization from the EOPS office. All students: If you cannot afford the application fee, simply request a fee waiver when you submit the online or paper application. Be prepared to answer questions about your gross family income and family size.



## CATEGORIES OF APPLICANTS

Undergraduate or regular status applicants are students who wish to enroll in an established curriculum at UC Merced for the purpose of completing the Bachelor of Arts or Bachelor of Science degree.

**Freshman applicants** are students who are currently enrolled in high school at the time of application, or students who have graduated from high school but have not enrolled in a college or university since the summer after leaving high school. Students who have completed a California Certificate of Proficiency or an equivalent proficiency examination from another state or the General Education Development (GED) certificate also may be freshman applicants if they have not enrolled in a college or university since completion of their high-school equivalency. All college or university work must be reported.

**Transfer applicants** are students who have enrolled in a regular term at a college or university after leaving high school. Students who meet this definition cannot disregard their college record and apply as freshmen. All college or university work must be reported.

**Nonresident applicants** are students whose legal permanent residence (as determined by the University) is outside the State of California. Nonresident applicants are generally required to pay nonresident tuition and must also present a higher grade point average than is required of California residents.

**International applicants** are students who hold or expect to hold student, exchange, visitor or diplomatic visas. International applicants are required to pay nonresident tuition and must also present a higher grade point average than is required of California residents. Prospective international students are encouraged to review requirements for admission of nonresident applicants prior to filing an application. International students are expected to complete the examination requirement.

International students whose native language is not English must demonstrate language proficiency by one of the following methods:

- Take the Test of English as a Foreign Language (TOEFL) and earn a minimum score of 220 (computer-based TOEFL), 83 (internet-based TOEFL) or 550 (paper-based TOEFL). Information about the TOEFL is available at [www.toefl.org](http://www.toefl.org).
- Take the International English Language Testing System exam (IELTS) and earn a minimum score of 7. Information about IELTS is available at [www.ielts.org](http://www.ielts.org).
- Earn a score of 3, 4 or 5 on the Advanced Placement International Advanced Placement International English Language (APIEL). Information about the APIEL is available at [www.collegeboard.com/ap/students/apel](http://www.collegeboard.com/ap/students/apel).

**Second baccalaureate applicants** are college or university graduates whose educational objective has changed substantially after receiving the bachelor's degree. Applicants for the second bachelor's degree must be fully eligible for admission to UC Merced and have strong promise of academic success in the new major. All such admissions are subject to the approval of the dean of the UC Merced School in which the second degree will be earned. Candidates for a second bachelor's degree are subject to the general requirements for the bachelor's degree and to the particular requirements of the School in which they are enrolled.

**Limited status applicants** are students whose special attainments qualify them to take certain courses in the university toward a definite and limited objective. To apply for limited status admission, students must either have a bachelor's degree but not be a candidate for an advanced degree, or have completed a substantial amount of college work with a satisfactory grade point average. Prospective students must submit an undergraduate application with fees, as well as a limited status petition and official transcripts from all schools attended. Limited status students are expected to maintain a certain scholarship average

during a predetermined time of enrollment. Admission requires the approval of the dean of the School in which the student intends to study.

NOTE: Students returning to UC Merced after a voluntary absence or academic disqualification are required to apply for readmission through the Office of the Registrar. See below.

## Readmission To UC Merced

Students who were formally admitted, registered and enrolled at UC Merced, then interrupted their studies for any length of time other than summer, must apply for readmission to the campus. The Readmission Policy and Process can be found on the Office of the Registrar's Web site ([registrar.ucmerced.edu](http://registrar.ucmerced.edu)).

## IMPORTANT DEADLINES RELATED TO ADMISSION

<b>November 30</b>	Application priority filing deadline for admission to fall semester
<b>March 2</b>	Financial aid priority deadline: FAFSA and CAL Grant GPA verification. Check the Financial Aid section of the UC Merced catalog for more information and deadlines.
<b>May 1</b>	Statement of Intent to Register (SIR) fall semester priority filing deadline: freshmen.
<b>June 1</b>	Statement of Intent to Register (SIR) fall semester priority filing deadline: transfer students
<b>July 15</b>	Final, official transcripts due to the Office of Admissions (fall semester applicants)
<b>July 31</b>	Application priority filing deadline for admission to spring semester
<b>November 1</b>	Statement of Intent to Register (SIR) spring semester priority filing deadline
<b>January 6</b>	Final, official transcripts due to the Office of Admissions (spring semester applicants)

## PREPARING FOR UNIVERSITY WORK

Please note: UC Regents have adopted changes to freshman eligibility beginning with the class entering Fall 2012.

As a prospective UC Merced undergraduate, you are encouraged to give careful thought to preparing yourself adequately in reading, writing, mathematics and other subject areas relevant to your intended major. Many undergraduate majors require preparation in mathematics beyond the three years required for admission to the University. The more comprehensive and challenging your high school or college program is, the better prepared you will be for your course work at UC Merced. Honors-level, Advanced Placement and college courses are good preparation for UC Merced. These challenging courses will help you develop the good study habits and skills you will need at UC Merced. Give priority to completing the high school or college course patterns required for admission and for your interest area. Check the UC Merced Admissions Web site at [admissions.ucmerced.edu](http://admissions.ucmerced.edu) for the most current information.

### University of California Entry-level Writing Requirement/Analytical Writing Placement Exam (formerly Subject A):

Every undergraduate is required to demonstrate an acceptable level of ability in English composition. For further details on the UC Entry-Level Writing Requirement (ELWR) and Analytical Writing Placement Exam, see the General Education section of this catalog.

# Freshman Admission

I LOVE SEEING HOW THE DIFFERENT CLUBS AND ORGANIZATIONS STARTED AND CONTINUE TO CONTRIBUTE TO THE VITALITY OF THE CAMPUS.

— Samuel Kim, student

## California Residents

There are three pathways of eligibility for resident students to enter UC Merced as freshmen: eligibility in the statewide context, eligibility in the local context and eligibility by examination alone. Eligibility in the statewide context is the path by which most students attain UC eligibility. To be eligible in the statewide context, students must satisfy the subject, scholarship and examination requirements described below.

## ELIGIBILITY IN STATEWIDE CONTEXT

### Subject Requirement

To satisfy the subject requirement you must complete, with grades of C or better, the 15 units of high school course work listed in the following subject pattern, known as the A-G subjects or requirements. A one-year course is equivalent to one unit and a one semester course is equal to one-half unit. Courses certified to meet

**B. English:** 4 years required. Four years of college-preparatory English that include frequent and regular writing, and reading of classic and modern literature. No more than one year of approved ESL-type courses can be used to meet the requirement.

**C. Mathematics:** 3 years required; 4 years recommended. Three years of college preparatory mathematics which include the topics covered in elementary and advanced algebra and two- and three-dimensional geometry. Approved integrated math courses may be used to fulfill part or all of the requirement, as may other Mathematics courses taken in the seventh and eighth grades that your high school accepts as equivalent to its own math courses.

**D. Laboratory Science:** 2 years required; 3 years recommended. Two years of laboratory science providing fundamental knowledge in at least two of these three disciplines: biology, chemistry and physics. Advanced laboratory science courses that have biology, chemistry or physics as prerequisites and offer substantial additional material may be used to fulfill this requirement. The final two years of an approved, three-year integrated science program may be used to fulfill this requirement.

**E. Language other than English:** 2 years required; 3 years recommended. Two years of the same language other than English. Courses should emphasize speaking and understanding, and include instruction in grammar, vocabulary, reading and composition. Courses in a language other than English taken in the seventh and eighth grades may be used to fulfill part of this requirement if your high school accepts them as equivalent to its own courses.

**F. Visual and Performing Arts (VPA):** 1 year required. One year-long approved arts course from a single VPA discipline: dance, drama/theater, music or visual art.

**G. College-Preparatory Electives:** 1 year required. One year (two semesters), in addition to those required in "A-F" above, chosen from the following areas: visual and performing arts (non-introductory level courses), history, social science, English, advanced mathematics, laboratory science and language other than English (a third year in the language used for the "e" requirement or two years of another language).

## SCHOLARSHIP REQUIREMENT

The scholarship requirement defines the grade point average (GPA) you must attain in the "A-G" subjects and the examination scores you must earn to meet the eligibility index (described below in Examination Requirement) for admission to the university.

The university calculates your GPA in the "A-G" subjects by assigning point values to the grades you earn, totaling the points and dividing by the total number of "A-G" course units. Points are assigned as follows: A=4 points, B=3 points, C=2 points, D=1 point and F=0 points. Only the grades you earn in "A-G" subjects in the tenth, eleventh and twelfth grades are used to calculate your GPA. Courses you take in ninth grade can be used to meet the subject requirements if you earned grades of C or better, but they will not be used to calculate your GPA.

California residents must earn, at minimum, a 3.0 GPA in "A-G" courses to meet the Scholarship Requirement.

**Honors courses:** The University assigns extra points for up to 4 units of certified honors-level and Advanced Placement courses taken in grades 10 – 12: A=5 points, B=4 points and C=3 points. No more than 2 units of certified honors-level courses taken in grade 10 may be assigned extra points. Grades of D are not assigned extra points. The courses must be in the following "A-G" subjects: history, English, advanced



UC Merced's womens soccer team competes with colleges and universities throughout the region.

the A-G requirements are identified for each California high school on the UC-certified course list available online at [www.ucop.edu/doorways/list](http://www.ucop.edu/doorways/list), or in paper format from your principal or guidance counselor. Courses from schools and colleges outside California must provide the same rigor and level of instruction to meet the A-G requirement.

## A-G Subject Requirements

**A. History/Social Science:** 2 years required. Two years of history/social science, including one year of world history, cultures and geography; and one year of U.S. history or one-half year of U.S. history and one half year of civics or American government.



UC Merced's Folklórico performs at many campus events.



mathematics, laboratory science and visual and performing arts. In these fields, as well as in the fields of computer science and social science, courses that are designed to prepare students for Advanced Placement Examinations, the International Baccalaureate Higher Level Examination and college courses that are transferable to the University are acceptable honors-level courses.

**D or F and Repeated Grades:** Students who receive D and F grades in “A-G” courses must repeat those courses with grades of C or better. In the subject areas of mathematics and foreign language, however, a D or F grade can be “validated” by earning a C grade or better in the second semester or more advanced level in the same subject. Courses that have been “validated” with a more advanced-level course cannot be subsequently repeated for a better grade. Consult the Office of Admissions or your counselor to determine how D or F grades can be improved and how the University will use them in evaluating your scholarship record. Grades will not be used for repeated courses in which you initially received a C or better.

### Examination Requirement

Students applying for admission must submit the following test scores:

- Either the ACT Assessment Plus Writing test or the SAT Reasoning Test, and
- Two SAT Subject Tests, in two different subject areas selected from history, literature, mathematics (Math Level II only), science or a language other than English.

The University will use the highest test scores you earn in computing your eligibility for admission, and there is no penalty for taking the examinations more than once. The UC strongly recommends that you submit scores from all tests taken. For more information about taking the tests to fulfill the examination requirement, visit the Web site: [www.universityofcalifornia.edu/admissions](http://www.universityofcalifornia.edu/admissions), talk to your school counselor or contact the appropriate testing organization.

Information for the ACT is available at [www.actstudent.org](http://www.actstudent.org) and for the SAT at [www.collegeboard.com](http://www.collegeboard.com). The University requires you to take these tests no later than December of your senior year. To be eligible in the Statewide Context, your combined test scores must match or exceed the scores indicated for your “A-G” GPA. To calculate your UC Score according to the Eligibility Index, please use the online calculator at [www.universityofcalifornia.edu/admissions/undergrad\\_adm/paths\\_to\\_adm/freshman/scholarship\\_reqs.html](http://www.universityofcalifornia.edu/admissions/undergrad_adm/paths_to_adm/freshman/scholarship_reqs.html).

### ELIGIBILITY IN THE LOCAL CONTEXT

Under the Eligibility in the Local Context (ELC) path, the top 4 percent of students at each participating California high school are designated UC eligible for admission. To be considered for ELC, a student must complete 11 specific units of the “A-G” subject requirements by the end of the junior year. With the assistance of each participating high school, the University will identify the top 4 percent of students on the basis of GPA in the required course work. The 11 units include 1 unit of history/social science, 3 units of English, 3 units of mathematics, 1 unit of laboratory science, 1 unit of language other than English and 2 units chosen from among the other subject requirements. The University will notify ELC students of their status at the beginning of their senior year. If you are designated UC eligible through ELC, you must submit the University’s undergraduate application for admission during the November filing period and complete remaining eligibility requirements—including the subject and examination requirements—to enroll.

### ELIGIBILITY BY EXAMINATION ALONE

You may be able to qualify for admission to the University by examination alone through achieving high scores on the ACT Assessment plus Writing or SAT Reasoning Test and two SAT Subject Tests.

To qualify for admission to the University by examination alone, you must achieve a minimum UC Score Total—calculated according to the Eligibility Index instructions—of 410 (425 for nonresidents). In addition, you must earn a minimum UC Score of 63 on each component of the ACT or SAT Reasoning Test and on each SAT Subject Test. See [www.universityofcalifornia.edu/admissions](http://www.universityofcalifornia.edu/admissions) to calculate your UC Score.

You may not use a SAT Subject Test to meet these requirements if you have completed a transferable college course in that subject with a grade of C or better.

### Nonresident and International Freshman Applicants

There are two paths to UC eligibility for nonresidents at the freshman level: Eligibility in the Statewide Context and Eligibility by Examination Alone. Both paths are similar to those described above, with the following exceptions: Scholarship Requirement: Your grade point average in the “A-G” subjects must be 3.4 or higher, regardless of your test scores. Students with a grade point average below 3.45 must have a UC Score of 147.

## ELIGIBILITY VS. SELECTION: FRESHMAN APPLICANTS

If the number of applicants exceeds the spaces available for a particular term or major, UC Merced may use selection criteria beyond minimum eligibility requirements to identify applicants who will be admitted. The following factors may be considered in a comprehensive review of eligible applicants for admission to UC Merced as freshmen:

- Academic grade point average in all required "A-G" courses, including additional points for completion of University-certified honors courses.
- Scores on the ACT plus Writing or SAT Reasoning Test, and two SAT Subject Tests.
- Number, content of and performance in academic courses beyond the minimum "A-G" requirements.
- Number of and performance in University-approved honors courses and Advanced Placement, International Baccalaureate and transferable college courses.
- Identification as being ranked in the top 4 percent of your high school class at the end of your junior year ("eligible in the local context").
- Quality of your senior-year program, as measured by the type and number of academic courses in progress or planned.
- Quality of your academic performance relative to the educational opportunities available in your secondary school.
- Outstanding performance in one or more academic subject areas.
- Outstanding work in one or more special projects in any academic field of study.
- Recent, marked improvement in academic performance, as demonstrated by your academic GPA and the quality of course work completed or in progress.
- Special talents, achievements and awards in a particular field, such as visual and performing arts, communication or athletic endeavors; special skills, such as demonstrated written and oral proficiency in other languages; special interests, such as intensive study and exploration of other cultures; experiences that demonstrate unusual promise for leadership, such as significant community service or significant participation in student government; or other significant experiences or achievements that demonstrate your promise for contributing to the intellectual vitality of the campus.
- Completion of special projects undertaken either in the context of your high school curriculum or in conjunction with special school events, projects or programs.
- Academic accomplishments in light of your life experiences and special circumstances.

## Transfer Admission

If you enrolled in a regular session of college or university-level course work after leaving high school, you are considered to be a transfer student and cannot ignore your college records to apply as a freshman. UC Merced is firmly committed to enrolling well-prepared transfer students. Following California's Master Plan for Higher Education, UC Merced will give highest priority to students transferring from California's community colleges. UC Merced will give priority to junior-level transfer students—students who have completed at least 60 and no more than 80 transferable semester units (90 to 120 quarter units). While preparing to transfer at the junior level, we encourage you to complete a pattern of courses that will best prepare you for upper division work in your chosen field of study. It is helpful if you identify an intended major early in your college course work. Contact the Office of Admissions for assistance in planning to transfer. Information about UC Merced majors and transfer preparation is available at [transfers.ucmerced.edu](http://transfers.ucmerced.edu). If you plan to transfer from a California Community College, contact the Admissions Office to inquire about Transfer Admission Guarantee contracts and visit [www.assist.org](http://www.assist.org) for information on courses to take to prepare for your major.

### Transferable College Units and Grade Point Average (GPA)

The University awards transfer credit for courses that are determined by the Office of Admissions to be essentially the same as those offered for the undergraduate degree at any UC campus, and taken at a regionally accredited institution of higher education. Transferable courses offered by California Community Colleges are listed on the UC Transferable Courses section of the California public institution articulation database, found on the Web site: [www.assist.org](http://www.assist.org).

Grade points for all UC-transferable courses attempted on a letter grade basis will be computed into the grade point average (GPA) that will be used to determine admission. Units for courses in which

I CAME TO UC MERCED FROM BOSTON UNIVERSITY AND SANTA MONICA COLLEGE BECAUSE OF THE OPPORTUNITY TO STAND OUT AND BE KNOWN. THEN I MET THE FACULTY AND I FOUND OUT THAT THE SMALLER STUDENT POPULATION REALLY ALLOWS THEM TO BE ACCESSIBLE. EVEN AT THE LARGER UNIVERSITIES WITH SMALL FACULTY TO STUDENT RATIOS YOU CAN'T GET THE SAME ATTENTION. TRUST ME, I'VE EXPERIENCED IT.

—Drew E. Glaser, student, Resident Assistant

you earned grades of W, Pass or Credit, and No Pass or No Credit, are excluded from the computation of your grade point average. Honors courses taken in college are not weighted when computing the transferable GPA for admission.

If you have attended only community colleges or two-year postsecondary institutions, all of your UC-transferable college courses will be accepted in transfer for subject credit and your GPA for admission is computed using all UC-transferable college courses attempted. When you transfer, however, the total number of units is limited to a maximum total of 70 semester units (105 quarter units).

### Excess Units

Students transferring to UC Merced from a regionally accredited four-year college or university may have up to 80 transferable

semester (120 quarter) units and still be eligible to transfer. It is important to note, however, that UC Merced considers students who have completed more than 80 semester units to have excess units and will not admit those students without special approval. A student who completes 80 or fewer units at a four-year institution, then transfers to a community college to complete course work that is necessary for admission, will not have excess units and can be considered for admission to UC Merced.

## ADMISSION ELIGIBILITY FOR TRANSFER STUDENTS

### California Residents

There are three ways for you to meet the University of California's minimum eligibility requirements for transfer admission. Meeting the eligibility requirements does not guarantee admission.

1. Eligible for admission upon high school graduation: If you were eligible for admission to the University when you graduated from high school – meaning you satisfied the Subject, Scholarship and Examination requirements – you are eligible to transfer if you have a C (2.0) grade point average in your transferable college course work.
2. Lacking only subject requirements upon high school graduation: If you met the scholarship and examination requirements but you did not satisfy the subject requirements when you graduated from high school, you must take transferable college courses in the subjects you are missing, earn a grade of C or better in each of these required courses and earn an overall C (2.0) average in all transferable college course work to be eligible to transfer.
3. Lacking the scholarship requirement upon high school graduation: If you were not eligible for admission to the University when you graduated from high school because you did not meet the scholarship and examination requirement, you must complete all of the following in (a) and (b) below.

Any student planning to enter UC Merced as a junior-level transfer student may complete the following requirements in place of (1) or (2) above.

(a) 60 semester units (90 quarter units) of UC-transferable college course work with a grade point average of at least 2.4. No more than 14 semester units (21 quarter units) may be taken Pass/Not Pass; and

(b) the transfer course pattern requirement to include:

- Two transferable college courses (3 semester or 4-5 quarter units each) in English composition, and
- One transferable college course (3 semester or 4-5 quarter units) in mathematical concepts and quantitative reasoning, and
- Four transferable college courses (3 semester or 4-5 quarter units each) chosen from at least two of the following subject areas:
  - Arts and humanities
  - Behavioral and social sciences
  - Physical and biological sciences

Students who have completed courses listed on the Intersegmental General Education Transfer Curriculum (IGETC) at [www.assist.org](http://www.assist.org) before they transfer to the University will have satisfied the transfer course pattern requirement.

### Transfer Requirements for International and Nonresident Students

Transfer students who are not residents of California must meet the same requirements as California residents and have a grade point average (GPA) of 2.8 or better in all transferable college work.



A member of the Bobcat Band plays during a campus event.

Please note: Students with a GPA of 2.4 or better who are enrolled in at least 12 units at a California Community College prior to transfer may be eligible to be considered as a California resident for admissions purposes.

### Eligibility vs. Selection: Transfer Applicants

If the number of transfer applicants exceeds the number of transfer enrollment spaces available, UC Merced may use supplemental criteria to select from among the qualified transfer applicants. Highest-priority consideration at the transfer level is given to students transferring from a California Community College who meet the University's definition of a California Community College student.

**Definition of a California Community College student:** A California Community College student applying for admission to the University of California in advanced standing will be given priority admission over all other applicants if: 1) he/she was enrolled at one or more California Community Colleges for at least two terms (excluding summer sessions); 2) the last college he/she attended before admission to a UC campus was a California Community College (excluding summer sessions); and 3) he/she has completed at least 30 semester (45 quarter) UC transferable units at one or more California Community Colleges.

### Selection Criteria for Transfer Applicants:

- Completion of a specified pattern or number of courses that meet breadth or general education requirements.

- Completion of a specified pattern or number of courses that provide continuity with upper division courses in your major.
- Your grade point average in all transferable courses.
- Participation in academically selective honors courses or programs.
- Special talents, achievements and awards in a particular field, such as visual and performing arts, communication or athletic endeavors; special skills, such as demonstrated written and oral proficiency in other languages; special interests, such as intensive study and exploration of other cultures; experiences that demonstrate unusual promise for leadership, such as significant community service or significant participation in student government; or other significant experiences or achievements that demonstrate your promise for contributing to the intellectual vitality of the campus.
- Completion of special projects undertaken in the context of your college curriculum or in conjunction with special school events, projects or programs.
- Academic accomplishments in light of your life experiences and special circumstances.
- Take the Test of English as a Foreign Language (TOEFL) and earn a minimum score of 220 (computer-based TOEFL), 83 (internet-based TOEFL) or 550 (paper-based TOEFL). Information about the TOEFL is available at [www.toefl.org](http://www.toefl.org).
- Take the International English Language Testing System exam (IELTS) and earn a minimum score of 7. Information about IELTS is available at [www.ielts.org](http://www.ielts.org).
- Earn a score of 3, 4 or 5 on the Advanced Placement International Advanced Placement International English Language (APIEL). Information about the APIEL is available at [www.collegeboard.com/ap/students/apel](http://www.collegeboard.com/ap/students/apel).
- Earn grades of B or better in two UC-transferable English composition courses taken at any regionally accredited post-secondary institution in the United States. Prospective international students are strongly encouraged to contact the Admissions office to discuss their academic background, English proficiency and visa status prior to application.

### Notes for California Community College Transfers

If you complete the Intersegmental General Education Transfer Curriculum (IGETC) prior to transfer, the campus-specific, lower-division general education requirements for graduation from UC Merced will be waived. Official certification of your completed IGETC must be sent to the Office of Admissions at UC Merced, along with your final, official transcript from the last community college you attended.

If you are already enrolled at a University of California campus as a degree-seeking student, you may apply to UC Merced as a transfer student. Intercampus transfers follow the same procedures and deadlines as transfers from other colleges and universities. If you complete the general education or breadth requirements for your UC school or college prior to transfer and obtain a letter from the dean declaring your requirements satisfied, UC Merced will use your letter to waive campus-specific, lower-division general education requirements at UC Merced.

### Transfer Admission Guarantee (TAG)

UC Merced offers Transfer Admission Guarantee (TAG) contracts for California Community College students throughout California. TAG contracts specify the courses to be completed and grade point averages students must earn at the community college to be guaranteed admission to their major. If you are interested in receiving a TAG contract, call the Office of Admissions at (209) 228-4682 or (866) 270-7301 (toll-free in California).

### International Students

Courses comparable to those offered for undergraduate degree credit in the University of California and completed in post secondary institutions outside the United States will transfer to UC Merced if taken at institutions recognized by the Ministry of Education in the institution's home country. International students with previous college attendance cannot disregard their academic records and apply as freshmen.

International students whose native language is not English must demonstrate language proficiency by one of the following methods:

### COST OF ATTENDANCE AND FINANCIAL AID

See the Financial Aid section of this catalog for detailed information about the estimated cost of attendance and information regarding financing your education.

### VERIFICATION OF SELF-REPORTED ACADEMIC RECORDS

All admission offers are provisional and subject to cancellation if official documents to verify self-reported academic information are not received in the Office of Admissions by the deadline pertaining to the term of entrance. Required documents include official test scores and final, official transcripts from high schools and colleges attended. Students admitted to fall semesters must be sure their official documents arrive five business days prior to their scheduled New Student Orientation session or by July 15, whichever date comes first. Students admitted to spring semesters must be sure their official documents are received by January 6.

### ORIENTATION FOR ADMITTED STUDENTS

All admitted students are required to attend New Student Orientation during summer for fall semester and during January for spring semester. At Orientation, students meet with an academic advisor, plan their program of study and enroll in classes. Final,

## MAKE UC MERCED YOUR TRANSFER DESTINATION

Transfer students who joined UC Merced's early classes have come together to form the Student Outreach Transfer Mentor Program (STOMP) to foster relationships among current and prospective transfer students. As UC Merced ambassadors, our transfer students are visiting California Community Colleges to let students know what a research university has to offer them and what services are available to support their educational success at UC Merced.

UC Merced aspires to be the top destination for transfer students. Come help your fellow transfer students make this program bigger and better. Partner with UC Merced's first classes, as the pioneering work of university-building continues. Check out this Web site: [transfer.ucmerced.edu](http://transfer.ucmerced.edu).

official transcripts and official test scores must arrive in the Office of Admissions by July 15 or at least five business days prior to their scheduled New Student Orientation session (whichever is earlier) or registration for courses will be delayed.

### CALIFORNIA RESIDENCY STATUS

The manner in which legal residence is defined for tuition purposes is different than that for admission purposes. If you have questions about your residency status for tuition purposes, contact the Office of the University Registrar (see the Registrar section of this catalog).

### ADVANCED PLACEMENT (AP) AND INTERNATIONAL BACCALAUREATE (IB) EXAMINATIONS

The University awards credit for successful completion of the College Board Advanced Placement (AP) and the International Baccalaureate Higher Level Examinations (IB). Students must have official test score reports sent directly from the testing service to UC Merced to receive credit. Students meet with advising staff during orientation to discuss which courses or requirements they may have waived based on their scores in these and other examinations.

#### CREDIT FOR AP EXAMS

UC Merced grants elective credit for all College Board AP examinations on which a student scores 3 or higher. Some examinations passed with scores of 3 or higher may award exemptions for degree requirements. The number of elective units awarded for each examination can be viewed on the chart in this section.

#### CREDIT FOR IB EXAMS

The International Baccalaureate Organization (IBO) awards either a diploma or awards a certificate for individual IB exams. Students completing the IB diploma with a score of 30 or above will receive a total of 20 semester units of elective credit toward their UC Merced undergraduate degree, as approved by UC faculty for implementation in 2002. To complete the IB diploma, students are required to take one subject from each of the six subject groups and complete an extended essay. At least three of the six subjects must be taken at the Higher Level. The University grants 5.3 semester units to students who receive IB certificates for each individual Higher Level Exam on which the student scores 5, 6, or 7. The University does not grant credit for Standard Level exams.

Prior to enrolling in their first classes at UC Merced, students will meet with an academic advisor to discuss their academic plans and test scores. The following chart provides guidelines used for awarding units (elective credit) and exemptions for degree requirements. Students who choose to take a course from which they are otherwise exempt will receive credit for the UCM course but not the units for the exam.

#### CREDIT FOR AP/IB EXAMS

Credit will be granted for either the IB or AP Exams in any one subject area.

SUBJECT EXAM	UNITS	COURSE EXEMPTIONS AND GENERAL EDUCATION
<b>IBH Visual Arts:</b> <b>AP Art (Studio)</b> Drawing 2-D Design 3-D Design	5.3 5.3 5.3 5.3	One (1) course in ARTS. Score 4 or 5 on Drawing exempts one (1) course in ARTS. Score 4 or 5 on 2-D Design exempts one (1) course in ARTS. Score 4 or 5 on 3-D Design exempts one (1) course in ARTS. Unit credit limit for all three AP exams: 5.3.
<b>AP Art History</b>	5.3	Score 4 or 5 exempts one (1) course in Arts.
<b>IBH Biology</b> <b>AP Biology</b>	5.3 5.3	No course exemption. Score 4 or 5 exempts BIO 001.
<b>IBH Chemistry</b> <b>AP Chemistry</b>	5.3 5.3	Course exemption to be determined. Score 3 or above exempts Chemistry Readiness Exam. Score 4 or 5 exempts CHEM 002.
<b>IBH Computer Science</b> <b>AP Computer Science</b> Comp Science A Comp Science AB	5.3 1.3 2.7	No course exemption. Unit credit limit for both AP exams: 2.7
<b>IBH Economics</b> <b>AP Economics:</b> Macroeconomics Microeconomics	5.3 2.7 2.7	Score 6 or 7 exempts ECON 001. Score 4 or 5 on both Microeconomics AND Macroeconomics exempts ECON 001.
<b>IBH English Language</b> <b>AP English:</b> Language/Composition Literature/Composition	5.3 5.3 5.3	Score 5 or above satisfies WRI 001 and ELWR. Score 6 or 7 exempts WRI 010. Score 3 or above on either AP exam satisfies WRI 001 and ELWR. Score 4 or 5 Lang/Comp exempts WRI 010. Score 4 or 5 Lit/Comp exempts one sequence from: LIT 020-021, 030-031, 040-041 Unit credit limit for both AP exams: 5.3.
<b>AP Environmental Science</b>	2.7	Score 4 or 5 exempts ESS 001.
<b>AP Government and Politics:</b> United States Comparative	2.7 2.7	Score 4 or 5 exempts POLI 001. Score 4 or 5 exempts POLI 003.
<b>IBH History</b> <b>AP History:</b> US History European History World History	5.3 5.3 5.3 5.3	Score 6 or 7 exempts one (1) lower division history sequence. Score 4 or 5 exempts HIST 016-017. Score 4 or 5 exempts HIST 030-031. Score 4 or 5 exempts HIST 010-011.

SUBJECT EXAM	UNITS	COURSE EXEMPTIONS AND GENERAL EDUCATION
<b>IBH Geography</b> <b>AP Human Geography:</b>	5.3 2.7	No course exemptions.
<b>IBH Language A2 or B</b>		
Chinese	5.3	Score 6 or 7 on Chinese exempts CHN 004. Score 5 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
French	5.3	Score 6 or 7 on French exempts FREN 004. Score 5 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
German	5.3	Score 5 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
Italian	5.3	Course exemptions to be determined.
Japanese	5.3	Score 6 or 7 on JPN 004. Score 5 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
Portuguese	5.3	Course exemptions to be determined.
Spanish	5.3	Score 6 or 7 exempts SPAN 004 and fulfills Spanish language requirement for those majoring in Literatures and Cultures with the concentration "Literatures of the Spanish Speaking World". Score 5 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
<b>AP Language Other Than English:</b>		
Chinese	5.3	Score 4 or 5 on Chinese language exam exempts CHN 004. Score 3 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
French Language	5.3	Score 4 or 5 on French language exempts FREN 004. Score 3 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
French Literature	5.3	Score 3 or higher on French literature fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
German Language	5.3	Score 3 or higher on German language fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
German Literature	5.3	Score 3 or higher on German literature fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with the concentration "Literatures of the English Speaking World."
Italian Language and Culture	5.3	Score 3 or higher on Italian language and culture fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
Japanese Language and Culture	5.3	Score 4 or 5 on Japanese language and culture exempts JPN 004. Score 3 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
Spanish Language	5.3	Score 4 or 5 on Spanish language exempts SPAN 004. Score 3 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World."
Spanish Literature	5.3	Score 4 or 5 on Spanish literature exempts LIT 050-051. Score 3 or higher fulfills the foreign language requirement for those majoring in History or Literatures and Cultures with a concentration in "Literatures of the English Speaking World." Score 4 or 5 fulfills Spanish language requirement for those majoring in Literatures and Cultures with the concentration "Literatures of the Spanish Speaking World."
<b>IBH Classical Languages:</b> <b>Latin</b> <b>Classical Greek</b>	5.3 5.3	No course exemptions.
<b>AP Latin:</b> Latin Literature Latin Vergil	2.7 2.7	No course exemptions.
<b>IBH Mathematics</b>	5.3	Course exemption to be determined.
<b>AP Mathematics</b> Calculus AB Calculus BC Calculus BC Subscore AB	2.7 5.3 2.7	Score 4 or 5 either exam exempts Math readiness Exam and SSHA's Quantitative Reasoning Requirement. Score 4 or 5 exempts MATH 021. Score 3 exempts Calculus Readiness exam and MATH 021; Score 4 or 5 exempts MATH 021 and MATH 022. Score 4 or 5 exempts MATH 021. Unit credit limit on all three AP exams: 5.3
<b>IBH Music</b> <b>AP Music Theory</b>	5.3 5.3	Score 6 or 7 exempts one (1) GE course in ARTS. No course exemption.
<b>IBH Physics</b> <b>AP Physics:</b> Physics B Physics C Mechanics Physics C Electricity and Magnetism	5.3 5.3 2.7 2.7	Course exemption to be determined. No course exemption. Score 5 exempts PHYS 008. No course exemption. Unit credit limit for all three AP exams: 5.3
<b>IBH Psychology</b> <b>AP Psychology</b>	5.3 2.7	Score 6 or 7 exempts PSY 001. Score 4 or 5 exempts PSY 001.
<b>IBH Social and Cultural Anthropology</b>	5.3	Score 6 or 7 or above exempts ANTH 001.
<b>AP Statistics</b>	2.7	Score 4 exempts MATH 018; SSHA quantitative reasoning requirement (PSY 010). Score 5 exempts ECON 010 or POLI 010.
<b>IBH Theatre Arts</b>	5.3	Score 5 or above exempts one (1) GE Course in Arts.

# Financial Aid And Scholarships

The Office of Financial Aid and Scholarships strives to make a college education affordable for all students regardless of their families' financial situations. While students are expected to contribute a certain amount toward their education, UC Merced offers a number of financial aid and scholarship resources to assist students in meeting their educational expenses. (Exceptions: The Office of Financial Aid and Scholarships does not have funds available to offer assistance to students on special or limited status or students enrolled in University Extension.)

All students, regardless of family income, are encouraged to apply for financial aid. In 2008-09, 77 percent of UC Merced undergraduate students received some form of financial assistance. Financial aid is intended both to remove financial barriers for families who cannot afford the cost of a higher education and to fill in the gap for families who can afford only part of the cost. A number of factors in addition to family income are considered in determining your financial eligibility, including the size of your family and the number of family members in college. Although most grant awards are based on financial need, some loans and scholarships are available regardless of need.

The Office of Financial Aid and Scholarships is dedicated to helping students and their parents understand the financial aid opportunities available as well as the criteria used in determining eligibility for the various financial aid programs available at UC Merced. The Office of Financial Aid and Scholarships welcomes your questions and is here to provide services and guidance that will contribute to your educational experiences at UC Merced. If you have questions or need additional information, please do not hesitate to contact us.

## OFFICE OF FINANCIAL AID AND SCHOLARSHIPS:

Web site: [financialaid.ucmerced.edu](http://financialaid.ucmerced.edu)  
 E-mail: [finaid@ucmerced.edu](mailto:finaid@ucmerced.edu)  
 Phone: (209) 228-4243  
 Address: Office of Financial Aid and Scholarships  
 5200 N. Lake Road  
 Merced, CA 95343

UCM School Code: 041271

## OTHER IMPORTANT WEB ADDRESSES:

Web site: FAFSA: [www.fafsa.ed.gov](http://www.fafsa.ed.gov)  
 Web site: CSAC: [www.csac.ca.gov](http://www.csac.ca.gov)

## HOW TO APPLY

Students applying for financial aid from UC Merced, the Federal Government and/or the state of California must complete the Free Application for Federal Student Aid (FAFSA).

For faster and more accurate filing, students can apply for financial aid online at [www.fafsa.ed.gov](http://www.fafsa.ed.gov). The FAFSA as well as the Cal Grant GPA Verification form should be completed and submitted as soon as possible after January 1 and no later than March 2nd. If the March 2nd deadline has already passed, some funding may still be available. Apply as soon as possible! We receive and process financial aid applications throughout the year and students will be considered for Federal Grants and Loans at all times. A financial aid advisor is available to assist students and parents with the financial aid application and award process, and can review special circumstances that may affect eligibility. Please contact the Office of Financial Aid and Scholarships for assistance.

## TYPES OF FINANCIAL AID

Students who receive financial aid may receive funds from one or more of the following sources: scholarships, grants, loans and work-study.

## SCHOLARSHIPS

The University of California, Merced administers a number of scholarship funds designed to benefit students. These scholarships are provided through the generosity of UC alumni; friends of UC Merced; corporations, businesses, professional associations; and the University itself. We have a variety of scholarships with a vast range of criteria available. There are merit-based and need-based scholarships for new and continuing students at all class levels.

New students are automatically considered for all merit-only scholarships as well as need-based scholarships simply by completing a Free Application for Federal Student Aid (FAFSA). Continuing students need to submit a Continuing Student Scholarship Application by March 2nd of each year.

Following is a partial list of scholarships that are available or will be available in the future for UC Merced students:

Bank of America Management Scholarship  
 Beverlee Sieghold Antoine Endowed Scholarship Fund  
 Caroline L. Adams Endowed Scholarship  
 Calvin E. Bright Engineering Scholarship  
 F.J. Cayting Friend of Education Scholarship and Fellowship  
 Chancellor's Scholarship  
 Comcast Research Week Scholarship

## APPLYING FOR FINANCIAL AID IS AS EASY AS 1, 2, 3!

### New Students

1. Complete and submit the University of California Application for Admissions & Scholarships by November 30th.
2. Complete and submit the Free Application for Federal Student Aid (FAFSA) and a GPA Verification form by March 2nd.
3. Complete and return any additional documents requested by the Office of Financial Aid and Scholarships by June 1st.

### Continuing Students

1. Complete and submit the Free Application for Federal Student Aid (FAFSA) by March 2nd.
2. Complete and submit a Continuing Student Scholarship Application by March 2nd.
3. Complete and return any additional documents requested by the Office of Financial Aid and Scholarships by June 1st.



"Beginnings" sculpture on the Carol Tomlinson-Keasey Quad.

Dan David Solar Endowment Fund  
 Earle C. Anthony Fellowship  
 Eich Family Scholarship  
 Ernest S. and Bettine Kuh Scholarship  
 Fletcher Jones Foundation Fellowship  
 Floyd Family Foundation Scholarship  
 Frances M. Benton Scholarship  
 Golden Bobcat Scholarship  
 Great Valley Center Book Scholarship  
 Grossman Family Endowed Scholarship  
 Hildebrand Scholarship  
 Jefferson Jennings Doolittle Endowed Scholarship  
 Joe and Margo Josephine Scholarship  
 John C. "Jack" Pjerrou Endowed Scholarship  
 Ken and Midge Riggs Endowed Scholarship  
 Kruszelnicki Memorial Scholarship  
 Kris-Tangella Academic Excellence Endowed Scholarship  
 Leon O. and Diana Chua Scholarship  
 Leroy C. Shobe Scholarship  
 Louis P. Gonella Scholarship  
 Lucia R. Myers Endowed Scholarship

Marvin Peletz Scholarship  
 Merced County Association of Realtors Scholarship  
 Merced Mall Regional Shopping Center Scholarship  
 Merced School Employees Federal Credit Union Endowed Scholarship  
 Michael and Arline Colvin Endowed Scholarship  
 Nina Wack Special Education Fellowship  
 Pamela Ann Stahl Scholarship  
 Professor Roland Winston Endowed Scholarship  
 Provost's Scholarship  
 Ray and Joan Dezember Scholarship  
 Ruth Solomon Hoffman Scholarship  
 SBC Pacific Bell Scholarship  
 Speck Family Scholarship  
 Stephen D. Peterson Endowed Scholarship  
 Stewart A. Resnick-Paramount Farms Scholarship  
 Steve and Mia Kang Endowed Scholarship  
 Theodore and Doris Koerner Scholarship  
 UC Merced Donor Scholarship  
 UC Merced Employees' Scholarship  
 UC Regents' Scholarship  
 Wally Coats Scholarship  
 Wells Fargo Scholarship for High School Students  
 Wells Fargo Scholarship for Transfer Students  
 Wendy Leone Olson Endowed Scholarship  
 Westly Foundation Alumni Scholarship  
 Willer/BUR Scholarship  
 Wishek Family Scholarship

Please note: All new students must have at least a 3.25 GPA and all continuing students must have at least a 3.0 GPA to be considered for scholarships.

## GRANTS

Grants are awarded on the basis of financial need and do not have to be repaid. The Federal Government provides funds for some grants (Federal Pell Grants, Federal ACG Grants and Federal SMART Grants). The State of California also offers grants to qualified undergraduate students (Cal Grants A and B). In addition, grant funds are provided by the University of California.

### Federal Pell Grants

To be eligible for a Federal Pell Grant, applicants must be U.S. citizens or eligible non-citizens, be enrolled as undergraduates, have not previously received a bachelor's degree and demonstrate financial need. The amount you receive depends on your financial need as determined by completing the FAFSA.

### Federal ACG Grants

To be eligible for ACG Grants, applicants must be enrolled as undergraduates, have not previously received a bachelor's degree, receive a federal Pell Grant, demonstrate financial need and meet other important requirements.



### National SMART Grants

To be eligible for SMART Grants, applicants must be enrolled as undergraduates, have not previously received a bachelor's degree, receive a federal Pell Grant, demonstrate financial need and meet other important requirements.

### Cal Grants

To be eligible for a Cal Grant award, applicants must be California residents, demonstrate financial need and meet appropriate deadlines. The California Student Aid Commission (CSAC) administers the Cal Grant program. Go to the CSAC web site at [www.csac.ca.gov](http://www.csac.ca.gov) for more information.

Cal Grant A awards are based on financial need and academic achievement. This grant pays the majority of University fees.

Cal Grant B awards are based on financial need and are for entering undergraduate students, primarily from low-income backgrounds. Cal Grant B pays a stipend each semester for living expenses for first-year students, and the majority of University fees plus a stipend each semester for living expenses for students in their second through fourth years. It is UC Merced's policy to apply the stipend portion of your Cal Grant B award to fees first. If you would like the stipend to instead be refunded to you, please contact our office.

### University Grants

The University of California returns a portion of all educational fee revenue to financial aid programs. UC Merced uses this funding to provide a need-based institutional grant and scholarship program



(Bobcat Grants and Scholarships) to eligible students. The grant and scholarship program strives to ensure that all students who are eligible to attend the University of California, Merced, have the financial resources to do so.

### LOANS

Loans are financial aid awards that require repayment. They offer the opportunity to defer the cost of your educational expenses by borrowing now and repaying later. While some loan programs are based on financial need, there are loan programs available to all students regardless of income. Loan programs available through UC Merced are federally funded, providing long-term, low-interest loans.

#### Direct Student Loans

Federal Stafford Loans are guaranteed, low-interest loans for students. UC Merced participates in the Direct Loan program meaning that the Department of Education provides the funding for this federal loan program.

**Direct Subsidized Student Loan:** The federal government pays the interest on the loan while the student is in school and for six months after the student graduates or ceases to enroll at least half-time working toward a degree.

**Direct Unsubsidized Student Loan:** The student is responsible for paying interest while in school, but can defer any interest payment until after graduation or ceasing to be enrolled at least half-time working towards a degree.

#### Direct Parent Loan for Undergraduate Students (PLUS)

A Federal PLUS Loan is a low-interest loan for biological or adoptive parents to borrow to help pay the educational expenses for their dependent student. The parent must be a U.S. citizen or eligible non-citizen with a good credit history. The dependent student must also be eligible to receive federal financial assistance. Like the Federal Stafford Loan, the Department of Education provides funds for the Federal PLUS program.

The parent may borrow up to the school's cost of attendance, minus any aid the student received. Different repayment options are provided by the Department of Education and are designed to provide flexibility in meeting repayment obligations.

#### PLUS Loans for Graduate and Professional Degree Students

Graduate and professional degree students are eligible to borrow under the PLUS Loan Program up to their cost of attendance minus other estimated financial assistance in. The terms and conditions applicable to Parent PLUS Loans also apply to Graduate/Professional PLUS loans. These requirements include a determination that the applicant does not have an adverse credit history, repayment beginning on the date of the last disbursement of the loan. Applicants for these loans are required to complete the Free Application for Federal Student Aid (FAFSA). They also must have applied for their annual loan maximum eligibility under the Federal Subsidized and Unsubsidized Stafford Loan Program before applying for a Graduate/Professional PLUS loan.

UC Merced students have unparalleled opportunities to intern and work in nearby Yosemite National Park.

## WORK-STUDY

Work-Study is an opportunity for students to obtain employment and earn money for educational expenses.

The award is not a guarantee of employment but we have found that most students who want to work are able to find employment. Students will need to obtain a student employment position and the money they earn from that position will be paid to them through payroll like any other employment opportunity. The Career Services Center is available to assist students in obtaining a student employment position.

Work-Study is awarded first-come, first-served on the basis of need.

However, students are not precluded from working if they are not awarded a Work-Study award. Work-Study students are given priority for on-campus positions but all students are welcome to apply for all positions.

## GENERAL ELIGIBILITY REQUIREMENTS

Federal financial aid programs are subject to regulations that define the criteria students must meet to qualify and maintain eligibility for those programs. The regulations state that a student must: (1) be a U.S. citizen or an eligible non-citizen of the U.S.; (2) be accepted for admission to the University; (3) be enrolled in good standing at the University (units taken through University Extension are not counted toward half- or full-time enrollment); (4) demonstrate financial need (except for Federal Unsubsidized Loans and Federal PLUS Loans); (5) maintain satisfactory academic progress for financial aid, as outlined below; (6) be registered for the selective service if the student is a male at least 18 years old, born after December 31, 1960, and not on active duty with the armed forces; and (7) not owe a refund on a federal grant or be in default on a federal educational loan. Please note: Financial need is the difference between the reasonable, approved expenses of attending UC Merced and all available resources, including the expected contribution from parents, the student and any outside aid.

### Full-time Enrollment

Students not enrolled in an approved part-time program are expected to enroll full time at the university. Students not enrolled full time by the 15th day of instruction each semester may have to pay back some of their financial aid.

### Satisfactory Academic Progress

Financial Aid Programs require that a recipient maintain Satisfactory Academic Progress (SAP). This policy pertains to federal and state and institutional funds. Note: Some funds have higher academic and/or enrollment requirements.

## Qualitative Measurement

### Academic Probation

An undergraduate student will be placed on SAP probation if one of the following occurs:

- (1) The student's semester grade point average is less than 2.0, or
- (2) The student's cumulative University of California grade point average is less than 2.0.

## Quantitative Measurement

An undergraduate student will be placed on SAP probation if the student fails to complete a minimum of 12 UC units per semester enrolled.

Dropped and failed courses; remedial courses for which no credit is received; and repeated courses do not count toward unit credit. To earn units for a course, you must complete and pass that course.

### Academic Probation

Both qualitative and quantitative requirements are measured and warning letters are mailed at the end of each semester and the student is placed on SAP probation for the next semester. You may receive financial aid while you are on probation, but you will lose all financial aid if you are dismissed. Students are allowed to receive financial aid while on probation for a maximum of two consecutive terms.

If you meet the next applicable SAP measurement for both qualitative and quantitative standards, you will return to good standing. If, however, you fail to meet the next applicable SAP requirement for both qualitative and quantitative standards, you will no longer be eligible for student financial support.

### Appeals

If your financial aid is denied, suspended or terminated for failure to achieve satisfactory academic progress, you may appeal if extenuating circumstances hindered academic performance. Appeal forms are available from the Office of Financial Aid and Scholarships. To file an appeal, complete the form, obtain and attach all documents that support the basis of your appeal, and return the form and documentation to the Office of Financial Aid and Scholarships. You are strongly encouraged to file your appeal form immediately after receiving notification that your aid has been denied but no later than 4 weeks after the last day of the term you failed to meet SAP. You are not eligible to receive financial aid while your appeal is under consideration, and the appeal process normally takes 2-4 weeks.

### Limited Number of Semesters

Financial aid is not available for an indefinite period. You are allowed up to 12 semesters of financial aid eligibility, depending on your class standing when you were admitted. The semester limit applies to time you have spent at any college or post-secondary institution; it includes semesters during which you received no financial aid, as well as terms during which you withdrew. It does not include semesters when you were not registered or summer sessions. The initial class level is assigned by the Office of Admissions, based on transfer credits accepted, including Advanced Placement units.

Entering Grade Level	Financial Aid Eligibility at UC Merced
Entering freshman	12 semesters
Entering sophomore	9 semesters
Entering junior	6 semesters
Entering senior	3 semesters

Note: Terms that you withdraw count toward the total number of semesters.

## EFFECTS OF WITHDRAWING ON FINANCIAL AID

An undergraduate student withdrawing from UC Merced during a semester or for a future semester must file an Official Notice of University Cancellation/Withdrawal Form with the University Registrar. When a student withdraws from UC Merced, the withdrawal date used in determining the amount of financial aid that needs to be returned is the earliest of the date: 1) the student files the Official Notice of University Cancellation/Withdrawal Form with the University Registrar, or 2) the student officially notifies the Registrar's Office of his/her intent to withdraw; or 3) UC Merced determines what most accurately reflects the last date of an academically related activity of the student. Students who will be on a Planned Education Leave are subject to the same guidelines as those listed above for students who withdraw from UC Merced.

If the student leaves without beginning UC Merced's official withdrawal process or otherwise providing official notification of his/her intent to withdraw, the withdrawal date for the return of federal funds will be the 50% point in the term. In this instance, UC Merced could determine an earlier withdrawal date if circumstances beyond the student's control (e.g., illness) prevented him/her from beginning the official withdrawal process. UC Merced could also determine the last date of an academically related activity of the student.

The date used to determine the return of federal funds may be different than the date used by UC Merced to determine institutional refunds.

For additional detailed information about Return to Title IV Funds at UC Merced, please see the "Return to Title IV Aid" guide available at the Office of Financial Aid and Scholarships.

**IMPORTANT WARNING:** Your semesters of financial aid eligibility are limited. When you withdraw you use up one semester of eligibility!

## DISBURSEMENT OF FINANCIAL AID

Generally, financial aid is offered for two semesters each academic year and an equal amount is made available each semester to eligible students. The Office of Student Business Services is responsible for the disbursement and delivery of financial aid.

If all necessary requirements are complete, Financial Aid proceeds are distributed to the student's account no sooner than 10 days prior to the first day of classes. This money will be applied towards institutional charges first. The remaining amount will be applied toward the authorized charges on the student's account or will be refunded to the student or parent as appropriate.

FOR ADDITIONAL INFORMATION: Please refer to our web site [financialaid.ucmerced.edu](http://financialaid.ucmerced.edu).

At UC Merced, I helped found the local chapter of the National Society of Black Engineers. I participated in a rewarding service-learning program, which was a great real-life, hands-on, project-oriented, leadership-development program. I attended various conferences that gave me perspective on the options before me in regard to graduate schools, potential employers and more. More importantly, I made connections here by doing research, mentoring lower classmen and learning from great teachers and advisors.

— Anley E. Tefera, Bioengineering

# Academic Policies And Procedures

## THE ACADEMIC YEAR

### The Semester System

The University of California, Merced is on the semester system. The academic year is divided into two semesters, and summer sessions during the summer term. Quarter units earned previously at another institution are converted to semester units by dividing the quarter units earned for each course by 1.5; for example, 4 quarter units equals 2.667 semester units.

### Summer Session

Every summer, students can earn units, expand their knowledge, take special study courses, fulfill prerequisites and complete general education or major requirements by enrolling in summer courses.

UC Merced offers multiple summer session options. A wide variety of courses are offered each summer in subjects that are transferable to most campuses. Enrollment in summer session courses is open to UC Merced students and other UC students, as well as students from other colleges and universities, adults and high school juniors and seniors. For additional information about summer courses, contact [summersession@ucmerced.edu](mailto:summersession@ucmerced.edu).

### OFFICE OF THE REGISTRAR

Web site: [registrar.ucmerced.edu](http://registrar.ucmerced.edu)  
 E-mail: [registrar@ucmerced.edu](mailto:registrar@ucmerced.edu)  
 Phone: (209) 228-2734  
 Address: 5200 N. Lake Road  
 Merced, CA 95343

## Enrollment

### ENROLLING IN COURSES

UC Merced students register each semester using the online registration system, MyRegistration (accessible via the MyUCMerced portal at [my.ucmerced.edu](http://my.ucmerced.edu)). The registration process includes enrolling in classes, paying fees and other financial obligations, filing a current address with the Office of the Registrar, and completing and filing other information forms. MyRegistration allows the student to enroll in classes via the Internet. With UC Merced's Internet registration, students will always receive the most up-to-date information regarding their registration and class enrollment. Pre-assigned appointments that are spread throughout the registration period regulate access to the registration system. For security purposes, students are assigned a unique login user code and password/PIN that must be entered to access MyRegistration. Students may make changes to their course schedule through the adjustment period. Courses may be added by the web through the first week of instruction and may be dropped by the web through the fourth week of instruction. A new or readmitted student must also:

- Obtain a student ID card, and
- If required, complete the online Statement of Legal Residence form on the Office of the Registrar's website ([registrar.ucmerced.edu](http://registrar.ucmerced.edu)) under the California Residency and Fees section.

### REGISTRATION PRIORITY

Access to registration (via MyRegistration) is by priority groups. The groups are established according to student class level as determined by the number of units completed, with the seniors registering first, juniors second, etc.

The number of semester units a student has completed determines undergraduate classification:

Professor Roland Winston and students on a solar energy project.

### Class Level

### Units

Freshman	0.0–29.9
Sophomore	30.0–59.9
Junior	60.0–89.9
Senior	90.0 or more

### LATE ENROLLMENT/REGISTRATION

Students who have not registered prior to the first day of instruction are considered late enrollments. Students may be assessed a \$50 late enrollment fee. Approval from the student's School is required to register late.

### ADDING AND DROPPING COURSES

#### Adding a Course

During the first week of instruction, students may add a course or courses if space is available. During the second and third weeks of instruction, a student may add courses only with the permission of



the instructor. After the third week of instruction, students may add a course only with the permission of both the instructor and the dean of the School with which the student is affiliated. A fee will be assessed for adding a course after the third week.

- First week: Students may add if space available
- Second and third weeks: Students may add only with instructor's approval
- After third week: Students may add through petition only (see below); fee assessed

### Dropping a Course

During the first four weeks of instruction, students may drop a course or courses without paying a fee and without further approval. After the fourth week of instruction and until the end of the tenth week of instruction (close of business on the Friday of that week), a student may drop for emergency reasons or for good cause with the signed approval of the instructor of record and confirmed by the dean of the school with which the student is affiliated, provided:

- (1) The student is not on special probation (i.e. students who have successfully appealed disqualification),
- (2) Dropping the course would be to the educational benefit of the student (in the judgment of the instructor and dean) and
- (3) The student is not being investigated for academic dishonesty in that course.

Dropping between the 5th and 10th weeks will be approved only provided the student submits a petition including a written description of the special circumstances warranting this action; therefore, students should continue to attend the course until their drop request is approved. Any request to drop beginning in the eleventh week of instruction will only be considered under exceptional circumstances (illness or injury substantiated by a doctor's note, recent death in the immediate family or other circumstances of equal gravity), and will only be considered following both signed approval of the instructor of record and submission of a petition that is approved by the dean of the School with which the student is affiliated. All drops must be received by the Office of the Registrar by the deadlines specified. For students dropping after the fourth week of instruction, a fee will be assessed and a "W" notation will be assigned by the Office of the Registrar and appear in place of a grade on the student's permanent transcript. Courses in which a "W" has been entered on a student's record carry no grade points, are not calculated in the grade point average, and will not be considered as courses attempted in assessing the student's progress to degree. Nevertheless, it is a marker used to indicate that the student was enrolled in the class beyond the third week of instruction. It does not indicate whether the student was passing or failing.

### PETITION OF ACADEMIC POLICY

A petition process exists for students who seek an exception to stated academic policies, procedures, and regulations. Approval for petitions will be granted by a University committee only in cases where extenuating circumstances are evident and can be substantiated.

### COURSE SUBSTITUTIONS

Students may petition the appropriate dean to substitute a suitable course in place of a required course. Petition forms are available on the following websites: Office of the Registrar, the Student Advising & Learning Center, College One and the Schools.

### REPETITION OF COURSES

An undergraduate student may repeat only those courses in which a grade of D+, D, D-, F, U, or Not Passed was received. Undergraduate courses in which a grade of D+, D, D-, or F has been earned may not be repeated on a passed/not passed basis. Similarly, a graduate course in which a grade below a B, or a grade of U, was received may be repeated only once (and may not be repeated on a S/U basis). Repetition of a course more than once requires approval by the appropriate dean in all instances. Degree credit for a course will be given only once, but the grade assigned at each enrollment shall be permanently recorded.

Only the most recently earned grade and grade points shall be used for the first 16 University of California units that undergraduate students repeat. For graduate students, only the most recently earned grades will be used in computing the student grade point average for the first 8 units of repeated course work. In the case of further repetitions, the grade point average shall be based on all grades assigned and total units attempted.

### ENROLLMENT STATUS

**Certification of Full-Time Status:** Undergraduate students must carry a study load of at least 15 units each semester in order to maintain normal progress toward their degree. At least 12 units are required for undergraduates to be certified as full-time students for financial aid purposes and to meet minimum progress requirements. Graduate students must carry a study load of at least 12 units each semester in order to be certified as full-time students.

**Part-Time Student Status:** If, for reasons of occupation, family responsibility, health or graduating senior status (one semester only), a student is unable to attend the university on a full-time basis, he/she may qualify for enrollment in part-time status. The student must file for part-time status each semester. To be considered eligible during the specific semester, undergraduate students must be registered for 10 units or fewer by the 10th day of instruction and graduate students must be registered in 6 units or fewer by the end of the second week of instruction. Minimum progress requirements are waived for approved part-time students. Undergraduate request for part-time status forms are available on the Office of the Registrar's website at registrar.ucmerced.edu, and for graduate students at the Graduate Studies website at graduativedivision.ucmerced.edu. Students approved for enrollment on a part-time basis pay the same fees as full-time students, but pay only one-half of the educational fee. Part-time Nonresidents pay one-half of the Nonresident Tuition Fee. Undergraduates file their part-time request with the Office of the Registrar; graduate students file their request with the Graduate Studies Division.

### PLANNED EDUCATIONAL LEAVE PROGRAM (PELP)

The Planned Educational Leave Program (PELP) allows students to suspend academic work at UC Merced, leave the campus and later resume studies at UC Merced with a minimum of procedural difficulties. Any registered student on the UC Merced campus, undergraduate or graduate, is eligible to enroll in the Planned Educational Leave Program, although restrictions may be imposed on the number of times a student can participate in the program. International students are not eligible. The maximum Planned Educational Leave is one full academic year. Applications for PELP should be filed no later than the tenth day of instruction, although exceptions can be made for medical or emergency reasons. For information regarding how the PELP status will affect financial aid eligibility, please see the financial aid section of the catalog.

A \$40 application fee must be paid prior to the student's enrollment in the PELP program. Approved applications submitted after the first day of instruction will entitle the student to only a partial refund of fees paid, in accordance with the Schedule of Refunds. The Schedule of Refunds refers to calendar days beginning with the first day of instruction. The effective date for determining a refund of fees is the date the completed and approved PELP form is returned to the Office of the Registrar.

While students may receive academic credit at other institutions and transfer this credit to UC Merced (subject to rules concerning transfer credit and School approval), participants are reminded that the intent of the program is to "suspend academic work." Therefore, students should consult with their academic advisors and carefully evaluate the desirability of taking academic work while away from the campus during PELP. Students enrolled in PELP are not eligible to enroll in concurrent courses at the UC Merced campus or to earn academic credit at UC Merced during the PELP leave.

Readmission is guaranteed assuming students resume academic work by enrolling in courses, satisfying any holds that may have been placed on their registration, and paying registration fees by the established deadlines for the semester specified for return on the approved PELP application. Students who do not return by the specified semester will be automatically withdrawn from the University.

Students will not be eligible to receive normal university services during the planned leave. Certain limited services, however, such as career services and advising are available. Students on PELP are not eligible to apply for on-campus or off-campus jobs except during the summer prior to their return for the fall semester. Students on PELP may elect to purchase the Student Health Insurance Plan for one term, but are not eligible to use the Student Health Center. UCM Library borrowing privileges may be retained by purchasing a library card.

### **INTERNATIONAL OPPORTUNITIES PROGRAMS (IOP) LEAVE**

If you are planning to study abroad with a non-UC program, you may take an IOP Leave. This leave option is specifically designed to enable students to participate in a program external to UC while still maintaining their student status. You may request approval for this leave at the Students First Center or at the International Center in Room KL 101. The leave may allow financial aid to transfer, includes pre-approval of transfer credit and retains your UC Merced email address.

The Senior Residence Requirement may be waived if you study abroad through the Education Abroad Program. However if you study abroad with an external program you must comply with the senior Residency Requirement that states that 24 of your last 36 units must be completed on the UC Merced campus. Your last two semesters before graduation cannot be spent studying on a non-UC program.

### **NORMAL PROGRESS TO DEGREE**

UC Merced undergraduate degree programs are designed to be completed in eight semesters or four academic years. To meet the normal progress requirement, undergraduate students are expected to enroll in and pass an average of 15 units per semester, completing the 120 units necessary for graduation in four years. An extension of enrollment beyond nine semesters requires the approval of the student's School.

### **PLANNING FOR A MAJOR**

The decision on the choice of a major is a very important one and should be made on the basis of a student's interests and abilities as well as his or her career goals. Students should look carefully into the programs available by using this catalog and visiting Schools in which they are interested.

Students are encouraged to declare a major as soon as possible and should begin thinking about possible majors in their first year at UC Merced. Some major requirements demand a full four years to complete. Since students are expected to declare into a major by the time they have completed 60 units, the lower division major requirements should be planned into the student's program for the first two years.

### **DECLARATION AND CHANGE OF MAJOR**

In order to declare or change a major a student must fill out a Change of Major/Minor request and have it approved by the dean or other authorized person in the School to which he/she is declaring or transferring and submit it to the Office of the Registrar. This form is available on the Office of the Registrar's website. Current students are only permitted to change their major until the end of the third week of the semester and throughout the summer. Admission into a major program may be denied or deferred if the student is in academic difficulty or has a grade point average (GPA) of less than 2.0 in courses required for the selected major.

Except under unusual circumstances, no change of major will be permitted after a student has attained senior standing (90 units). It is not possible to change or declare a major in the semester in which a student has filed to graduate.

### **DOUBLE MAJORS**

Information is available on the Office of the Registrar website ([registrar.ucmerced.edu](http://registrar.ucmerced.edu)). A student who wishes to pursue a double major should meet with his/her advisor to request and complete a "Double Major Application Packet."

### **MINORS**

In order to declare or change a minor, a student must fill out a Change of Major/Minor request and have it approved by the dean or other authorized person in the School to which he/she is declaring and submit it to the Office of the Registrar.

### **ADDITIONAL ENROLLMENT OPPORTUNITIES**

#### **Leadership Excellence through Advanced Degrees (UC LEADS)**

The goal of the University of California's Leadership Excellence through Advanced Degrees (UC LEADS) program is to educate California's future leaders by preparing promising students for advanced education in science, technology, mathematics and engineering (STEM). The program is designed to identify upper division undergraduate students with the potential to succeed in these disciplines, but who have experienced situations or conditions that have adversely impacted their advancement in their field of study. Participants receive benefits such as research funding and summer room and board.

Once chosen as UC LEADS Scholars, students embark upon a two-year program of scientific research and graduate school preparation guided by individual faculty mentors. Scholars are provided with



UC Merced's Campus Store sells books, UC Merced clothing, computers and supplies.

an excellent opportunity to explore their discipline, experience a research environment, and improve their opportunities for future study in their chosen field. The Scholar gains valuable educational experience, the University a better prepared and more diverse graduate applicant pool, and the State, well-educated future leaders. Each Scholar is mentored by a member of UC the faculty, who assists the student in designing a plan of research and enrichment activities fitted to the individual interests and academic goals of the Scholar. This "Action Plan" includes:

- academic year research
- paid summer research experience
- participation in the University-wide UC LEADS Symposium
- attendance at professional or scientific society meetings
- travel to another UC campus
- academic enrichment activities, including preparation for the Graduate Record Examination (GRE)

For further information, contact the Graduate Division.

### **Alliance for Graduate Education and the Professoriate (AGEP)**

AGEP is a partnership among the ten campuses of the University of California System and the National Science Foundation (NSF). The goal of this partnership is to increase the number of underrepresented minority students who acquire doctoral degrees in the fields of science, technology, engineering and mathematics (STEM), and ultimately enter the professoriate. Methods used to help see the participants through to doctoral study include:

- faculty mentoring
- campus visitations and networking opportunities
- professional and academic skills workshops
- summer enrichment opportunities

For further information, contact the Graduate Division.

### **McNair Scholars Program**

McNair Scholars are ambitious students from underrepresented groups in the professoriate, who aspire to earn a Ph.D. in any academic discipline. Participants receive summer research funding, as well as access to faculty mentoring, networking opportunities,

workshops and field trips, and various other activities that help them to build the confidence that they will need to succeed in graduate school and beyond. This program is open to students of junior standing and higher. The aim of this program is to diversify the professoriate. This program honors the memory of Dr. Ronald McNair, who lost his life in the Space Shuttle Challenger explosion after overcoming the hardships of life in a segregated, impoverished community, and then reaching the heights of a Ph.D. in physics from the University of Maryland. For further information, contact the Vice Provost for Undergraduate Education.

### **The University of California Washington Center (UCDC)**

UCDC is an academic program created in 1997 for the purpose of providing students

the opportunity to continue their studies while interning in Washington, D.C. Moreover, the availability of a credit-based research seminar that satisfies upper-division course requirements for a number of majors affords students the opportunity to reflect on their intern experiences in an academic exercise. UCDC is also a residential program with apartments at the centrally-located UC Washington Center. Not only does this facilitate relocating temporarily in the nation's capital, the Center offers students a rich exposure to the Washington community through tours and an evening speaker series. For further information, contact the Vice Provost for Undergraduate Education.

### **UC Center at Sacramento (UCCS)**

The UCCS Academic Program gives undergraduate and graduate students a rare opportunity to learn about California's public policy and journalistic processes firsthand. The program includes rigorous coursework as well as professional experiences while living, interning and conducting research in the State Capitol.

Offered during academic semesters and summer, students enroll in classes while working 24-40 hours per week in internship placements. The UC Center at Sacramento nurtures the ongoing dialogue between the UC and Capitol Communities, promoting excellence in public policy through academics, research and public service. For further information, contact the Career Services Center.

### **Intercampus Transfer**

Undergraduates may apply for transfer to another University of California campus. Copies of the Application for Undergraduate Admission are available from the Office of Admissions and must be filed with the University of California Undergraduate Application Processing Service, P.O. Box 4010, Concord, CA 94524-4010 by the established deadlines.

The application is also available online at UC's PATHWAYS website at [www.ucop.edu/pathways](http://www.ucop.edu/pathways). Students may apply online or download a copy of the application to mail to the postal address above. Students who are or have been enrolled in a regular UC Merced semester may apply for an intercampus transfer to another UC campus, provided they have not been registered subsequently in a regular semester at another collegiate institution. A nonrefundable fee is required at the time an application is submitted.

### Intercampus Visitor (ICV)

The ICV Program allows qualified undergraduate students at UCM to take advantage of educational opportunities at other UC campuses. Students may take courses that are not available at their home campus, participate in special programs or study with a distinguished faculty member at another campus. Participants in the ICV Program may enroll at the host campus for only one semester. For an exception to this limitation, consultation and authorization from the home and host campuses are required. Consultation is also required with the home campus academic advisor about the courses students wish to take at the host campus. Information about these courses can be found in the host campus's General Catalog. To qualify as an Intercampus Visitor, students must be an undergraduate who has:

- Completed at least one year of residence at UCM and is currently a continuing student;
- Maintained a grade point average of at least 2.0 or the equivalent and is currently in good standing;
- Obtained the approval of the Dean or Provost, or a designee, of the school in which students are currently enrolled.

Applications are subject to approval by the host campus and some campuses have additional requirements, which are described on the ICV Program application, as well as deadline dates for each of the UC campuses. Applications may be picked up and turned in at Student's First Center. A \$60 application fee is required.

### Simultaneous Enrollment

UC students (undergraduate) may enroll, without formal admission and without payment of additional University fees, in courses at another UC campus on a space available basis at the discretion of the appropriate campus authorities on both campuses. Students qualify for this program when they have completed a minimum of 12 units as a matriculated student at the home campus (this requirement can be waived at the discretion of the dean of the appropriate School); are enrolled at both campuses in the current term with a minimum of 12 units as a matriculated student at the home campus; are in good academic standing; and are certified by their home campus as to eligibility, residence, fee, financial aid and health status. To participate in this program, please contact the Students First Center to obtain form(s) that must be filled out by appropriate authorities on both campuses and must assert that the application of a non-home UC course will or will not satisfy degree, graduation, major, General Education or other specific requirements (other than unit credit). Failure to ensure the applicability of the non-home UC course to UC Merced requirements could result in a refusal to allow the course to satisfy any specific requirements (other than unit requirements).

### Intercampus Exchange Program for Graduate Students

A graduate student registered on the UC Merced campus may become an intercampus exchange student for a full term at any of the other UC campuses with the approval of the graduate advisor, the director of the graduate group and the deans of Graduate Studies on both the home and host campuses. To be eligible, the graduate student must have attended UC Merced for a minimum of one semester before participating in the intercampus exchange program. Students are limited to a maximum of two consecutive semester-based terms or three quarter-based terms on intercampus exchange. Permission for exchange is done on a semester-by-semester basis. Application forms may be obtained from the Office of the Registrar website and should be submitted four weeks in advance of the semester in which you wish to participate.

Intercampus exchange students register at both campuses and pay fees on their home campus; however, they have access to student services available on the host campus. Students should make arrangements with the Office of the Registrar to follow the enrollment procedure of the host campus so that the grades students obtain in courses taken on the host campus will be transferred to records on their home campus. Grades from courses completed on the host campus will be transferred to the home campus and become part of the student's official graduate transcript. Exchange students are considered graduate students in residence on the home campus and are not formally admitted to the host graduate school and department. For further information, contact Graduate Studies and the Office of the Registrar.

### UC Merced and Merced College Intersegmental Cross-Enrollment Program

UC Merced and Merced College have created an Intersegmental Cross-Enrollment agreement that allows approved full-time undergraduate students from either institution to cross-enroll in one course per term. For eligibility requirements and approval guidelines, please see information available on the Office of the Registrar website ([registrar.ucmerced.edu](http://registrar.ucmerced.edu)).





### Concurrent Credit from Another Institution

With the exception of currently registered students participating in the UC/CSU/Community College Intersegmental Cross-Enrollment Program or the UC Merced and Merced College Intersegmental Cross-Enrollment Program, a student may not obtain transfer credit for courses at a non-University of California campus in a

term during which the student is registered as a full-time student at UC Merced. An exception can be obtained only by petitioning the appropriate School dean well in advance of the desired registration, and the student must still be enrolled in at least 12 units at the UC Merced campus during the term in which the exception applies.

## Examinations

### MIDTERM EXAMINATIONS

The number of midterm examinations varies at the discretion of the instructor. In undergraduate courses for which a midterm examination is required, each student has the right to take the midterm (or submit the take-home examination as required by the instructor) during one of the regularly scheduled class meetings as defined in the Schedule of Classes. Dates and times for mid-terms scheduled outside of regularly scheduled class meeting times must be listed in the Schedule of Classes prior to registration. If an out-of-class exam is not listed in the Schedule of Classes, the scheduling of a midterm examination at a time other than a regularly scheduled class meeting requires mutual consent of the instructor and each student registered in the course. A student who does not consent in writing to the different time must be permitted to take the examination (or submit the take-home examination) at the officially scheduled time. A student who consents in writing to the change of examination time waives the right to take the midterm at the officially scheduled time.

### FINAL EXAMINATIONS

**Scheduling:** The Schedule of Classes lists the times that final examinations are to be held. These are set up according to the day-and-hour periods in which the classes are given during the semester.

This information is available online or in the Schedule of Classes each semester so that students can avoid final examination conflicts. A student who has multiple exams on the same day may discuss the situation with the instructors of the course. An instructor has the option to agree to provide the student the exam on a different day, but is not required to do so. If a change to the time of a scheduled final exam is necessary, all students in the class must agree to the schedule change in writing.

### Disabilities

Students with documented disabilities may be entitled to in-class accommodations. The student must provide the instructor with a letter from the Disability Services Office recommending those academic accommodations that the instructor is responsible for providing. Students must request accommodation as soon as possible to allow the university reasonable time to evaluate the request and offer necessary adjustments. No accommodations shall alter the nature of the academic demands made of the student nor decrease the standards and types of academic performance, nor require facilities or personnel that cannot reasonably be provided. The instructor should consult with the student and the Disability Services Center with any questions or concerns.

Students find the Carol Tomlinson-Keasey Quad a relaxing place to meet and study.



## Religious Observances

UC Merced seeks to accommodate any student who, in observance of a religious creed, encounters an unavoidable conflict with an examination schedule. In order to request accommodation, the student is responsible for providing, in writing and at the beginning of the semester, notification of a potential conflict to the individual responsible for administering the examination. Instructors will consider such requests on a case-by-case basis and determine whether such conflicts can be resolved without imposing on the instructor or the other students in the class an undue hardship that cannot be reasonably avoided. If so, the instructor will determine, in consultation with the student, a time during which the student can take the examination without incurring a penalty or violation of the student's religious creed.

## CREDIT BY EXAMINATION

Students currently registered in any regular semester and in good academic standing who by reason of advance preparation believe themselves to be adequately grounded in the materials and principles of a given course may request credit by examination for any course offered at UC Merced without formally enrolling in that course. Students may obtain a form and a copy of the prescribed conditions from the Office of the Registrar's website at registrar.ucmerced.edu.

The request is subject to the approval of the instructor giving the examination and the dean of the School involved. Once the

request has the signed approvals of the appropriate dean, it should be submitted to the Office of the Registrar, accompanied by the mandatory fee.

Owing to special features of the instruction, such as extensive laboratory work, certain courses may not be considered appropriate for obtaining credit by examination. In addition, credit by examination will not be approved in the following circumstances:

- (1) for a student who has had prior instruction in the topic,
- (2) for the purpose of repeating a course,
- (3) for courses in subjects in which the student has completed more advanced work,
- (4) for elementary and intermediate courses in a student's native language or
- (5) for granting credit for a course which the student has attended and audited.

To earn credit through the credit by examination process, the examination must be given by a UC Merced instructor and be for a course listed in the current General Catalog. The final results will be reported to the Office of the Registrar, who will record the appropriate grade (P/NP). Since failure to pass the examination will be recorded as an NP, students are encouraged to prepare fully for such an examination before attempting it.

# Grades, Progress To Degree And Dismissal

## GRADES

The work of all students on the UC Merced campus is reported in terms of the following grades:

A+	(excellent)
A	(excellent)
A-	(excellent)
B+	(good)
B	(good)
B-	(good)
C+	(fair)
C	(fair)
C-	(fair)
D+	(barely passing)
D	(barely passing)
D-	(barely passing)
F	(not passing)
P	(passed at a minimum level of C- or better by an undergraduate student)
S	(satisfactory - passed at a minimum level of B or better by a graduate student)
NP	(not passed)
U	(unsatisfactory)
I	(incomplete)
IP	(in progress)
NR	(no report, when an instructor fails to report a grade for a student)

## Credit Toward Degree Requirements

A course in which the grade A, B, C, D, P or S is received is counted toward undergraduate degree requirements. A course in which the grade F, NP or U is received is not counted toward degree requirements. Grades of I or IP are not counted until when they are replaced by grades A, B, C, D, P or S. Course minimum grade requirements may differ depending on the program. Students should check with their academic advisor to confirm.

## Grade Points

Grade points are assigned as follows: A+ = 4.0, A = 4.0, A- = 3.7, B+ = 3.3, B = 3.0, B- = 2.7, C+ = 2.3, C = 2.0, C- = 1.7, D+ = 1.3, D = 1.0, D- = 0.7, F = 0.0. The grades P, S, NP, U, I and IP carry no grade points and the units in courses so graded are excluded in determination of the grade point average.

## Grade Point Average

A student's grade point average is computed on courses undertaken in the University of California, with the exception of courses undertaken in University Extension. Grades A, B, C, D and F are used in determining the grade point average; grades I, IP, P, S, NP and U carry no grade points and are excluded from all grade point computations. Grade point average is calculated by dividing the accumulated number of grade points earned by the accumulated number of units undertaken.

## Change of Grade

All grades except Incomplete and In Progress are considered final when assigned by an instructor at the end of a term. An instructor may request a change of grade when a computational or procedural

error has occurred in the original assignment of a grade, but a grade may not be changed as a result of re-evaluation of a student's work. No final grade may be revised as a result of re-examination or the submission of additional work after the close of the semester.

Grade changes for "clerical" errors (such as incorrect addition of points), upon documentation, are automatically granted. Requests to interchange P, NP, S or U grades with normal letter grades based upon student need (such as to allow graduation or to meet entrance requirements for professional school) do not involve clerical or procedural errors and are automatically denied. Thus, students should exercise the Passed/Not Passed or Satisfactory/Unsatisfactory grading options with caution.

Students are reminded of their responsibility to be aware of the procedures and regulations contained in this catalog and the Schedule of Classes, to verify their class schedule and to familiarize themselves with the expectations of their instructors. No changes, except completion of an I grade as noted above, can be made to the student's record once he or she has graduated.

### Grade I (Incomplete)

The grade of I may be assigned when the instructor determines that a student's work is of passing quality and represents a significant portion of the requirements for a final grade, but is incomplete for a good cause (good cause may include current illness, serious personal problems, an accident, a recent death in the immediate family, a large and necessary increase in working hours or other situations of equal gravity). It is the student's responsibility to obtain written permission from the instructor to receive an I grade as opposed to a non-passing grade. An Incomplete form is available from the Office of the Registrar's website and must be filed prior to the end of the final examination period. If, however, extenuating circumstances exist where submission of the I grade form is not possible before the end of the final examination period, an instructor may submit an I grade; however, the form, including student and instructor signatures, must be submitted to the Office of the Registrar before the first day of instruction of the next semester (which would include the summer sessions). If the form is not received by the Office of the Registrar before the first day of instruction of the next semester, then the I grade will revert to an F, NP, or U.

If an I grade is assigned, students may receive unit credit and grade points by satisfactorily completing the coursework as specified by the instructor. Students cannot re-enroll in the course to complete an I grade. Doing so would result in the course being recorded twice on the transcript.

I grades are not counted in computing the grade point average. Except as noted below, any I grade that has not been replaced within the deadlines will revert to an F, NP, or U. The grade will retroactively be counted in computing a student's grade point average.

AT UC MERCED THERE'S A SPECIAL SPIRIT  
AND COMMUNITY WITHIN THE CLASSROOM  
AND ACROSS CAMPUS. IT'S EXCITING TO  
BOTH WITNESS AND PARTICIPATE IN THE  
GROWTH OF SUCH A DYNAMIC INSTITUTION.

— Professor Kathleen Hull, Anthropology



Executive Vice Chancellor and Provost Keith Alley talks to a student group.

Exception: If a degree is conferred before the end of the deadlines above following the assignment of an I grade, the grade will not be converted to an F, NP, or U. However, the student still has the option of removing the I grade within the deadlines above. Students with 15 or more units of I on their record may not register without permission of the appropriate dean.

### Grade IP (In Progress)

For a course extending over more than one semester where the evaluation of the student's performance is deferred until the end of the final semester, provisional grades of In Progress (IP) shall be assigned in the intervening terms. The provisional grades shall be replaced by the final grade if the student completes the full sequence. The grade IP is not included in the grade point average. If the full sequence of courses is not completed, the IP will be replaced by a grade of Incomplete. Further changes in the student's record will be subject to the rules pertaining to I grades.

### Grade Passed/Not Passed (P/NP)

Undergraduate students in good standing who are enrolled in at least 12 units may take certain courses on a passed/not passed (P/NP) basis. Students may enroll in one course each term on a P/NP basis (two courses if they have not elected the P/NP in the preceding term), not including Freshman Seminars which are always P/NP courses.

Changes to and from the P/NP option must be made during the enrollment period. No changes can be made after the first two weeks of classes without the approval of the appropriate dean. A student may not repeat on a P/NP basis a course that was previously taken on a letter-graded basis.

The grade P is assigned for a letter grade of C- or better. If the student earns a grade of D+ or below, the grade will be recorded as NP. In both cases, the student's grade will not be computed into the grade point average.

Credit for courses taken on a P/NP basis is limited to one-third of the total units taken and passed on the UC Merced campus at the time the degree is awarded.

A course that is required or a prerequisite for a student's major may be taken on a P/NP basis only upon approval of the faculty. Schools may designate some courses as passed/not passed only. Students do not have the option of taking these courses for a letter grade.

### Grade Satisfactory/Unsatisfactory (S/U)

The grade of S is awarded to graduate students for work in graduate courses that otherwise would receive a grade of B or better.

Graduate students, under certain circumstances, may be assigned grades of S or U, but units earned in this way will not be counted in calculating the grade point average. Forms to elect S/U grading are available from the Graduate Division's website at gradstudies.ucmerced.edu and must be signed by the student's graduate advisor. Graduate students may request to take no more than one course per term on an S/U grading basis. A graduate course in which a C, D or F grade is received may not be repeated with the S/U option.

In specific approved courses, instructors will assign only Satisfactory or Unsatisfactory grades. Such courses count toward the maximum number of units graded S allowable toward the degree, as specified by each degree program.

### Grading Options

Unless otherwise stated in the course description, each course is letter graded with a P/NP or S/U option (unless required for your major or graduate program), not including Freshman Seminars which are always P/NP courses.

Students have until the end of the second week of each semester to change the grade option on a course via MyRegistration, accessible through MyUCMerced. After the second week of each semester and up until the last day of instruction for that semester, a student may only change the grade option on a course with the approval of their School dean using the add/drop form available on the Office of the Registrar's website: registrar.ucmerced.edu. Students in good standing who are changing a grade option for a course from a letter grade to a P/NP option must conform to the rules guiding the taking of courses on a P/NP basis (see section on Passed/Not Passed).

UC Merced's Men's Volleyball Team.

### Mid-Semester Grades

Mid-semester grades provide students in lower division courses with early feedback (both positive and negative) about their academic performance. Mid-semester grades provide an opportunity for students to receive positive reinforcement and motivation if they are doing well, and to identify those who are struggling. Mid-semester grades allow faculty, advisors, and services on campus to intervene with students who are in academic difficulty, while there is still time in the semester. Mid-semester grades for all lower division courses only are reported at the end of the eighth week of the semester, and all grades are submitted as letter grades for letter-graded courses (regardless of whether the student has elected to take the course as P/NP). If a course is P/NP only, all grades will be submitted as P/NP. Mid-semester grades are notational grades which are used to help ensure the academic success of UC Merced students in lower division courses. These grades are not recorded in any permanent record or on a student's academic transcript.

All mid-semester grades of D+, D, D- or F on any course requires freshmen-only students attend a one-hour Academic Success Workshop. Attendance is mandatory and a hold for future semester course registration will be placed for non-participation in the one-hour workshop. Sophomores with a D+, D, D- or F grade are encouraged to attend an Academic Success Workshop; however, they can have the hold for future semester course registration released by meeting with their academic advisor.

### Final Grades

After grades are recorded for a semester or summer session, they are available online via MyStudentRecord (accessible via MyUCMerced). With the availability of online grade reporting, students can print their grade reports from the Internet.

### DEAN'S HONOR LIST

Undergraduate students will be eligible for the Dean's Honor List if they have earned in any one semester a minimum of 12 graded units with a 3.5 grade point average or better with no grade of I or NP. Dean's Honors are listed on student transcripts. Any student who



has been found to violate the academic integrity policies during an academic year will not be eligible for the Dean's Honor List during that academic year.

### CHANCELLOR'S HONOR LIST

Undergraduate students who are placed on the Dean's Honor List for both semesters in a single academic year (fall and spring) will be placed on the Chancellor's Honor List for that academic year.

### PROBATION, DISMISSAL, AND MINIMUM PROGRESS

#### A. Academic Probation

An undergraduate student is placed on academic probation if one of the following occurs:

- (1) The student's semester grade point average is less than 2.0, or
- (2) The student's cumulative University of California grade point average is less than 2.0.

**Probation Status:** Academic review occurs at the end of each academic semester. When a student is placed on academic probation, the university notifies the student, and the student's official transcript states "Academic Probation" for the affected semester. While on academic probation, the student is under the supervision of his/her School or advising unit.

**Removal from Declared Major:** A student on probation may be removed from a declared major or changed to Undeclared due to failure to meet the particular standards or fulfill specific requirements that the student's School may impose. If the student is removed from a declared major or changed to Undeclared, the student may apply to be reinstated to a School as follows:

Lower Division Students (fewer than 60 units earned at the end of the semester in which the student applies) must meet these requirements:

- Cumulative University of California grade point average of at least 2.0
- Current semester grade point average of at least 2.0
- Major grade point average of 2.0-2.5 (minimum varies by School)
- Completion of all lower division major courses with grades of C- or higher

Upper Division Students (greater than 60 units earned at the end of the semester in which the student applies) must meet the requirements listed above for Lower Division students and must also complete 8-16 units (minimum varies by School) of upper division major requirements.

**Return to Good Standing:** Once a student has met grade point average standards listed above, the student's academic status returns to regular academic standing.

#### B. Academic Dismissal

An undergraduate student is subject to academic dismissal from the university if one of the following occurs:

- (1) The student has been on academic probation for two or more semesters and the student's cumulative grade point average is less than 2.0, or

- (2) The student's semester grade point average is less than 1.5 and the student's cumulative grade point average is less than 2.0.

**Academic Dismissal Appeals:** A student not previously on probation who earns a semester grade point average below 1.5 maybe offered the opportunity to appeal dismissal. The student who is subject to academic dismissal and does not complete the appeal process as prescribed is automatically dismissed. The student whose appeal is approved returns on probation and is under the supervision of the appropriate School or advising unit.

**Dismissal Status:** When a student is academically dismissed, the university notifies the student, and the student's official transcript states "Academic Dismissal" for the affected semester.

**Note:** A student who is academically dismissed may return after fulfilling reinstatement requirements (see the Reinstatement policy on the Office of the Registrar website at registrar.ucmerced.edu).

#### C. Minimum Progress

An undergraduate student is subject to administrative probation if the student does not complete a minimum of 24 University of California units during an academic year, including summer.

**Return to Good Standing:** Once the student has completed 24 units during a subsequent academic year, the student's minimum progress status returns to good standing.

**Note:** Minimum unit completion does not apply to part-time students or to students who have a Dean's approval to carry fewer units than the minimum progress load (reasons may include medical disability, employment, a serious personal problem, a recent death in the immediate family, the primary responsibility for the care of a family, or a serious accident involving the student).

### READMISSION/REINSTATEMENT

Readmission is the act of restoring active-student status to former students who have withdrawn from the University or had their student matriculation interrupted by a lapse of their student status (for failure to pay fees, failure to satisfy the entry level writing requirement, failure to enroll in future semesters, or failure to graduate). Undergraduate students who wish to return to the University of California, Merced must file an application for readmission with the Office of the Registrar by the deadlines listed below. This will provide enough time to review the application and have a readmitted student register before new incoming students are scheduled to register for classes. As with all other UCs, a non-refundable application fee of \$60 is charged.

#### Readmission Deadlines:

Fall Semester – May 1

Spring Semester – November 1

**Reinstatement** is the act of restoring active-student status to former students who left the University in academic difficulty (academic probation, special probation, subject to disqualification, or academically dismissed). Undergraduate students in academic difficulty who wish to return to the University of California, Merced must file an application for reinstatement with the Office of the Registrar by the deadlines listed below. It is expected that all official transcripts from other institution(s) with course work for all terms prior to the current semester would be submitted with the reinstatement application, and that a final set of official

transcripts then be provided to the University at the conclusion of that current semester of enrollment demonstrating the completion of an acceptable number of units (normally 24 semester units). Any decision by the University to accept the application of reinstatement will be provisional until the University has received the final official transcripts showing the academic performance of the current term of attendance at another institution(s) of higher education. All final decisions for reinstatement will be made by the dean of the School to which the student had been admitted or the Dean of the School to which the student has requested to transfer. It is possible that if the student's academic performance at another institution does not meet the expectations outlined by the application for reinstatement, the decision to be reinstated could be revoked by the appropriate School dean. As with all other UCs, a non-refundable application fee of \$60 is charged.

#### Reinstatement Deadlines:

Fall Semester – May 1

Spring Semester – November 1

#### TRANSFER WITH SCHOLASTIC DEFICIENCIES

To transfer from one campus of the University to another, or from one School to another on the same campus, a student who has been academically disqualified or is on academic probation must obtain the approval of the dean to whose jurisdiction the student seeks to transfer.

#### TRANSCRIPTS AND RECORDS

Transcripts may be ordered via the National Clearing House website (for routine request) or the Office of the Registrar (for rush request and overnight delivery). See the Office of the Registrar's website at registrar.ucmerced.edu for further information. At times other than the end of the semester, the normal period required for processing and issuing transcripts for both registered and former students is 7 to 10 working days after receipt of the student's request (plus mailing time). There is a \$7 charge for each routine transcript request and \$14 charge for each rush transcript request. There is an additional \$15 dollar per address charge for overnight delivery. The student's financial account must be paid in full prior to the processing of the transcript request, and the transcript fees must be either paid online through the National Clearing House, at mybill.ucmerced.edu, or accompany the application. Students who urgently need a transcript that would normally take 7 to 10 days to issue can expect processing within 2 days for the rush transcript request (plus mailing time).

#### ACCESS TO RECORDS

Students are entitled by law and University policy to examine and challenge most of the records that the University maintains on them. These records are confidential and in most circumstances may be released to third parties only with the student's prior consent. See information about the Family Educational Rights and Privacy act at registrar.ucmerced.edu.

Transcripts and other documents submitted from other institutions and agencies are the property of UC Merced and will not be reissued to applicants, students, alumni or other parties.

#### CHANGE OF NAME AND ADDRESS

Students may request to change their name on official University records. The form can be downloaded from the Office of the Registrar's website. Legally recognized proof of the change of name will be required before the petition is accepted and processed. (Students planning to graduate should file this request no later than the fifth week of the semester in which they intend to graduate.)

Students may also update their address(es) using MyStudentRecord or submit a Change of Address form downloaded from Office of the Registrar's website.

#### LEAVING UC MERCED

Students who find that they cannot attend the University for a semester in which they have enrolled may cancel their registration only if instruction for that semester has not yet begun. To do so, they must formally request a cancellation or withdrawal of their registration from the Office of the Registrar. If instruction has already begun and students find it necessary to stop attending all classes, they must formally request withdrawal from the University. When a completed withdrawal form is approved by the dean of the School with which the student is affiliated (after the fourth week of instruction), a W notation will be assigned for each course in which the student has been enrolled. Students will not be eligible to re-enroll until they have been readmitted. Students who withdraw during a semester must file a Notice of Cancellation/Withdrawal, available from the Office of the Registrar's website at registrar.ucmerced.edu. Before considering a complete withdrawal, students must consult an academic advisor and the Office of Financial Aid and Scholarships, if appropriate, to consider the full implications of this action.

Please see the refund policies for specific details on refund rules. Students who fail to submit an the required paperwork for cancellation/ withdrawal will receive F, NP or U grades, as appropriate, for all courses in which they are enrolled for that semester.

I CAME TO UC MERCED TO GET A UC-  
LEVEL EDUCATION CLOSE TO HOME.

—Katie Heaton, student, Resident Assistant

# Graduation

## Residency Requirement

Each candidate for the bachelor's degree must complete 24 of the last 36 units in residence in the school of the University of California in which the degree is to be earned. Under certain circumstances, the appropriate dean or Vice Provost for Undergraduate Education may grant exceptions, such as when a student attends classes at another UC campus as an approved visitor or participates in one of the following: UC Education Abroad, UC Washington Center Program or UC Sacramento Center.

## Scholarship Requirement

To receive a bachelor's degree, a candidate must have a cumulative 2.0 grade point average attempted at the University.

## UNDERGRADUATE STUDENTS

### Declaration of Candidacy

Students expecting to complete work for their degree by the end of a semester must declare their intent to graduate by submitting a form, accompanied by the appropriate fee, to the Office of the Registrar for the semester in which they plan to receive the degree. Students have until December 1 of each year to file to graduate in the following Spring or Summer terms, or until April 1 of each year to file to graduate in the following fall semester.

### Degree Check

The Office of the Registrar will check all pertinent records to ensure that the student has completed a minimum of 120 units and appropriate institutional requirements. The student's School will check for the fulfillment of major and School requirements.

### Honors at Graduation

To be eligible for honors at graduation, a student must have completed a minimum of 50 semester units at the University of California, of which a minimum of 43 units must have been taken for a letter grade and a minimum of 30 units must have been completed at UC Merced. The grade point average achieved must rank in the top 2 percent of the student's School for highest honors, the next 4 percent for high honors, and the next 10 percent for honors at graduation. The number of recipients eligible under these percentages shall be rounded up to the next higher integer.

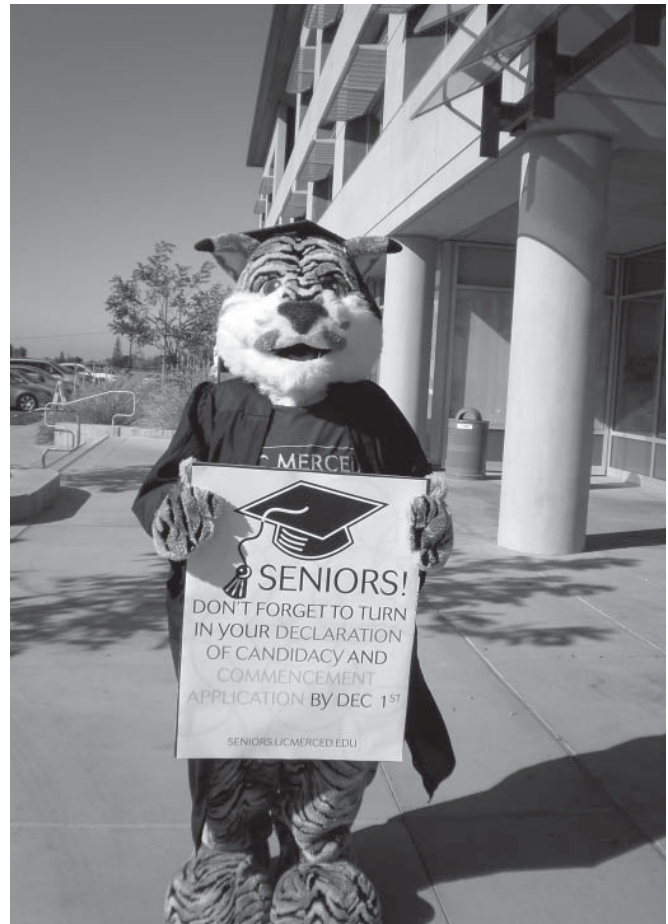
## GRADUATE STUDENTS

Before a graduate degree can be conferred, candidates must have been advanced to candidacy and completed the master's thesis or doctoral dissertation and any required comprehensive or oral examinations. For assistance, go to the Graduate Division office.

## COMMENCEMENT

UC Merced conducts its annual Commencement ceremony following the spring semester. Graduating students are strongly encouraged to participate with their classmates. Commencement celebrates the academic achievements of our undergraduate and graduate students and the impact they will have as they transition from the University to the world beyond.

Each student may participate in only one Commencement



ceremony as an undergraduate. Graduate students may participate in two ceremonies if master's and doctoral degrees are conferred in separate years. Undergraduates may choose to participate in the Commencement ceremony if they completed their degree requirements the prior fall, or if they anticipate completing their degree requirements in spring, summer or the next fall semester.

Students who complete their degree requirements in a fall semester may elect to participate in Commencement the spring prior to their completion date or they may cross the stage the following spring.

Participating in Commencement does not indicate confirmation that degree requirements have been fulfilled. Diplomas are not distributed at Commencement and degrees are not awarded until all requirements are completed.

## DIPLOMAS

Diplomas are not distributed at Commencement, but are available several months afterward. The Office of the Registrar emails students when diplomas arrive and will retain diplomas for five years only.

# General Education And College One

## EDUCATION IS WHAT REMAINS AFTER ONE HAS FORGOTTEN EVERYTHING...LEARNED IN SCHOOL.

— Albert Einstein, Recipient of Nobel Prize In Physics and Professor of Theoretical Physics, Princeton University

### General Education

What is general education? All universities aspire to educate the whole student. General education provides you with the practical skills and diverse knowledge base that you will need to become an informed citizen and a good problem-solver after graduation. You will be entering the workplace in an era of rapid change; your future career may ultimately be in a field that doesn't exist today. Through general education, you will craft for yourself the tools that will let you continue to grow in a world that demands lifelong learning for success.

General education at UC Merced will help you grow intellectually by:

- Strengthening your abilities in quantitative reasoning and written, oral and other communication skills; and
- Introducing and teaching you to integrate broad domains of knowledge: arts and humanities; social and cognitive sciences; natural sciences; and technologies and engineering methods.

Throughout your undergraduate years, UC Merced's general education program will help you fine-tune your ability to communicate through words, numbers, images, and actions; and enable you to discover the many ways in which knowledge is created and put to good use.

General education at UC Merced places a high premium on demonstrating the ways in which different disciplines can make connections with each other. There also will be an emphasis on practicing and applying what you are learning in the classroom—an educational value also reflected in the undergraduate majors at UC Merced.

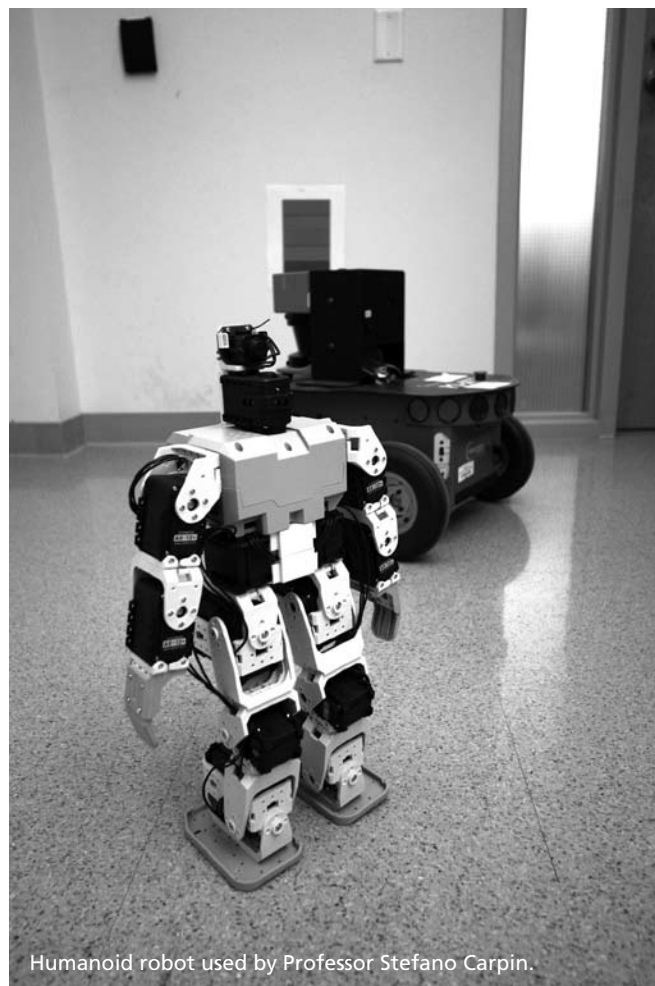
The faculty has created a set of principles that embody the kinds of learning to be achieved through general education at UC Merced. You will encounter these principles in action through the Core Course sequence, a unique opportunity for all UC Merced undergraduates to share a common exploration of the issues that will affect your future. All freshmen and juniors will take a Core Course.

### Guiding Principles for General Education at UC Merced

UC Merced's educational experiences are designed to prepare well educated people of the 21st century for the workplace, for advanced education and for a leadership role within their communities. UC Merced graduates will be exceptionally well prepared to navigate and succeed in a complex world. The principles guiding the design and implementation of our academic program are envisioned within a continuum that ranges from preparatory and advanced curricula in general education and in the majors, through a variety of educational activities inside and outside the classroom.

All UC Merced graduates will reflect these principles, which provide the foundation for their education:

- **Scientific Literacy:** To have a functional understanding of scientific, technological and quantitative information, and to know both how to interpret scientific information and effectively apply quantitative tools;
- **Decision Making:** To appreciate the various and diverse factors bearing on decisions and the know-how to assemble, evaluate, interpret and use information effectively for critical analysis and problem solving;
- **Communication:** To convey information to and communicate and interact effectively with multiple audiences, using advanced skills in written and other modes of communication;



Humanoid robot used by Professor Stefano Carpin.



- **Self and Society:** To understand and value diverse perspectives in both the global and community contexts of modern society in order to work knowledgeably and effectively in an ethnically and culturally rich setting;
- **Ethics and Responsibility:** To follow ethical practices in their professions and communities, and care for future generations through sustainable living and environmental and societal responsibility;
- **Leadership and Teamwork:** To work effectively in both leadership and team roles, capably making connections and integrating their expertise with the expertise of others;
- **Aesthetic Understanding and Creativity:** To appreciate and be knowledgeable about human creative expression, including literature and the arts; and
- **Development of Personal Potential:** To be responsible for achieving the full promise of their abilities, including psychological and physical well-being.

## GENERAL EDUCATION REQUIREMENTS

The UC Merced general education program consists of courses that are informed by the Guiding Principles and that meet the following graduation requirements:

- University requirements,
- Campus requirements, and
- School requirements.

In consultation with faculty, with advisors in the Student Advising and Learning Center and with advisors in your School, you should keep track of your progress in fulfilling university, campus and school requirements for general education.

### A. UNIVERSITY REQUIREMENTS

- University of California Entry Level Writing Requirement (formerly, Subject A Requirement)
- American History and Institutions

#### University of California Entry Level Writing Requirement/ Analytical Writing Placement Exam (formerly, Subject A)

To succeed at UC Merced, you must be able to understand and to respond adequately to written material typical of reading assignments in freshman courses, including being able to structure and develop an essay that uses written English effectively. Any student who has not yet satisfied this entrance requirement through one of the alternatives listed below will be required to complete it by the end of the second semester of enrollment at UC Merced. Failure to complete this requirement in the time allowed will result in a hold on a student's registration. Students may satisfy the University of California Entry Level Writing Requirement in any of the following ways:

- Score 3, 4 or 5 on the College Board Advanced Placement Examination in English (Language or Literature);
- Score 30 or higher on the ACT combined English/Writing Test;
- Score 680 or higher on the College Board SAT Reasoning Test Writing Section or the SAT II: Writing Subject Test;
- Score 5 or higher on the International Baccalaureate Higher Level Examination in English (Language A only);
- Score 6 or higher on the International Baccalaureate Standard Level English A exam;

- Prior to enrolling in the University, complete with a grade of C or better a transferable college course in English composition worth four quarter or three semester units;
- Achieve a passing score on the University's writing proficiency examination, called the University of California Analytical Writing Placement Exam (formerly, Subject A Examination); or
- Complete an acceptable writing course at UC Merced (WRI 001 or other acceptable course).

The University offers the University of California Analytical Writing Placement Exam (formerly, Subject A Examination) each spring on the second Saturday in May at test centers throughout the state for students who plan to enroll in the University the following fall. California residents who will enter the University as freshmen must take the exam if they have not otherwise satisfied the requirement (by one of the methods listed above). Students must pay a nonrefundable fee to cover test administration costs. Students who received admission application fee waivers will automatically have this fee waived.

Students will receive detailed information about the exam in April. Students who are not from California may take an equivalent exam in the fall after enrolling at the University.

#### University of California Entry Level Writing Requirement/ Subject A Online

Comprehensive information about the University of California Entry Level Writing Requirement/Subject A Requirement and examination is available at [www.ucop.edu/sas/awpe/requirement](http://www.ucop.edu/sas/awpe/requirement).

#### American History and Institutions Requirement

As a candidate for an undergraduate degree at UC Merced, you need to demonstrate knowledge of American history and of the principles of American institutions under the federal and state constitutions. You may meet the requirement by completing specific courses or earning a certain score on an examination. Transfer students are urged to complete the requirement before they enroll.

You may satisfy both the American History and American Institutions requirements in the following ways:

1. Complete in high school one year of United States history with grades of C or better, or one semester of United States history and one semester of United States government with grades of C or better;
2. Achieve a score of 3, 4 or 5 on the College Board Advanced Placement Examination in U.S. History;
3. Achieve a score of 550 or better on the SAT II: U.S. History test;
4. Complete acceptable course work at a community college or other accredited institution; or
5. Complete acceptable course work at UC Merced (both HIST 016 and HIST 017).

BEING AT UC MERCED MAKES ME FEEL  
LIKE I AM A PART OF UC HISTORY.

— Mary Panos, student, Resident Assistant

## CORE FRIDAY!

The CORE Course sequence is College One's unique way to introduce you to how the disciplines understand problems and devise tools to grapple with them. Faculty from all three schools—Natural Sciences, Engineering, and Social Sciences, Humanities and Arts—challenge freshmen to think about ways that academic disciplines connect or debate with one another.

CORE Friday is part of what makes CORE 001 unique. CORE Friday events round out the week's lectures and discussions with a film, documentary, panel discussion, theatrical production or distinguished speaker. CORE Friday programming illuminates ideas presented during the CORE 001 lectures for the week, as well as alternative views.

### B. CAMPUS REQUIREMENTS

- Two-Semester CORE Course sequence
- Lower division writing course
- College-level mathematics/quantitative reasoning course

### The World at Home—Planning for the Future in a Complex World

The CORE Course sequence is future-oriented, striving to help students gain the intellectual tools, knowledge and insights that will help informed citizens devise future solutions to real-life problems. The UC Merced CORE Course sequence aims to understand the world at large as it is reflected in the world at home—California. By examining, for example, the local evidence of global problems, you will begin to grapple with the issues that will affect you personally and professionally.

CORE 001 will pose a set of questions as they are framed by the various domains of human knowledge known as the disciplines. CORE 100 will give you a chance to build on what you have been learning during your first two years by returning to the questions introduced in CORE 001 and trying out different ways to find answers. CORE 100 is required of all transfer students as well as all continuing UC Merced students.

In CORE 001, UC Merced faculty will introduce you to how their disciplines define the challenges faced by informed citizens of this new century.

For example:

- Can advances in technology mitigate the effects of burgeoning populations and resource depletion?
- How will a changing climate affect the future migration of human populations?
- How do citizens decide among conflicting ethical choices, each with a compelling claim?

Faculty from all three Schools will join together to show how such complex questions might best be probed through connecting the insights of their disciplines.

As a junior in CORE 100, you will begin to apply what you have learned during your first two years from your lower division general education and the introductory work in your chosen major. Every society needs people who can solve problems, and increasingly, problem-solving is accomplished by many professions through

multidisciplinary team efforts. The goal of this course is to teach students problem-solving skills through the experience of working on a multidisciplinary team to formulate a solution for a societal problem. The team will be composed of students from several majors to provide the breadth needed for a multidisciplinary approach; and will address the pros and cons of proposed solutions from scientific, cultural, ethical and economic perspectives.

Across the two semesters of the CORE Course, you will:

- work together in groups on joint projects or problems to build your leadership and teamwork abilities;
- learn to think analytically and communicate effectively in the context of problems affecting your lives and futures;
- use quantitative methods as well as ethical judgment to make decisions and defend those decisions to your peers; and
- in CORE 100, present your solutions in a public presentation, which would include written, graphic and oral elements and even allow you to write and perform brief plays or songs, or create art in other media.

### Lower Division Writing Course

Analytical writing is a means for understanding better what you are learning and conveying your ideas to different audiences: your instructors, your fellow students and people outside the university. The lower division writing requirement will start you on a path of writing development that will continue through your four years at UC Merced.



**WRI 010: College Reading and Composition**

This course is designed to help you develop your college-level skills in effective use of language, analysis and argumentation, organization, and strategies for creation, revision and editing. It must be completed during your freshman or sophomore year.

**Mathematics/Quantitative Reasoning**

All students will take a college-level mathematics/quantitative reasoning course. For some of you, mathematics and statistics will be an essential tool for mastering a field in depth. For others, you will build your ability to understand how quantitative methods are applied in society to support arguments and solve problems. A variety of courses will be available to meet this requirement, based on your field of interest. Check the requirements of the major that interests you, in the School section of the catalog, for information on courses that satisfy Mathematics/Quantitative Reasoning.

**C. SCHOOL REQUIREMENTS**

The Schools of Engineering, Natural Sciences, and Social Sciences, Humanities and Arts each have a set of general education requirements to be completed if you choose a major offered by that School. School requirements include courses to help you build the collateral knowledge and skills you will need in order to succeed in your major. School requirements also include courses to help you understand the broad domains of knowledge. Check the School section of this catalog for specific requirements.

**FOR TRANSFER STUDENTS: SATISFYING GENERAL EDUCATION**

In addition to meeting the transfer admissions requirements described in the Undergraduate Admissions section of this Catalog, transfer students should complete an acceptable general education course pattern and preparatory courses for the intended major, prior to transfer. Successful completion of general education and major preparation will assure that you do not need to take any additional lower division courses at UC Merced. For detailed information on how transfer students can satisfy lower division general education and major preparation requirements, see the Catalog section on the School which offers your intended major. Please note the following:

California Community College transfer students who complete the Intersegmental General Education Transfer Curriculum (IGETC) satisfy all lower division general education requirements at UC Merced. For further details, see the Catalog section on the School which offers your intended major. Transfer students from other University of California campuses who have completed lower division general education requirements at the UC campus have satisfied lower division general education requirements at UC Merced.

IN MY 30 YEAR CAREER, I HAVE NEVER ENJOYED TEACHING AS MUCH AS I HAVE HERE AT UC MERCED. IT IS THE HIGHLIGHT OF MY DAY.

—Professor Will Shadish, Psychology

UC MERCED FACULTY AND ADMINISTRATORS ARE AMONG THE MOST APPROACHABLE, ACCESSIBLE PEOPLE IN THE ENTIRE UC SYSTEM. UC MERCED STUDENTS CAN PERFORM INDEPENDENT RESEARCH, JOIN UNIVERSITY COMMITTEES AND DESIGN NEW CURRICULUM. BECAUSE UC MERCED IS IN ITS RELATIVE INFANCY, OPPORTUNITIES FOR STUDENT LEADERSHIP AND ACADEMIC CURRICULAR DEVELOPMENT ARE ABUNDANT. FOR THE INSPIRED STUDENT, THE CHANCE TO EFFECT CHANGE ON GENERATIONS OF FUTURE STUDENTS IS WORTH MORE THAN THE MONEY YOU PAY FOR TUITION.

—Yang Li, Psychology and Management

# School of Engineering

*The mission of the School of Engineering is to provide an exceptional technical and professional education that instills in our students advanced problem-solving skills, effective leadership qualities, and the ability to recognize and build on individual strengths throughout one's career.*

## THE SCHOOL OF ENGINEERING OFFERS THE FOLLOWING MAJORS:

- Bioengineering (BIOE)
- Computer Science and Engineering (CSE)
- Environmental Engineering (ENVE)
- Materials Science and Engineering (MSE)
- Mechanical Engineering (ME)

## WHAT IS ENGINEERING?

Engineering is about problem solving, innovation, and the creation of devices, systems, processes, and structures for human use.

Engineers create new ideas and then transform those ideas into products and services that improve people's lives. Engineers apply mathematics and the principles of science—particularly chemistry and physics—to solve problems and meet the needs of society. Engineering spans the very small to the very large, from micro-sensors that can continuously monitor human health, to space stations that can support the exploration of new worlds. It also touches our everyday lives.

Engineering has provided our shelter, our transportation, our entertainment, our medical supplies and technologies, our water supplies, the food we eat, the movies we watch, the appliances that make our lives easier, and the protection of our environment. Engineering careers are among the highest in demand in the United States, and as a result, provide great personal and professional satisfaction and quality of life. Engineering is a “people-serving profession” and a pathway to financial security. In short, engineering makes the world work!



### LETTER OF WELCOME FROM THE DEAN

Dear Future Engineer:

I am delighted to learn of your interest in UC Merced and, in particular, your interest in becoming an engineer. Engineering is a remarkable profession—one that provides a solid foundation for careers of leadership and responsibility.

You are about to begin an exciting journey. Your engineering education at UC Merced will be both challenging and satisfying, and will give you the chance to meet some extraordinary people: world-class faculty, committed fellow students, and dedicated staff. These associations will develop during your time at UC Merced, will last throughout your career, and be a source of intellectual nourishment well into the future. From the time you enter our program you will be exposed to new technologies that will become the tools that you will use in solving problems and delivering exciting new products and services to society. Engineers have been and will continue to be the designers and builders of the things that improve people's lives.

Your education in Engineering is a launch pad. Some of you will go on to pursue careers in engineering design, others will become engineering managers, and still others will pursue graduate education in engineering or perhaps go on to other professions such as law or medicine. Once you master the methods of engineering problem-solving, you will have the skills and flexibility to chart your own course, and to adapt to whatever your future holds.

You are to be congratulated for your vision and initiative. I look forward to welcoming you into our program and watching you develop into a technical leader for tomorrow.

Jeff R. Wright  
Dean, School of Engineering

## SCHOOL OF ENGINEERING REQUIREMENTS

All Engineering students, regardless of major, are expected to meet the minimum requirements for the B.S. degree. First-year Engineering students have a freshman year that lays the foundation for further study in the majors. Students have the opportunity to explore the different UC Merced majors during that year through freshman seminars, service learning, research experiences and informal contact with faculty and graduate students.

Two general education courses are common for all UC Merced students: CORE 1 and 100 (or equivalent), The World at Home. These provide a framework for the skills and ideals articulated in the UC Merced Guiding Principles for General Education (see General Education section of this catalog), including decision-making, communication, ethics, responsibility, leadership, teamwork, aesthetic understanding, creativity and an appreciation of diverse perspectives in both the global and community contexts.

### Service Learning

Under the advisement of a faculty mentor, students have the opportunity to form service learning teams that work with an approved community not-for-profit organization—or client—to solve practical engineering problems. For example, a team composed of both upper and lower division students might work together to design, develop, implement and test an information system to serve the needs of a local non-profit service organization. Students develop skills to create organizational structures within the team; a communications structure with their client organization; and a strategic plan, mission statement and work plan to guide the activities of the team. Interacting closely and continuously with the client, students learn about the needs of the organization, delineate project objectives, formulate work plans, conduct design activities, implement resulting solutions, and monitor and assess program effectiveness. Students' performance and contribution to the team effort are formally assessed through regular written reports and panel interviews.

In addition to obtaining practical experience that complements their formal course work, students gain experience in working in teams, organizing and writing reports and proposals, interacting with clients, performing and evaluating basic engineering designs and formally evaluating outcomes. Because teams and team activities extend across multiple semesters and years, clients are assured of continuity of technical support and ongoing attention to their needs.

Students electing to enroll in the UC Merced Service Learning initiative may earn up to two credits per semester for participation, depending on their leadership position within the team for that semester.

### GENERAL EDUCATION REQUIREMENTS [AT LEAST 46 UNITS]

*School of Engineering students are required to complete the following list of general education courses:*

#### LOWER DIVISION GENERAL EDUCATION REQUIREMENTS:

The World at Home (CORE 001)	4 units
College Reading and Composition (WRI 010)	4 units
MATH 021	4 units
PHYS 008 (or PHYS 018)	4 units
Contemporary Biology (BIO 001)	4 units
Introduction to Computing I and II (CSE 020 and CSE 021 or equivalent)	4 units

Probability and Statistics (MATH 032)	4 units
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#### UPPER DIVISION GENERAL EDUCATION REQUIREMENTS:

The World at Home (CORE 100) or equivalent	4 units
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#### Additional General Education Requirements:

*General Education Electives (selected from a list of acceptable courses):*

Humanities or Arts	4 units
Social Sciences	4 units
Either 3 upper division Service Learning units, or 3 additional upper division Humanities or Arts or Social Sciences units	3 units
Either 3 additional Service Learning units, or 3 additional Humanities or Arts or Social Sciences units; these units can be upper division or lower division	3 units

Freshman Seminar (CORE 090X) or Service Learning (ENGR 097 or 197) (1-10 units). One unit of freshman seminar or service learning must be taken during the freshman year.

All students in the School of Engineering, regardless of major, are required to complete all requirements for all majors with a C- or better effective Fall 2009 for entering or readmitted students.

### MAJOR PREPARATION [32 UNITS]

*Engineering students are required to complete the following major preparation courses.*

General Chemistry (CHEM 002)	4 units
Physics II (PHYS 009 or PHYS 019)	4 units



Calculus of a Single Variable II (MATH 022)	4 units
Multi-Variable Calculus (MATH 023)	4 units
Introduction to Linear Algebra and Differential Equations (MATH 024)	4 units
Probability and Statistics (MATH 032)	4 units
Introduction to Computing I and II (CSE 020 and CSE 021 or equivalent)	4 units
Contemporary Biology (BIO 001)	4 units

### ENGINEERING FUNDAMENTALS

*The following fundamentals course is required for all engineering majors:*

Engineering Economic Analysis (ENGR 155)	3 units
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Remaining Engineering Fundamentals courses are determined by specific majors. See specific majors or talk to your advisor to find out which of the following fundamentals courses are required for you.

Introduction to Materials (ENGR 045) . . . . .	4 units
Dynamics (ENGR 057) . . . . .	4 units
Strength of Materials (ENGR 151) . . . . .	4 units
Fluid Mechanics (ENGR 120) . . . . .	4 units
Thermodynamics (ENGR 130) . . . . .	3 units
Circuit Theory (ENGR 065) . . . . .	3 units
Spatial Analysis and Modeling (ENGR 180) . . . . .	4 units

**MAJOR AREA UPPER DIVISION COURSES**

Major Area Upper Division Courses include major core courses, major technical electives and other specified requirements. See specific majors for the list of courses.

Professional Seminar (1 unit, ENGR 191). Must be taken during the senior year.

**TRANSFER STUDENTS**

Transfer students can satisfy lower division general education and prepare for the majors in Engineering by completing the following:

**General Education**

All transfer students need to complete at least 7 credits of upper division general education and may need to complete some lower division major preparation or prerequisite courses where equivalents are not offered at other institutions.

Students with more than 45 transferable units, but without IGETC, can satisfy Engineering lower division general education requirements by completing at least 34 credits in the following pattern of transferable courses:

- Two English composition courses
- One mathematics course (a mathematics course that satisfies major preparation will satisfy this requirement)
- Three arts/humanities courses with at least one each in arts and humanities
- Three social sciences courses in at least two disciplines
- Two science courses, one each from biological sciences and physical sciences (sciences courses that satisfy major preparation will also satisfy this requirement)

Students with 45 or fewer transferable units default to the School of Engineering general education pattern.

**Major Preparation**

Transfer students who wish to enter any major in the School of Engineering should complete the following:

- Three semesters of calculus, plus linear algebra and differential equations
- One semester of general chemistry with laboratory
- Two semesters of calculus-based physics with laboratory
- Two semesters of introduction to computer science

Transfer students should consult with an Engineering advisor as soon as possible to determine whether they need to complete any additional preparatory courses at UC Merced.

Since Engineering is a rapidly developing profession, curricular changes are made by the Faculty from year to year. Changes made to the School of Engineering curriculum will be made available on the School of Engineering website at [eng.ucmerced.edu](http://eng.ucmerced.edu).

Senior Vice President Nancy McFadden presents Chancellor Kang (right) and Dean Wright (center) accept a check for \$1,000,000 from PG&E to support Engineering programs.



## Engineering Majors

### ■ Bioengineering Major

We strive to provide a top-quality educational program in BIOE that will prepare its graduates with the intellectual rigor, foundational practical skills, and independent creativity needed for successful professional careers in academic, medical, commercial and government endeavors. Our educational objectives are guided by the values (founding Principles of Community) of UC Merced, the mission of UC Merced's School of Engineering, and the accreditation requirements of ABET.

Bioengineering is a highly interdisciplinary field in which the techniques, devices, materials and resourcefulness of engineers are used to address problems in biology and healthcare; lessons from biology are used to inspire design and inform progress in engineering. During the past 40 years, this synergy between biology and engineering has led to a wide range of implantable materials, diagnostic devices, sensors and molecular characterization techniques, and it has produced tools that greatly expedited the sequencing of the human genome. Along with these practical innovations has come a rapidly increasing need for personnel with the necessary hybrid skills, and undergraduate bioengineering programs have proliferated alongside the continued growth of bioengineering research.

The undergraduate major in Bioengineering is designed to provide students with both breadth and depth, and the possibility of a focus on nanobioengineering, tissue engineering, or physiological engineering. It is suitable preparation for individuals seeking a career in research or industry, or pursuing advanced degrees such as Ph.D. or M.D.

A nanobioengineering focus reflects the synergy between the “nano” and “bio” themes in engineering and science. It highlights molecular, supramolecular, cellular and material aspects of bioengineering, drawing efficiently on the talents of the biologists, chemists, physicists and other UC Merced faculty in basic engineering and science programs. Convergence between engineering and biology in the expanding area of nanotechnology—the realm of biological molecules, molecular aggregates and cellular processes—has begun to offer new, rich areas of study and commercialization.

Tissue engineering focuses on a specific class of applications for biomedical engineering. Current medical devices do not repair or replace diseased tissue, but rather, are designed to either minimize symptoms or partially replace a minimal level of organ functionality. An emerging and ambitious area of research seeks to build devices that would actually replace diseased tissues/organs with their biological equivalents, thus completely restoring tissue/organ functionality. This area has been termed Tissue Engineering and/or Regenerative Medicine. It is, by nature, cross disciplinary in that it employs cell culture methods combined with appropriate materials, scaffolding architecture, technologies for cell delivery, and nutrient transport strategies while also synergizing with nanobioengineering by employing the use of small nanoparticles or nanocomposite scaffolding materials.

Physiological engineering is an area of bioengineering that focuses on the development and implementation of instruments and techniques to evaluate the function of biological systems at the tissue, cellular and molecular level. This area includes bioelectronics, bioinstrumentation, modern optical techniques, molecular biology, spectroscopy, electrophysiology, single molecule detection and genetic engineering techniques to evaluate central paradigms

and hypotheses in bioengineering. In their training to become independent bioengineers, learners will acquire a broad background in basic engineering and biomedical sciences, advanced knowledge in a specific area of experimental and theoretical physiology, the ability to identify specific problems and formulate testable hypotheses related to these bioengineering problems, and the technical competence to develop new or adapt existing laboratory techniques for solving bioengineering problems.

We require our students to participate in Engineering Service Learning, which provides practical exposure to the interface between engineering and society, and an introduction to the design, communication, budgetary and timekeeping skills that professional engineers need.

#### Requirements For The Bioengineering (BIOE) Major

The additional requirements that must be met to receive the B.S. in Bioengineering at UC Merced:

#### ENGINEERING FUNDAMENTALS [20 UNITS]

Dynamics (ENGR 057) . . . . .	4 units
Introduction to Materials (ENGR 045) . . . . .	4 units
Thermodynamics (ENGR 130) . . . . .	3 units
Engineering Economic Analysis (ENGR 155) . . . . .	3 units
Circuit Theory (ENGR 065) . . . . .	3 units
Analog and Digital Electronics (ENGR 166) . . . . .	3 units

#### BIOENGINEERING CORE [31 UNITS]

The bioengineering core consists of 8 courses (1 lower division and 7 upper division) designed to give all students a common foundation of core knowledge specific to the discipline.

##### Lower Division Courses

Introduction to Bioengineering (BIOE 030) . . . . .	4 units
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##### Upper Division Courses

Introduction to Molecular Biology (BIO 002) . . . . .	4 units
Physiology for Engineers (BIOE 100) . . . . .	4 units
Biosensors & Bioinstrumentation (BIOE 103) (or Biosensors BIOE 102) . . . . .	4 units
Biotransport (BIOE 104) . . . . .	3 units
Fluid Mechanics (ENGR 120) . . . . .	4 units
The Cell (BIO 110) . . . . .	4 units
Bioengineering Design (BIOE 150) (or appropriate Service Learning Project - by approval only) . . . . .	3 units

#### ADDITIONAL DEGREE REQUIREMENTS

Principles of Organic Chemistry (CHEM 008) . . . . .	4 units
Principles of Physical Chemistry (CHEM 10) . . . . .	4 units
Professional Seminar (ENGR 191) . . . . .	1 unit

#### TECHNICAL ELECTIVES

Technical electives (minimum 6 units) should be selected in a manner that is complementary to, yet integrated with, your major area of study, and should be determined through close interaction with your major area advisor. These are 100-level courses. Up to 3 units of research credit (BIOE 195) may also be used.

Tissue Engineering (BIOE 114) . . . . .	3 units
Lab on a Chip (BIOE 117) . . . . .	4 units
Modeling Nanoscale Processes in Biology (BIOE 101) . . . . .	3 units

Electron Microscopy (ENGR 170 and 170L) . . . . .	3-4 units
Biochemistry (BIO 101) . . . . .	4 units
Advanced Molecular Biology (BIO 102) . . . . .	4 units
Biophysics (BIO 104) . . . . .	4 units
Genetics (BIO 140) . . . . .	4 units
Embryos, Genes, and Development (BIO 150) . . . . .	4 units
Molecular Immunology (BIO 151) . . . . .	4 units
Genome Biology (BIO 142) . . . . .	4 units
Biostatistics (BIO 175) . . . . .	4 units
Computational Biology (BIO 181) . . . . .	4 units
Bioinformatics (BIO 182) . . . . .	4 units
Biomedical Ethics (BIO 185) . . . . .	4 units
Material Structure & Characterization (MSE 113) . . . . .	3 units
Polymeric Materials (MSE 114) . . . . .	4 units
Intro to Nanotech & Nanoscience (MSE 118) . . . . .	3 units
Numerical Analysis (Math 133) . . . . .	4 units
Self Assembling Molecular Systems (BIOE 110) . . . . .	3 units
Research credit (BIOE 195) . . . . .	1-3 units

### Bioengineering Learning Outcomes

Upon graduation, our graduates demonstrate:

- (i) an understanding of biology and physiology.
- (ii) the capability to apply advanced mathematics (including differential equations and statistics), science, and engineering to solve problems at the interface of engineering and biology.
- (iii) the ability to make measurements on, and interpret data from, living systems.
- (iv) the ability to address problems associated with the interaction between living and non-living materials and systems.
- (v) professional and ethical responsibility.

### SAMPLE PLAN OF STUDY FOR BIOENGINEERING DEGREE

#### SEMESTER 1

CORE 001	The World at Home	4
BIO 001	Contemporary Biology	4
BIO 001L	Contemporary Biology Lab	1
MATH 021	Calculus I	4
PHYS 008	Physics I (or PHYS 018)	4
ENGR 097	Service Learning: Engineering Projects in Community Service (or Freshman Seminar)	1

**Semester Units 18**

#### SEMESTER 2

MATH 022	Calculus II	4
CHEM 002	General Chemistry	4
PHYS 009	Physics II (or PHYS 019)	4
CSE 020	Introduction to Computing I or equivalent	2
WRI 010	College Reading and Composition	4

**Semester Units 18**

#### SEMESTER 3

BIOE 030	Introduction to Bioengineering	4
CHEM 010	Principles of Physical Chemistry	4
CSE 021	Introduction to Computing II or equivalent	2

MATH 023	Multi-Variable Calculus	4
ENGR 057	Dynamics	4

**Semester Units 18**

#### SEMESTER 4

MATH 024	Introduction to Linear Algebra and Differential Equations	4
CHEM 008	Principles of Organic Chemistry	4
ENGR 045	Introduction to Materials	4
BIO 002	Introduction to Molecular Biology	4

**Semester Units 16**

#### SEMESTER 5

ENGR 065	Circuit Theory	3
MATH 032	Probability and Statistics	4
BIO 110	The Cell	4
ENGR 120	Fluid Mechanics	4

**Semester Units 15**

#### SEMESTER 6

BIOE 104	Biotransport	3
BIOE 100	Physiology for Engineers	4
CORE 100	The World at Home or equivalent	4
ENGR 166	Analog and Digital Electronics	3
	Technical Elective	3

**Semester Units 17**

#### SEMESTER 7

BIOE 103	Biosensors & Bioinstrumentation	4
ENGR 130	Thermodynamics	3
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	General Education	4
	General Education Elective	4

**Semester Units 16**

#### SEMESTER 8

BIOE 150	Bioengineering Design	3
ENGR 155	Engineering Economics Analysis	3
ENGR 191	Professional Seminar	1
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	Technical Elective	3
	General Education Elective	4

**Semester Units 15**

**Total Program Units 133**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.



## ■ Computer Science And Engineering Major

The undergraduate major in Computer Science and Engineering is designed to provide students with both breadth and depth in the exciting and rapidly expanding fields of:

- Computer science—the study of computation, including algorithms and data structures, and
- Computer engineering—including hardware, software and network architecture.

A degree in Computer Science and Engineering from UC Merced prepares students to assume leadership roles in designing, building and implementing a vast array of powerful new technologies that will continue to advance humankind. As the foundation for innovation in areas ranging from robotics and automation, computer networks, graphics and visualization and computer vision to informatics, machine learning and artificial intelligence careers in computer science and engineering are among the most satisfying and rewarding of any.

Computer Science and Engineering students at UC Merced work with the top computer scientists and engineers in the world. Our faculty has developed a program of study that combines practical exposure to the most modern technologies available, with a theoretical foundation that empowers students to master future changes and innovation as technologies continue to evolve at an astonishing pace. Our graduates will thus have both tools and insights to propel them into positions of responsibility and leadership across virtually any occupation.

Computer science and engineering constitutes one of the strongest industrial sectors in the state and the nation, offering a broad spectrum of career opportunities. Education at UC Merced provides the opportunity to participate in innovative classroom learning experiences, to become involved in laboratory research, to participate with fellow students in team activities and projects, and to interact directly with our remarkable faculty. From introductory programming courses through architecture design experiences, and research and team project activities, our students gain insights that allow them to excel throughout their chosen career path.

The program includes service learning components designed to engage students in the solution of real-world problems in their community. The team projects resemble what is found in actual engineering practice, with increasing responsibility as students progress through the program. Engineers need to understand not only the technical but also the social and political contexts of their work. They must be able to communicate and to plan, finance and market their products and ideas. Social sciences, business, humanities and arts are an important part of the curriculum. The result is a learning experience that is hands-on and creative, engaging and adaptable.

### Requirements For The Computer Science And Engineering (CSE) Major

The additional requirements that must be met to receive the B.S. in Computer Science and Engineering at UC Merced include:

#### COMPUTER SCIENCE AND ENGINEERING CORE [30 UNITS]

The computer science and engineering core consists of 6 courses (2 lower division and 4 upper division) designed to provide students a common foundation of core knowledge specific to the discipline.

#### Lower Division Core Courses

Introduction to Computer Science and Engineering I (CSE 030) . . . 4 units  
Introduction to Computer Science and Engineering II (CSE 31) . . . 4 units

#### Upper Division Core Courses

Algorithm Design and Analysis (CSE 100) . . . . . 4 units  
Database Systems (CSE 111) . . . . . 4 units  
Software Engineering (CSE 120) . . . . . 4 units  
Computer Architecture (CSE 140) . . . . . 4 units  
Operating Systems (CSE 150) . . . . . 4 units  
Computer Networks (CSE 160) . . . . . 4 units

#### TECHNICAL ELECTIVES

A total of 16 units of CSE technical electives are required. CSE technical electives are all upper division courses (CSE 1XX). Upper division core courses taken in excess of the core requirements may be counted as technical electives. Other upper division courses outside your major area of study can be selected with approval.

#### Computer Science and Engineering Learning Outcomes

Upon graduation, our students to demonstrate:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline;
- An ability to analyze a problem and identify the computing requirements appropriate for its solution;
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs;
- An ability to function effectively as a member of a team in order to accomplish a common goal;
- An understanding of professional, ethical, legal, security, and social issues and responsibilities;
- An ability to communicate effectively with a range of audiences;
- An ability to analyze the local and global impact of computing on individuals, organizations, and society;
- Recognition of the need for and an ability to engage in continuing professional development;
- An ability to use current techniques, skills, and tools necessary for computing practice;
- An ability to apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices;
- An ability to apply design and development principles in the construction of software systems of varying complexity.

#### SAMPLE PLAN OF STUDY FOR COMPUTER SCIENCE & ENGINEERING DEGREE

##### SEMESTER 1

CORE 001	The World at Home	4
CSE 020	Introduction to Computing I (or equivalent)	2
MATH 021	Calculus I	4
PHYS 008	Physics I (or PHYS 018)	4

ENGR 097	Service Learning: Engineering Projects in Community Service or	
CORE 090X	Freshman Seminar	1
<b>Semester Units</b>		<b>15</b>

**SEMESTER 2**

CSE 021	Introduction to Computing II (or equivalent)	2
MATH 022	Calculus of a Single Variable II	4
BIO 001	Contemporary Biology	4
PHYS 009	Physics II (or PHYS 19)	4
CORE 090X	Freshman Seminar	1
<b>Semester Units</b>		<b>15</b>

**SEMESTER 3**

CSE 030	Introduction to Computer Science And Engineering I	4
MATH 023	Multi-Variable Calculus	4
MATH 032	Probability and Statistics	3
CHEM 002	General Chemistry	4
ENGR 097	Service Learning: Engineering Projects in Community Service	1
<b>Semester Units</b>		<b>16</b>

**SEMESTER 4**

CSE 031	Introduction to Computer Science and Engineering II	4
MATH 024	Introduction to Linear Algebra and Differential Equations	4
WRI 010	College Reading and Composition	4
	Engineering Fundamentals	3
ENGR 097	Service Learning: Engineering Projects in Community Service	1
<b>Semester Units</b>		<b>16</b>

**SEMESTER 5**

CSE 100	Algorithm Design and Analysis	4
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	Engineering Fundamentals	4
	Engineering Fundamentals	3
	General Education Elective (Arts/Humanities)	4
<b>Semester Units</b>		<b>16</b>

**SEMESTER 6**

CSE 150	Operating Systems	4
CORE 100	The World at Home	4
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	Technical Elective	4
	Engineering Fundamentals	3
<b>Semester Units</b>		<b>16</b>

**SEMESTER 7**

CSE 160	Computer Networks	4
ENGR 155	Engineering Economics Analysis	3
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	Technical Elective	4
	General Education Elective (Social/Cognitive Sciences)	4
<b>Semester Units</b>		<b>16</b>

**SEMESTER 8**

CSE 120	Software Engineering	4
ENGR 191	Professional Seminar	1
	Technical Elective	4
	Technical Elective	4
	Free Elective	3
<b>Semester Units</b>		<b>16</b>

**Total Program Units****126**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

Engineering Service Learning students demonstrating how the Trebuchet that they built works.



## ■ Environmental Engineering Major

The undergraduate major in Environmental Engineering prepares students for careers in both industry and government agencies concerned with managing water, energy, public health and the environment. The program is also a good foundation for further study in Earth science, engineering, business, management, law and public health. The curriculum provides students with a quantitative understanding of the physical, chemical and biological principles that control air, water and habitat quality and sustainability on Earth, along with expertise in the design, development, implementation and assessment of engineering solutions to environmental problems.

Environmental engineers are distinguished from other environmental professionals through their focus on problem solving, design and implementation of technological or management systems. Environmental engineers search for creative and economical ways to use resources efficiently, limit the release of residuals into the environment, develop sensitive techniques to track pollutants once released and find effective methods to remediate spoiled resources. They serve as the vital link between scientific discovery, technological development and the societal need for protecting human health and ecological integrity. In the coming decades, environmental engineers will increasingly be called upon to address broader issues of environmental sustainability by minimizing the release of residuals through altered production processes and choice of materials; by capturing the resource value of wastes through recovery, recycling and reuse; and by managing natural resources to meet competing societal objectives.

UC Merced emphasizes a highly interdisciplinary approach to environmental engineering, combining a strong theoretical foundation with field studies, laboratory experiments and computations. Core courses within the major provide students with a firm foundation in the physical and life sciences and the ways that they apply to energy, hydrology, air and water quality issues. Emphasis areas allow students the flexibility to study in more depth by following tracks developed in consultation with their academic advisor(s). The main areas of emphasis for Environmental Engineering at UC Merced are hydrology, water quality and air pollution and sustainable energy.

**Hydrology:** focuses on the sources, balance and use of water in both natural and managed environments, including precipitation, mountain snowpack, river runoff, vegetation, water use and groundwater. Both the physical and chemical aspects of the water cycle are included.

**Water quality:** focuses on engineering solutions to water and waste issues, including measurement technology, water quality assessments, treatment systems and remediation of contaminated waters. Physical, chemical and biological aspects are included.

**Air pollution and sustainable energy:** focuses on engineering solutions to air quality and energy problems, both regionally and globally. The sources, fate, effects of air pollutants, as well as the planning and design of solar and other renewable energy systems are included.

The program includes service learning components designed to engage students in the solution of real-world problems in their community. The team projects resemble those found in actual engineering practice, with increasing responsibility as students progress through the program.

Engineers need to understand not only the technical but also the social and political contexts of their work. They must be able to communicate, and to plan, finance and market their products and ideas. Social sciences, business, humanities and arts courses are an important part of the curriculum. The result is a major that is hands-on and creative, engaging and adaptable.

### Requirements for the Environmental Engineering (ENVE) Major

The additional requirements that must be met to receive the B.S. in Environmental Engineering at UC Merced are: General Chemistry II (CHEM 010, 4 units), Engineering Fundamentals (19 units), Environmental Engineering Core (16 units), and Technical electives (15-17 units, including at least one Field Methods Course).

#### ENGINEERING FUNDAMENTALS [19 UNITS; 3 UNITS SPECIFIED]

*The following fundamentals course is required:*

Engineering Economic Analysis (ENGR 155) . . . . . 3 units

The following fundamentals course sequence (designated by \*) is strongly recommended for environmental engineering students preparing for the Fundamentals of Engineering (FE) examination. The additional courses listed may be substituted depending on each student's broader interests. Students may petition to substitute other courses.

Dynamics (ENGR 057)\* . . . . . 4 units  
 Fluid Mechanics (ENGR 120)\* . . . . . 4 units  
 Thermodynamics (ENGR 130)\* . . . . . 3 units  
 Circuit Theory (ENGR 065)\* . . . . . 3 units  
 Introduction to Materials (ENGR 045) . . . . . 4 units  
 Strength of Materials (ENGR 151) . . . . . 4 units  
 Spatial Analysis and Modeling (ENGR 180) . . . . . 4 units

#### ENVIRONMENTAL ENGINEERING CORE [20 UNITS]

The environmental engineering core consists of 4 courses designed to give all students a common foundation of core knowledge specific to the discipline:

##### Lower Division Courses

Introduction to Environmental Science and Technology (ENVE 020) . . . . . 4 units

##### Upper Division Courses

Environmental Chemistry (ENVE 100) . . . . . 4 units  
 Hydrology and Climate (ENVE 110) . . . . . 4 units  
 Meteorology and Air Pollution (ENVE 130) . . . . . 4 units  
 Sustainable Energy (ENVE 160) . . . . . 4 units

#### ADDITIONAL DEGREE REQUIREMENTS [4 UNITS]

*The following course is required:*

General Chemistry II (CHEM 010) . . . . . 4 units

#### TECHNICAL ELECTIVES [AT LEAST 14 UNITS]

Technical electives should be selected in a manner that is complementary to, yet integrated with, your major area of study, and should be determined through close interaction with your major area advisor. Check carefully for current offerings as some of the courses are offered only in alternate years. Courses should be selected from the following list of approved technical electives, or students can petition to include other upper division courses outside their major. At least one field methods course is required.

A maximum of 4 Service Learning (ENGR 97/197) and/ or Undergraduate Research (ENGR 99/199) units may be used as technical elective units.

Spatial Analysis and Modeling (ENGR 180)	4 units
Environmental Data Analysis (ENVE 105)	3 units
Subsurface Hydrology (ENVE 112)	4 units
Mountain Hydrology of the Western States (ENVE 114)	4 units
Applied Climatology (ENVE 116)	3 units
Global Change (ENVE 118)	4 units
Environmental Microbiology (ENVE 121)	4 units
Water Resources and Management (ENVE 140)	3 units
Remote Sensing of the Environment (ENVE 152)	4 units
Decision Analysis in Management (ENVE 155)	4 units
Sustainable Energy (ENVE 160)	4 units
Modeling and Design of Energy Systems (ENVE 162)	3 units
Contaminant Fate and Transport (ENVE 170)	3 units
Environmental Organic Chemistry (ENVE 171)	3 units
Water and Wastewater Treatment (ENVE 176)	3 units
Field Methods in Snow Hydrology (ENVE 181)	1-3 units
Field Methods in Surface Hydrology (ENVE 182)	1-3 units
Field Methods in Subsurface Hydrology (ENVE 183)	1-3 units
Field Methods in Environmental Chemistry (ENVE 184)	1-3 units
Watershed Biogeochemistry (ESS 105)	3 units
Air Pollution Control (ENVE 132)	3 units

### LIST OF COURSES FOR EMPHASIS TRACKS

#### Hydrology

Subsurface Hydrology (ENVE 112)	4 units
Mountain Hydrology of the Western US (ENVE 114)	4 units (DESIGN)
Remote Sensing of the Environment (ENVE 152)	4 units
Watershed Biogeochemistry (ESS 105)	3 units
Decision Analysis in Management (ENVE 155)	4 units
Environmental Data Analysis (ENVE 105)	3 units (DESIGN)
Field Methods in Snow Hydrology (ENVE 181)	1-3 units
Field Methods in Surface Hydrology (ENVE 182)	1-3 units
Field Methods in Subsurface Hydrology (ENVE 183)	1-3 units

#### Water quality

Subsurface Hydrology (ENVE 112)	4 units (DESIGN)
Environmental Microbiology (ENVE 121)	4 units
Decision Analysis in Management (ENVE 155)	4 units
Environmental Data Analysis (ENVE 105)	3 units (DESIGN)
Water Resources and Management (ENVE 140)	3 units
Contaminant Fate and Transport (ENVE 170)	3 units
Environmental Organic Chemistry (ENVE 171)	3 units
Water and Wastewater Treatment (ENVE 176)	3 units (DESIGN)
Field Methods in Surface Hydrology (ENVE 182)	1-3 units
Field Methods in Subsurface Hydrology (ENVE 183)	1-3 units
Field Methods in Environmental Chemistry (ENVE 184)	1-3 units

#### Air Pollution and Sustainable Energy

Decision Analysis in Management (ENVE 155)	4 units
Remote Sensing of the Environment (ENVE 152)	4 units
Air Pollution Control (ENVE 132)	3 units (DESIGN)
Applied Climatology (ENVE 116)	3 units
Modeling and Design of Energy Systems (ENVE 162)	3 units (DESIGN)
Heat Transfer (ENGR 135)	3 units

#### Environmental Engineering Learning Outcomes

The ENVE program has six learning outcomes which characterize

an ENVE graduate and what he/she will be enabled to accomplish following graduation:

1. ENVE graduates will have gained a strong foundation in basic mathematics, science, social science, humanities and arts, along with engineering principles, enabling active engagement as citizens in their communities.
2. ENVE graduates will be adept at applying critical thinking, problem solving, engineering principles and reasoning, the scientific method, and teamwork to solve environmental resource problems and to restore and sustain the global environment.
3. ENVE graduates will be prepared for advanced studies and research and/or employment advancement in a broad spectrum of industries and government agencies.
4. ENVE graduates will communicate effectively in written, spoken, and visual formats with technical, professional, and broader communities.
5. ENVE graduates will practice engineering according to the highest professional standards, demonstrating respect for social, ethical, cultural, environmental, economic, and regulatory concerns.
6. ENVE graduates will be instilled with a desire to pursue life-long learning opportunities including continued education, professional licensure, challenging professional experiences and active participation in professional organizations.

### SAMPLE PLAN OF STUDY FOR ENVIRONMENTAL ENGINEERING DEGREE

#### SEMESTER 1

CORE 001	The World at Home	4
CSE 020	Introduction to Computing I or equivalent	2
MATH 021	Calculus of a Single Variable I	4
PHYS 008	Introductory Physics I (or PHYS 018)	4
ENGR 097	Service Learning: Engineering Projects in Community Service or	
CORE 090X	Freshman Seminar	1

**Semester Units 15**

#### SEMESTER 2

MATH 022	Calculus of a Single Variable II	4
CSE 021	Introduction to Computing II or equivalent	2
BIO 001	Contemporary Biology	4
PHYS 009	Introductory Physics II (or PHYS 019)	4
ENGR 097	Service Learning: Engineering Projects in Community Service or	
CORE 090X	Freshman Seminar	1

**Semester Units 15**

#### SEMESTER 3

WRI 010	College Reading and Composition	4
CHEM 002	General Chemistry	4
MATH 023	Multi-Variable Calculus	4
ENGR 057	Dynamics	4
ENGR 097	Service Learning: Engineering Projects in Community Service	1

**Semester Units 17**

Engineering Professor Christopher Viney in Africa conducting materials science research on hippos.

**SEMESTER 4**

MATH 024	Introduction to Linear Algebra and Differential Equations	4
CHEM 010	General Chemistry II	4
MATH 032	Statistics	4
ENVE 020	Introduction to Environmental Science and Technology	4

**Semester Units** **16**

**SEMESTER 5**

ENVE 100	Environmental Chemistry	4
ENGR 130	Fundamentals – Thermodynamics	3
ENGR 155	Fundamentals – Engineering Econ Analysis	3
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	General Education Elective (Arts/Humanities)	4

**Semester Units** **15**

**SEMESTER 6**

ENGR 120	Fundamentals – Fluid Mechanics	4
ENGR 065	Fundamentals – Circuit Theory	4
ENVE 1XX	Technical Elective	4
CORE 100	The World at Home (or equivalent)	4
ENGR 197	Service Learning: Engineering Projects in Community Service	1

**Semester Units** **17**

**SEMESTER 7**

ENVE 1XX	Technical Elective	4
ENVE 110	Hydrology and Climate	4
ENVE 160	Sustainable Energy	4
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	General Education Elective (Soc/Cog Sciences)	4

**Semester Units** **17**

**SEMESTER 8**

ENVE 130	Meteorology and Air Pollution	4
ENVE 1XX	Field Methods	2
ENVE 1XX	Technical Elective	4
ENGR 180	Spatial Analysis or other Fundamental option	4
ENGR 191	Professional Seminar	1

**Semester Units** **15**

**Total Program Units****127**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

MY EXPERIENCE HERE AT UC MERCED HAS GONE ABOVE AND BEYOND ALL EXPECTATIONS. I HAVE NETWORKED AND BECOME FAMILIAR WITH A VARIETY OF CULTURES. I HAVE STUDIED CUTTING-EDGE TECHNOLOGY IN STATE-OF-THE-ART FACILITIES. I HAVE HAD INTERNSHIPS AND RESEARCH OPPORTUNITIES AS AN UNDERGRADUATE THAT MOST GRADUATE STUDENTS AT OTHER INSTITUTIONS HAVE A HARD TIME OBTAINING AND A CHILDHOOD DREAM OF TRAVELING THE WORLD CAME TRUE THIS PAST SUMMER WHEN I SPENT FIVE WEEKS IN EUROPE STUDYING RENEWABLE ENERGY.

— Heather Marie Poiry, Mechanical Engineering with Emphasis in Renewable Energy

## ■ Materials Science And Engineering Major

UC Merced students majoring in Materials Science and Engineering (MSE) will be equipped for leadership in a field that dictates the pace of technological progress.

Since the beginnings of civilization, technological progress has always relied on the materials that people were able to acquire from nature or through trade or by innovation. Wood, stone, bronze, iron, steel, aluminum, cements, plastics, semiconductors, liquid crystals, nanomaterials and quantum dots all have unique properties that enable—but also limit—what humans can make and do. Nations continue to go to war over access to particular raw materials. The construction of safe dwellings, the conveniences of rapid travel, the efficiency of telecommunications, the calculating and archiving power of computers, the life-prolonging gift of surgical implants and the dazzling performances of athletes all require dependable materials. Future technological progress of any kind will always be driven by the available materials.

Materials Science and Engineering (MSE) applies fundamental principles of physics and chemistry to designing materials with desired combinations of mechanical, optical, electrical, magnetic, electrochemical and other properties. Increasingly, innovative materials are being developed with the benefit of lessons that have been learned from nature. Examples include armor based on the structure of abalone shells and rats' teeth, optical materials that owe a debt to sea urchin spines and peacock feathers, high-performance ballistic fibers modeled on spider silk, self-cleaning surfaces copied from lotus leaves, and strong, reusable adhesives that emulate the behavior of gecko feet. Also encompassed in MSE are the methods by which particular atomic and molecular arrangements (nanostructures and microstructures) are achieved, the overall cost of the ingredients and processes used to produce particular materials, the effects of the environment on materials, the effects of materials and materials processing on the environment, and characterization of materials structure and properties. Because MSE embraces skills from physics, chemistry, mathematics and biology, it is especially appealing to anyone who enjoys interdisciplinary studies and who seeks to apply such knowledge to solving practical engineering problems.

MSE graduates are in demand in a great variety of fields that include manufacturing, energy, utilities, patent law, the financial sector, construction, transportation, aerospace, computer industries, sport, consulting, public policy, education and research. Employers appreciate the ability of MSE graduates to relate to colleagues across a broad spectrum of expertise.

Recent surveys of employment prospects nationally point to a steady growth in the overall MSE job market over the next decade at least. It is expected that the growth will be focused in areas related to the development of new materials, including materials for nanotechnology and biotechnology, rather than traditional areas of materials manufacturing. The MSE major at UC Merced reflects this expectation, with an emphasis on materials issues that will ensure the long-term relevance of our MSE degree.

### Requirements for the Materials Science and Engineering (MSE) Major

The additional requirements that must be met to receive the B.S. in Materials Science and Engineering at UC Merced are: Engineering

Fundamentals (18 units), MSE Core (22 units), and Technical electives (at least 12 units).

### ENGINEERING FUNDAMENTALS [18 UNITS; SPECIFIED]

*The following fundamentals courses are required:*

Dynamics (ENGR 057) . . . . .	4 units
Strength of Materials (ENGR 151) . . . . .	4 units
Fluid Mechanics (ENGR 120) . . . . .	4 units
Thermodynamics (ENGR 130) . . . . .	3 units
Engineering Economic Analysis (ENGR 155) . . . . .	3 units

### MATERIALS SCIENCE AND ENGINEERING CORE [22 UNITS; SPECIFIED]

The MSE core consists of courses designed to give all students a common foundation of core knowledge and skills specific to the discipline:

#### Lower Division Courses

Introduction to Materials (ENGR 045) . . . . .	4 units
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#### Upper Division Courses

Solid State Materials Properties (MSE 110) . . . . .	4 units
Materials Processing (MSE 111) . . . . .	4 units
Materials Selection and Performance (MSE 112) . . . . .	3 units
Materials Characterization (MSE 113) . . . . .	4 units
Materials Capstone Design (MSE 120) . . . . .	3 units

### ADDITIONAL DEGREE REQUIREMENTS:

Six Service Learning units, at least three of which should be upper division.

Service Learning (ENGR 097 or ENGR 197) . . . . .	6 units
(up to 2 credits could be freshman seminars)	

### TECHNICAL ELECTIVES [AT LEAST 12 UNITS]

Technical electives should be selected in a manner that is complementary to, yet integrated with, your major area of study, and should be determined through close interaction with your major area advisor. At least 9 units should be selected from the following list of approved technical electives:

Polymeric Materials (MSE 114) . . . . .	3 units
Ceramic Materials (MSE 115) . . . . .	3 units
Composites (MSE 116) . . . . .	3 units
New Materials (MSE 117) . . . . .	3 units
Introduction to Nanotechnology and Nanoscience (MSE 118) . . . . .	3 units
Materials Modeling (MSE 119) . . . . .	3 units
Introduction to Electron Microscopy (ENGR 170) . . . . .	3 units
Self-Assembling Molecular Systems (BIOE 110) . . . . .	3 units
Biomembranes (BIOE 111) . . . . .	3 units
Biomolecule-Substrate Interactions (BIOE 112) . . . . .	3 units
Quantum Chemistry and Spectroscopy (CHEM 112) . . . . .	3 units
Nanodevice Fabrication (MSE 126) . . . . .	3 units

### Nanotechnology Emphasis:

An emphasis in nanotechnology concurrent to a BS degree is offered to students who complete the following 2 required courses and 1 elective course.

*Required courses:*

- (1) Nanodevice Fabrication (MSE 126) . . . . . 3 units
- (2) Introduction to Nanotechnology and Nanoscience (MSE 118). 3 units

**Elective Courses:**

Polymeric Materials (MSE 114)	3 units
New Materials (MSE 117)	3 units
Materials Modeling (MSE 119)	3 units
Self-assembling Molecular Systems (BIOE 110)	3 units
Nanoscale Materials Chemistry (CHEM 140)	3 units
Introduction to Electron Microscopy (ENGR 170)	3 units

**Materials Science and Engineering Learning Outcomes**

Upon graduation, our graduates demonstrate the following:

- (i) Ability to apply advanced science (such as chemistry and physics) and engineering principles to materials systems.
- (ii) Integrated understanding of the scientific and engineering principles that underlie the four major elements of the field: structure, properties, processing, and performance related to materials systems appropriate to the field.
- (iii) Ability to apply and integrate knowledge from each of the above four elements of the field to solve materials selection and design problems.
- (iv) Ability to utilize experimental, statistical and computational methods in the context of materials systems.
- (v) Professional and ethical responsibility.

**SAMPLE PLAN OF STUDY FOR MATERIALS SCIENCE AND ENGINEERING DEGREE****SEMESTER 1**

MATH 021	Calculus of a Single Variable I	4
PHYS 008	Physics I (or PHYS 018)	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I (or equivalent)	2
ENGR 097	Service Learning: Engineering Projects in Community Service or	
CORE 090X	Freshman Seminar	1
<b>Semester Units</b>		<b>15</b>

**SEMESTER 2**

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Physics II (or PHYS 019)	4
CSE 021	Introduction to Computing II (or equivalent)	2
BIO 001	Contemporary Biology	4
ENGR 097	Service Learning: Engineering Projects in Community Service	1
<b>Semester Units</b>		<b>15</b>

**SEMESTER 3**

CHEM 002	General Chemistry	4
MATH 023	Multi-Variable Calculus	4
MATH 032	Probability and Statistics	4
ENGR 057	Dynamics	4
<b>Semester Units</b>		<b>16</b>

**SEMESTER 4**

ENGR 045	Introduction to Materials	4
MATH 024	Introduction to Linear Algebra and Differential	4
WRI 010	College Reading and Composition	4
	General Education Elective (Arts/Humanities)	4
ENGR 097	Service Learning: Engineering Projects in Community Service	1

**Semester Units 17**

**SEMESTER 5**

MSE 110	Solid State Materials Properties	4
ENGR 151	Strength of Materials	4
ENGR 130	Thermodynamics	3
CORE 100	The World at Home (or equivalent)	4
ENGR 197	Service Learning: Engineering Projects in Community Service	1

**Semester Units 16**

**SEMESTER 6**

ENGR 120	Fluid Mechanics	4
ENGR 155	Engineering Economics Analysis	3
MSE 111	Materials Processing	4
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	Technical Elective	3

**Semester Units 15**

**SEMESTER 7**

MSE 112	Materials Selection and Performance	3
MSE 113	Materials Characterization	4
ENGR 197	Service Learning: Engineering Projects in Community Service	1
	Technical Elective	3
	General Education Elective (Social/Cognitive Sciences)	4

**Semester Units 15**

**SEMESTER 8**

MSE 120	Materials Capstone Design	3
	Technical Elective	4
	Technical Elective	4
	Free Elective	3
ENGR 191	Professional Seminar	1

**Semester Units 15**

**Total Program Units 124**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## ■ Mechanical Engineering Major

The undergraduate major in Mechanical Engineering provides students with a solid foundation and the necessary skills to assume leadership roles in industry and government agencies. The major also offers a number of opportunities for students intending to continue their education in graduate school. Mechanical Engineering impacts society by developing innovative technologies through the application of analysis for the design and synthesis of mechanical components and systems. The employment opportunities for graduates in this field are many and diverse. Mechanical engineers are recruited in a variety of industries, including automotive, aerospace, power generation, environmental, electronics, bioengineering, food processing, and consulting firms, among many others. Because of the variety of fields that are relevant to this profession, the undergraduate program covers areas in dynamics, materials, thermal/fluids, vibrations, controls, computer aided engineering, design and manufacturing. The innovative curriculum at UC Merced provides hands-on education that exposes students to engineering fundamentals, laboratory work and the use of computational tools to solve realistic engineering problems.

The program also prepares students to pursue graduate work in engineering or other disciplines. Mechanical Engineering is an evolving discipline that adapts to the current needs of society. Some of the exciting current areas of research include advanced energy systems, sustainable energy, autonomous vehicles, biomechanics and biosensors, nano/micro-technology, computational modeling, design optimization and complex systems. The programs at UC Merced emphasize a highly interdisciplinary approach; thus the curriculum offers several technical electives in topics inside and outside the Mechanical Engineering program.

The program includes service learning components designed to engage students in the solution of real-world problems that are relevant to their community. The team projects resemble those found in actual engineering practice, with increasing responsibility as the participating students progress through the program. Engineers need to understand not only the technical but also the social and political contexts of their work. They must be able to communicate, and to plan, finance and market their products and ideas. Social sciences, business, humanities and arts courses are an important part of the curriculum. The result is a major that is creative, engaging and adaptable.

### Requirements for the Mechanical Engineering Major (ME)

The additional requirements that must be met to receive the B.S. in Mechanical Engineering at UC Merced include:

#### ENGINEERING FUNDAMENTALS [18 UNITS]

*The following fundamentals course is required by the School of Engineering:*

Engineering Economic Analysis (ENGR 155) . . . . . 3 units

Remaining engineering fundamentals courses for ME majors are:

Dynamics (ENGR 057) . . . . . 4 units  
 Introduction to Materials (ENGR 045) . . . . . 4 units  
 Strength of Materials (ENGR 151) . . . . . 4 units  
 Thermodynamics (ENGR 130) . . . . . 3 units

Other School of Engineering fundamentals courses may be substituted upon prior approval by major faculty.

#### MECHANICAL ENGINEERING CORE [30 UNITS]

The Mechanical Engineering core consists of 8 upper division courses designed to give all students a common foundation of core knowledge specific to the discipline.

Fluid Mechanics (ENGR 120) . . . . . 4 units  
 Component Design (ME 120) . . . . . 3 units  
 Heat Transfer (ENGR 135) . . . . . 4 units  
 Numerical Methods I (MATH 131) . . . . . 4 units  
 Finite Element Analysis (ME 135) . . . . . 3 units  
 Computer Aided Engineering (ME 137) . . . . . 4 units  
 Vibration and Control (ME 140) . . . . . 4 units  
 Capstone Design (ME 170) . . . . . 4 units

#### TECHNICAL ELECTIVES

Technical electives should be selected in a manner that is complementary to, yet integrated with, your major area of study, and should be determined through close interaction with your major area advisor. Examples of TE classes are:

Circuit Theory (ENGR 065) . . . . . 3 units  
 Mechatronics (ME 142) . . . . . 4 units  
 Meteorology and Air Pollution (ENVE 130) . . . . . 4 units  
 Air Pollution Control (ENVE 132) . . . . . 3 units  
 Sustainable Energy (ENVE 160) . . . . . 4 units  
 Modeling and Design of Energy Systems (ENVE 162) . . . . . 3 units  
 Introduction to Nanotechnology and Nanoscience (MSE 118) . . . 3 units

#### ADDITIONAL DEGREE REQUIREMENTS [6 UNITS]

Service Learning: Engineering Projects in Community Service (ENGR 097 or ENGR 197) . . . . . 4 units

#### Mechanical Engineering Learning Outcomes

Upon graduation, our students demonstrate:

- a. Ability to apply knowledge of informatics, mathematics, science, and engineering;
- b. Ability to design and conduct experiments and numerical simulations, analyze, and interpret general scientific and engineering information;
- c. Ability to design a system, component, or process to meet desired needs;
- d. Ability to solve multidisciplinary problems;
- e. Ability to identify, formulate, and solve engineering problems;
- f. Understanding of professional and ethical responsibilities;
- g. Ability to communicate effectively;
- h. The broad education necessary to understand the impact of engineering solutions in a social context;
- i. A sound basis and motivation to engage in lifelong learning and continuing education;
- j. Knowledge of contemporary issues;
- k. Ability to use the techniques, skills, and modern engineering and scientific tools necessary for engineering practice;
- l. Working knowledge of the principles of Mechanics and Thermodynamics and how these principles evolve into other disciplines such as Heat and Mass Transfer, Vibration and Control, Computational Engineering, Mechanical Design, etc.;



m. Ability to recognize new forms of thinking and new promising directions in engineering, and an understanding of modern tools of analysis, synthesis and design (such as neural networks, genetic algorithms, adaptive and bio-mimetic design, virtual environments, uncertainty in simulations, life-cycle analysis, etc.);

n. Ability to incorporate interdisciplinary concepts from mathematics, physics, biology, chemistry and other disciplines into engineering solutions and vice-versa;

o. A culminating design experience.

### SAMPLE PLAN OF STUDY FOR MECHANICAL ENGINEERING DEGREE

#### SEMESTER 1

CORE 001	The World at Home	4
CSE 020	Introduction to Computing I (or equivalent)	2
MATH 021	Calculus of a Single Variable I	4
PHYS 008	Introductory Physics I (or PHYS 018)	4
CORE 090X/ENGR 097	Freshman Seminar/Service Learning: Engineering Projects in Community Service*	1

**Semester Units** 15

#### SEMESTER 2

MATH 022	Calculus of a Single Variable II	4
CSE 021	Introduction to Computing II (or equivalent)	2
BIO 001	Contemporary Biology	4
PHYS 009	Introductory Physics II (or PHYS 019)	4
ENGR 097	Service Learning: Engineering Projects in Community Service*	1

**Semester Units** 15

#### SEMESTER 3

MATH 032	Probability and Statistics	4
CHEM 002	General Chemistry	4
MATH 023	Multi-Variable Calculus	4
ENGR 097	Service Learning: Engineering Projects in Community Service*	1
	Gen. Education Elective (Arts/Humanities)	4

**Semester Units** 17

WITH THE SMALL COMMUNITY, IT REALLY HAS ALLOWED ME TO PERSONALLY GET TO KNOW MY PEERS, FACULTY, ADMINISTRATORS, AND ESPECIALLY ABOUT MYSELF.

—Kim Che, Union City, Biological Sciences Major

#### SEMESTER 4

MATH 024	Introduction to Linear Algebra and Differential Equations	4
ENGR 045	Introduction to Materials	4
ENGR 057	Dynamics	4
WRI 010	College Reading and Composition	4
ENGR 097	Service Learning: Engineering Projects in Community Service*	1

**Semester Units** 17

#### SEMESTER 5

ENGR 130	Thermodynamics	3
ENGR 120	Fluid Mechanics (Lab)	4
ENGR 151	Strength of Materials (Lab)	4
MATH 131	Numerical Methods I	4
ENGR 197	Service Learning: Engineering Projects in Community Service*	1

**Semester Units** 16

#### SEMESTER 6

ME 120	Component Design	3
ME 135	Finite Element Analysis	3
ENGR 135	Heat Transfer* (Lab)	4
ENGR 197	Service Learning: Engineering Projects in Community Service*	1
	General Education Elective (Social/Cognitive Sciences)	4

**Semester Units** 15

#### SEMESTER 7

CORE 100	The World at Home (or equivalent)	4
ME 137	Computer Aided Engineering*	4
ENGR 155	Engineering Economic Analysis*	3
ENGR 065	Circuit Theory	3

**Semester Units** 14

#### SEMESTER 8

ME 170	Capstone Design*	4
ME 140	Vibration and Control (with Lab)	4
ENGR 191	Professional Seminar	1
	Technical Elective	3
	Technical Elective	3

**Semester Units** 15

**Total Program Units** 124

\* Design Component

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

# School Of Natural Sciences

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*The mission of the School of Natural Sciences is to share the joy of discovery of our natural world, to provide a stimulating environment that enables our students to better understand the scientific foundation of the world in which we live and to develop the skills of the next generation of leaders to meet the scientific challenges of the 21st century. Science, technology and innovation are the keys to future prosperity and quality of life.*

## THE SCHOOL OF NATURAL SCIENCES OFFERS THE FOLLOWING MAJORS:

- Applied Mathematical Sciences
- Biological Sciences
- Chemical Sciences
- Earth Systems Science
- Physics



### LETTER OF WELCOME FROM THE DEAN

Dear Science Students:

The UC Merced Natural Sciences faculty invites you to join one of the greatest adventures of all time—discovering how our universe works and applying this knowledge to improve human well-being. You live in an age of immense challenges and equally immense opportunities. Each year brings new crises in human health, energy production and natural resources, yet each year also brings stunning new scientific and technical advances that were unimaginable just a few years earlier. Entering the School of Natural Sciences is the first step towards joining the worldwide team of people working to develop and apply new scientific knowledge. A degree in the sciences opens the door to a vast array of exciting careers. Graduates from the UC Merced School of Natural Sciences will have practical skills to enter the high-tech job market directly, as well as the in-depth knowledge needed to succeed in professional schools or graduate programs. We have created a range of multidisciplinary majors in some of the most exciting and innovative areas of science: applied mathematical sciences, biological sciences (including tracks in molecular and cell biology, ecology and evolutionary biology, human biology, developmental biology and microbiology and immunology), chemical sciences, Earth systems sciences and physics.

I personally welcome you to the exciting world of science and invite you to visit me or any of our faculty members to talk about the many opportunities for you in the School of Natural Sciences.

Sincerely,

Maria Pallavicini  
Dean, School of Natural Sciences

THE MOST  
INCOMPREHENSIBLE  
THING ABOUT THE  
WORLD IS THAT IT IS  
COMPREHENSIBLE.

— ALBERT EINSTEIN (1879–1955)

## SCHOOL OF NATURAL SCIENCES REQUIREMENTS

All School of Natural Sciences students, regardless of major, are expected to meet the minimum requirements for the BS degree.

The School of Natural Sciences degree requirements are: At least 120, but not more than 150 semester units to include the following:

- At least 46 general education semester units.
- At least 60 semester units of upper division courses.

All courses required for completion of a major (or minor) in Natural Sciences must be passed with a grade of C- or better, not to include general education courses taken outside of Natural Sciences and Engineering.

## GENERAL EDUCATION REQUIREMENTS [46–48 UNITS]

School of Natural Sciences students are required to complete the following list of general education courses.

### MATH/SCIENCE PREPARATORY CURRICULA

Calculus of a Single Variable I (MATH 021)* . . . . .	4 units
Probability and Statistics course. . . . .	4 units
Introductory Physics I (PHYS 008* or PHYS 018) . . . . .	4 units
Computer Science Course. . . . .	2-4 units
General Chemistry I (CHEM 002). . . . .	4 units

\*Integrated Calculus/Physics (ICP 001, 008 units) may be taken in place of MATH 021 and PHYS 008

### GENERAL EDUCATION COURSES OUTSIDE OF NATURAL SCIENCES AND ENGINEERING

The World at Home I and II (CORE 1 and CORE 100). . . . .	8 units
College Reading and Composition (WRI 010) . . . . .	4 units
General Education elective in the Humanities or Arts. . . . .	4 units
General Education elective in the Social Sciences. . . . .	4 units
Two other General Education electives outside of Natural Sciences and Engineering . . . . .	8 units

(One General Education elective must emphasize written or oral communication and at least one must be an upper division course.)

Students in Natural Sciences have a freshman year that lays the foundation for further study in the majors. Students have the opportunity to explore the different UC Merced majors during that year through freshman seminars, research experiences and informal contact with faculty and graduate students. Currently freshman seminars are not required but highly encouraged for students within Natural Sciences. Taking a freshman seminar course and also participating in research experiences gives students the opportunity to work closely with faculty.

Two General Education courses, CORE 001 and CORE 100, The World at Home I and II, are common for all freshmen or sophomores entering UC Merced in the lower division. Transfer students entering in the upper division must take Core 100. These one semester courses lay the foundation in skills and ideals articulated in the UC Merced Guiding Principles for General Education (see General Education section of this catalog). These include decision-making, communication, ethics, responsibility, leadership, teamwork, aesthetic understanding, creativity and an appreciation of diverse perspectives in both the global and community contexts. All UC Merced students take CORE 001 during their freshman year and CORE 100 during their junior year.

Major area upper division courses and emphasis track requirements are unique to each major. These are presented in the following section on Majors.

## SCIENCE IS ABOUT DISCOVERY

*The scientist does not study nature because it is useful; he studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing, life would not be worth living.*

—JULES HENRI POINCARÉ (1854–1912)

Mathematics, physics, biology, chemistry and Earth systems science are the links to making discoveries about the natural world, the impact of human activities on that world and the impact of that world on human health. The academic programs in the School of Natural Sciences are designed to help students learn fundamental scientific principles in the context of the real world.

## SCIENCE IS ABOUT CREATIVITY, INNOVATION AND TECHNOLOGY

*Discovery consists in seeing what everyone else has seen and thinking what no one else has thought.*

—ALBERT SZENT-GYORGI (1893–1986)

Answering questions requires creativity and innovation—creativity to think about a problem in a different way; to design the strategy to, for example, discover the gene(s) responsible for asthma, cancer or cardiovascular disease; to generate ideas for new technologies. Students in the School of Natural Sciences receive the foundational learning to create innovative technologies to solve problems and implement solutions.

## SCIENCE IS ABOUT STEWARDSHIP OF OUR NATURAL RESOURCES

*A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community.*

—ALDO LEOPOLD (1887–1948)

Understanding and prediction must precede protection. Students in the School of Natural Sciences fully understand the complex interactions between the physical and biological world and the consequences of society's actions on the Earth and its biota. With this understanding, they are well positioned to manage and preserve our resources for future generations.

## SCIENCE IS ABOUT UNDERSTANDING THE HUMAN CONDITION

*Louis Pasteur's theory of germs is ridiculous fiction.*

—PIERRE PACHET, 1872

The understanding of science has improved and will continue to improve. Health and disease, prevention and treatment rely on understanding complex systems. Students in Natural Sciences at UC Merced are at the forefront of state-of-the-art research and technology to unravel biological complexity. They are the world's future scientists, healers and policy makers.



## PARTNERSHIP WITH KINGS CANYON, SEQUOIA AND YOSEMITE NATIONAL PARKS

On June 17, 2004, UC Merced signed a second five-year partnership agreement for education and research with Sequoia/Kings Canyon and Yosemite National Parks. In cooperation with schools in the San Joaquin Valley, the partnership has been sponsoring summer environmental education programs for high school students. With the dedication of the Sierra Nevada Research Institute Yosemite Field Station (pictured above), the partnership has kicked off a new phase of research collaboration that is advancing scientific and cultural understanding, meeting regional needs and enriching university and public education. Research buildings are also available in Sequoia/Kings Canyon National Parks.

### Transfer Students

**General Education:** For students with at least 45 transferable semester units who have completed and had certified the Intersegmental General Education Transfer Curriculum (IGETC), no additional lower division general education courses are required. All transfer students need to complete at least 7 units of upper division general education, including CORE 100, and may need to complete some lower division major preparation or prerequisite courses where equivalents are not offered at other institutions. Please consult [www.assist.org](http://www.assist.org) for suggested course equivalences.

Students with at least 45 transferable semester units, but without certified IGETC, can satisfy Natural Sciences general education requirements by including the following pattern of transferable, one semester courses within the 45 units:

- Two English composition courses;
- One mathematics course (a mathematics course that satisfies major preparation will satisfy this requirement);
- Three arts/humanities courses with at least one each in arts and humanities;
- Three social sciences courses in at least two disciplines;
- Two science courses, one each from biological sciences and physical sciences (sciences courses that satisfy major preparation will also satisfy this requirement).

Students who transfer with fewer than 45 transferable semester units will need to complete Natural Sciences general education requirements.

## Natural Science Majors

### ■ Applied Mathematical Sciences Major

Mathematics has been a central feature of humanity's intellectual achievements over the past several centuries. Its role in the physical sciences and engineering is well established and continues to aid in their development. Mathematics is also becoming increasingly important in the social and life sciences with a wide range of new applications requiring sophisticated mathematical techniques. Thus, the field of applied mathematical sciences is undergoing remarkable growth.

UC Merced offers an undergraduate major leading to a B.S. degree in the Applied Mathematical Sciences. This educational experience provides students with knowledge of the foundations of mathematics and the skills needed to apply mathematics to real-world phenomena in the social sciences, natural sciences and engineering. The curriculum is composed of courses in the fundamentals while allowing for building expertise in an application area through the emphasis tracks. There is a core set of courses all mathematical sciences students take. Beyond these classes, students complete an emphasis track consisting of courses in other fields. Some examples of emphasis tracks include physics, computational biology, economics, computer science and engineering, and engineering mechanics. New emphasis tracks will be added alongside new programs developing at UC Merced. Students may also design their own emphasis track with the approval of the faculty program leads for the Applied Mathematical Sciences major.

A degree in applied mathematical sciences opens the door to a wide variety of careers. Employers understand that a degree in mathematics means a student has been trained well in analytical reasoning and problem solving. Moreover, applied mathematical sciences majors with skills in scientific computing have the additional leverage of substantial computing experience. The market for applied mathematicians has usually been good, especially for those who can relate their mathematics to real world problems. In particular, applied mathematics majors familiar with concepts in management, biology, engineering, economics or the environmental sciences among others are well suited for many specialized positions. In addition, the breadth and rigor of this program provide an excellent preparation to teach mathematics at the elementary or high school levels.

### Requirements for the Applied Mathematical Sciences Major (MATH)

Students majoring in Applied Mathematical Sciences must adhere to all UC Merced and School of Natural Sciences requirements. For the Math/Science Preparatory Curricula, students majoring in Applied Mathematical Sciences must take:

MATH 021: Calculus I . . . . .	4 units
MATH 032: Probability & Statistics . . . . .	4 units
PHYS 008: Introductory Physics I . . . . .	4 units
CSE 020: Introduction to Computing . . . . .	4 units
CHEM 002: General Chemistry I . . . . .	4 units

**The additional requirements that must be met to obtain the B.S. degree in the Applied Mathematical Sciences at UC Merced are:**

Applied Mathematical Sciences Requirements (63-64 units): The Applied Mathematical Sciences major consists of 16 courses (5 or 7 lower division and 9 or 11 upper division, depending on the emphasis track chosen) designed to give all students a common foundation of core knowledge specific to the discipline, plus breadth in an application area.

**LOWER DIVISION COURSES [20 UNITS]**

BIO 001: Contemporary Biology, ESS 001: Introduction to Earth Systems Science or ESS 005: Introduction to Biological Earth Systems\* . . . 4 units  
 MATH 022: Calculus II . . . . . 4 units  
 MATH 023: Vector Calculus . . . . . 4 units  
 MATH 024: Linear Algebra and Differential Equations . . . . . 4 units  
 PHYS 009: Introductory Physics II. . . . . 4 units

\* For the Computational Biology emphasis track listed below, students must take BIO 001 and BIO 001L: Contemporary Biology Lab

**UPPER DIVISION COURSES [24 UNITS]**

MATH 121: Applied Math Methods I. . . . . 4 units  
 MATH 122: Applied Math Methods II . . . . . 4 units  
 MATH 131: Numerical Analysis I . . . . . 4 units  
 MATH 132: Numerical Analysis II. . . . . 4 units  
 MATH 141: Linear Analysis I . . . . . 4 units  
 MATH 142: Linear Analysis II. . . . . 4 units

**EMPHASIS TRACKS [19-20 UNITS]**

The student must complete at least 19 units of approved course work from other programs toward the completion of an emphasis track. At least 12 of these 19 units must be upper division courses. Some examples of emphasis tracks include physics, computational biology, economics, computer science and engineering, and engineering mechanics. These examples appear in the sample course plans below. More application themes will become available as new programs on campus develop. Students may design their own emphasis track with approval from the faculty program leads for the Applied Mathematical Sciences major.

**Additional Requirements for Physics Emphasis Track**

PHYS 010: Introductory Physics III . . . . . 4 units  
 PHYS 105: Analytical Mechanics Core . . . . . 4 units  
 PHYS 110: Electrodynamics Core. . . . . 4 units  
 PHYS 112: Statistical Mechanics Core . . . . . 4 units  
 PHYS 137: Quantum Mechanics Core . . . . . 4 units

**Additional Requirements for Computational Biology Emphasis Track**

BIO 100: The Molecular Machinery of Life. . . . . 4 units  
 BIO 175: Biostatistics. . . . . 4 units  
 BIO 180: Mathematical Modeling for Biology . . . . . 4 units  
 BIO 181: Survey of Computational Biology . . . . . 4 units  
 BIO 182: Bioinformatics . . . . . 4 units

**Additional Requirements for Economics Emphasis Track**

ECON 001: Introduction to Economics . . . . . 4 units  
 ECON 100: Intermediate Microeconomic Theory . . . . . 4 units  
 ECON 101: Intermediate Macroeconomic Theory . . . . . 4 units  
 ECON 130: Econometrics . . . . . 4 units  
 One additional upper division ECON course . . . . . 4 units

**Additional Requirements for Computer Science & Engineering Emphasis Track**

CSE 030: Introduction to Computer Science and Engineering I . . 4 units  
 CSE 031: Introduction to Computer Science and Engineering II . . 4 units  
 CSE 100: Algorithm Design and Analysis. . . . . 4 units  
 CSE 111: Database Systems . . . . . 4 units  
 CSE 160: Networking . . . . . 4 units

**Additional Requirements for Engineering Mechanics Emphasis Track**

ENGR 050: Statics . . . . . 2 units  
 ENGR 057: Dynamics . . . . . 3 units  
 ENGR 120: Fluid Mechanics . . . . . 4 units  
 ENGR 130: Thermodynamics. . . . . 3 units  
 ENGR 151: Strength of Materials . . . . . 4 units  
 ME 135 Finite Element Analysis. . . . . 3 units

**Transfer Students**

Transfer students who wish to major in Applied Mathematical Sciences should complete two semesters of calculus of a single variable, vector calculus, linear algebra and differential equations. In addition, transfer students should complete one semester of general chemistry with laboratory and two semesters of calculus-based physics with laboratory. Students should consult the online student transfer information system at [www.assist.org](http://www.assist.org). Students should also consult the Information for Prospective Students link on the School of Natural Sciences web site [naturalsciences.ucmerced.edu](http://naturalsciences.ucmerced.edu) for more information.

**Program Learning Outcomes for the Applied Mathematical Sciences Major**

The over-arching goal of the Applied Mathematical Sciences program is to *build a community of life-long learners that use the analytical and computational tools of mathematics to solve real-world problems.*

Upon graduating, we expect students completing the Applied Mathematical Sciences major to have become effective problem-solvers, meaning that student will be able to

1. Solve mathematical problems using analytical methods.
2. Solve mathematical problems using computational methods.
3. Recognize the relationships between different areas of mathematics and the connections between mathematics and other disciplines.
4. Give clear and organized written and verbal explanations of mathematical ideas to a variety of audiences.
5. Model real-world problems mathematically and analyze those models using their mastery of the core concepts.

**SAMPLE PLAN OF STUDY FOR APPLIED MATHEMATICAL SCIENCES DEGREE–PHYSICS EMPHASIS**

**SEMESTER 1**

MATH 021	Calculus I	4
PHYS 008	Introductory Physics I	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2
	Freshman Seminar*	1

**Semester Units**

**15**

**SEMESTER 2**

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Introductory Physics II	4
CHEM 002	General Chemistry I	4
WRI 010	College Reading and Composition	4

**Semester Units 16****SEMESTER 3**

MATH 023	Vector Calculus	4
MATH 032	Probability and Statistics	4
PHYS 010	Introductory Physics III	4
	General Education Elective (Arts/Humanities)	4

**Semester Units 16****SEMESTER 4**

MATH 024	Linear Algebra and Differential Equations	4
PHYS 105	Analytic Mechanics Core	4
BIO 001	Contemporary Biology**	4
	General Education Elective (Social/Cognitive Sciences)	4

**Semester Units 16****SEMESTER 5**

MATH 121	Applied Mathematical Methods I	4
PHYS 110	Electrodynamics Core	4
	General Education (communication)	4
	Free Elective	3

**Semester Units 15****SEMESTER 6**

MATH 122	Applied Mathematical Methods II	4
PHYS 112	Statistical Mechanics Core	4
CORE 100	The World at Home	4
	Free Elective	3

**Semester Units 15****SEMESTER 7**

MATH 131	Numerical Analysis I	4
MATH 141	Linear Analysis I	4
PHYS 137	Quantum Mechanics Core	4
	General Education Elective	4

**Semester Units 16****SEMESTER 8**

MATH 132	Numerical Analysis II	4
MATH 142	Linear Analysis II	4
	Upper division sciences/engineering elective	4
	Free Elective	3

**Semester Units 15****Total Program Units 124**

\* Freshman Seminar is an optional course; it is not required for Applied Math majors.

\*\* or ESS 001 Introduction to Earth Systems Science or ESS 005 Introduction to Biological Earth Systems.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**PLAN OF STUDY FOR APPLIED MATHEMATICAL SCIENCES DEGREE—COMPUTATIONAL BIOLOGY EMPHASIS****SEMESTER 1**

MATH 021	Calculus I	4
BIO 001	Contemporary Biology	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2
	Freshman Seminar*	1

**Semester Units 15****SEMESTER 2**

MATH 022	Calculus of a Single Variable II	4
PHYS 008	Introductory Physics I	4
CHEM 002	General Chemistry I	4
WRI 010	College Reading and Composition	4

**Semester Units 16****SEMESTER 3**

MATH 023	Vector Calculus	4
PHYS 009	Introductory Physics II	4
BIO 100	The Molecular Machinery of Life	4
	General Education Elective (Humanities and Arts)	4

**Semester Units 16****SEMESTER 4**

MATH 024	Linear Algebra and Differential Equations	4
MATH 032	Probability and Statistics	4
BIO 180	Mathematical Modeling for Biology	4
	General Education Elective (Social and Cognitive Sciences)	4

**Semester Units 16****SEMESTER 5**

MATH 121	Applied Mathematical Methods I	4
BIO 175	Biostatistics	4
	General Education (communication)	4
	Free Elective	3

**Semester Units 15****SEMESTER 6**

MATH 122	Applied Mathematical Methods II	4
BIO 181	Survey of Computational Biology	4

CORE 100	The World at Home	4
	Free Elective	3

**Semester Units** **15**

### SEMESTER 7

MATH 131	Numerical Analysis I	4
MATH 141	Linear Analysis I	4
BIO 182	Bioinformatics	4
	General Education Elective	4

**Semester Units** **16**

### SEMESTER 8

MATH 132	Numerical Analysis II	4
MATH 142	Linear Analysis II	4
	Upper division Science/Engineering Elective	4
	Free Elective	3

**Semester Units** **15**

**Total Program Units 1** **24**

\* Freshman Seminar is an optional course; it is not required for Applied Math majors.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## SAMPLE PLAN OF STUDY FOR APPLIED MATHEMATICAL SCIENCES DEGREE—ECONOMICS EMPHASIS TRACK

### SEMESTER 1

MATH 021	Calculus 1	4
PHYS 008	Introductory Physics I	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2
	Freshman Seminar*	1

**Semester Units** **15**

### SEMESTER 2

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Introductory Physics II	4
CHEM 002	General Chemistry I	4
WRI 010	College Reading and Composition	4

**Semester Units** **16**

### SEMESTER 3

MATH 023	Multi-Variable Calculus	4
ECON 001	Introduction to Economics**	4
BIO 001	Contemporary Biology***	4
	General Education Elective (Humanities and Arts) 4	

**Semester Units** **16**

### SEMESTER 4

MATH 024	Linear Algebra and Differential Equations	4
MATH 032	Probability and Statistics	4
ECON 101	Intermediate Macroeconomic Theory	4
	General Education Elective (Social and Cognitive Sciences)	4

**Semester Units** **16**

### SEMESTER 5

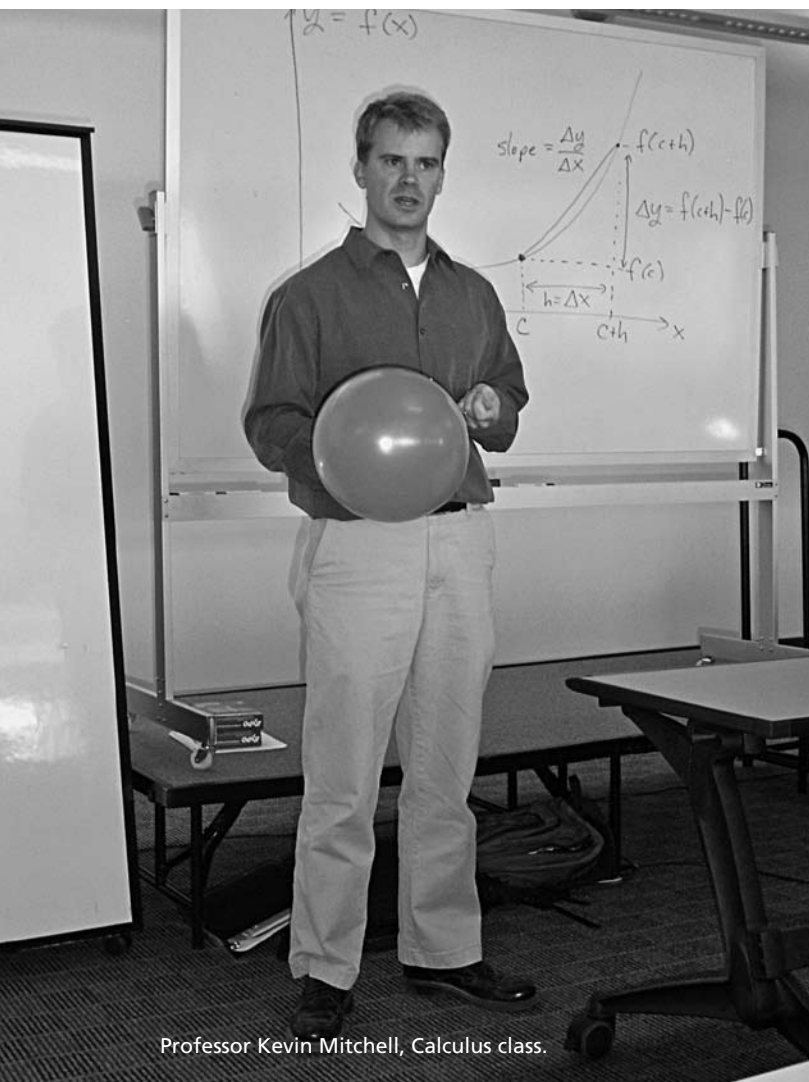
MATH 121	Applied Mathematical Methods I	4
ECON 100	Intermediate Microeconomic Theory	4
	General Education (communication)	4
	Free Elective	3

**Semester Units** **15**

### SEMESTER 6

MATH 122	Applied Mathematical Methods II	4
ECON 130	Econometrics	4
CORE 100	The World at Home	4
	Free Elective	3

**Semester Units** **15**



Professor Kevin Mitchell, Calculus class.

**SEMESTER 7**

MATH 131	Numerical Analysis I	4
MATH 141	Linear Analysis I	4
	Upper Division ECON course	4
	General Education Elective	4

**Semester Units** 16

**SEMESTER 8**

MATH 132	Numerical Analysis II	4
MATH 142	Linear Analysis II	4
	Upper division Science/Engineering Elective	4
	Free Elective	3

**Semester Units** 15

**Total Program Units** 124

\* Freshman Seminar is an optional course; it is not required for Applied Math majors.

\*\* ECON 001 can be used to satisfy a Social and Cognitive Sciences General Education Requirement.

\*\*\* Or ESS 001 Introduction to Earth Systems Science or ESS 005 Introduction to Biological Earth Systems.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**SAMPLE PLAN OF STUDY FOR APPLIED MATHEMATICAL SCIENCES DEGREE—COMPUTER SCIENCE AND ENGINEERING EMPHASIS TRACK**

**SEMESTER 1**

MATH 021	Calculus 1	4
PHYS 008	Introductory Physics I	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2
	Freshman Seminar*	1

**Semester Units** 15

**SEMESTER 2**

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Introductory Physics II	4
CHEM 002	General Chemistry I	4
WRI 010	College Reading and Composition	4

**Semester Units** 16

**SEMESTER 3**

MATH 023	Multi-Variable Calculus	4
CSE 030	Introduction to Computer Science And Engineering I	4
BIO 001	Contemporary Biology**	4
	General Education Elective (Arts/Humanities)	4

**Semester Units** 16

**SEMESTER 4**

MATH 024	Linear Algebra and Differential Equations	4
CSE 031	Introduction to Computer Science And Engineering II	4
MATH 032	Probability and Statistics	4
	General Education Elective (Social/Cognitive Sciences)	4

**Semester Units** 16

**SEMESTER 5**

MATH 121	Applied Mathematical Methods I	4
CSE 100	Algorithm Design and Analysis	4
	General Education (communication)	4
	Free Elective	3

**Semester Units** 15

**SEMESTER 6**

MATH 122	Applied Mathematical Methods II	4
CSE 111	Database Systems	4
CORE 100	The World at Home	4
	Free Elective	3

**Semester Units** 15

**SEMESTER 7**

MATH 131	Numerical Analysis I	4
CSE 160	Networking	4
MATH 141	Linear Analysis I	4
	General Education Elective	4

**Semester Units** 16

**SEMESTER 8**

MATH 132	Numerical Analysis II	4
MATH 142	Linear Analysis II	4
	Upper division Science/Engineering Elective	4
	Free Elective	3

**Semester Units** 15

**Total Program Units** 124

\* Freshman Seminar is an optional course; it is not required for Applied Math majors.

\*\* Or ESS 001 Introduction to Earth Systems Science or ESS 005 Introduction to Biological Earth Systems.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.



## SAMPLE PLAN OF STUDY FOR APPLIED MATHEMATICAL SCIENCES DEGREE—ENGINEERING MECHANICS EMPHASIS TRACK

### SEMESTER 1

MATH 021	Calculus 1	4
PHYS 008	Introductory Physics I	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2
	Freshman Seminar*	1

**Semester Units** 15

### SEMESTER 2

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Introductory Physics II	4
CHEM 002	General Chemistry I	4
WRI 010	College Reading and Composition	4

**Semester Units** 16

### SEMESTER 3

MATH 023	Vector Calculus	4
ENGR 050	Statics	2
BIO 001	Contemporary Biology**	4
	General Education Elective (Arts/Humanities)	4

**Semester Units** 14

### SEMESTER 4

MATH 024	Linear Algebra and Differential Equations	4
MATH 032	Probability and Statistics	4
ENGR 057	Dynamics	3
	General Education Elective (Social/Cognitive Sciences)	4

**Semester Units** 15

### SEMESTER 5

MATH 121	Applied Mathematical Methods I	4
MATH 131	Numerical Analysis I	4
	General Education (communication)	4
ENGR 130	Thermodynamics	3

**Semester Units** 15

### SEMESTER 6

MATH 122	Applied Mathematical Methods II	4
MATH 132	Numerical Analysis II	4
CORE 100	The World at Home	4
	Free Elective	3

**Semester Units** 15

### SEMESTER 7

MATH 141	Linear Analysis I	4
ENGR 151	Strength of Materials	4
ME 135	Finite Element Analysis	3

General Education Elective 4

**Semester Units** 15

### SEMESTER 8

MATH 142	Linear Analysis II	4
ENGR 120	Fluid Mechanics	4
	Upper division Science/Engineering Elective	4
	Free Elective	3

**Semester Units** 15

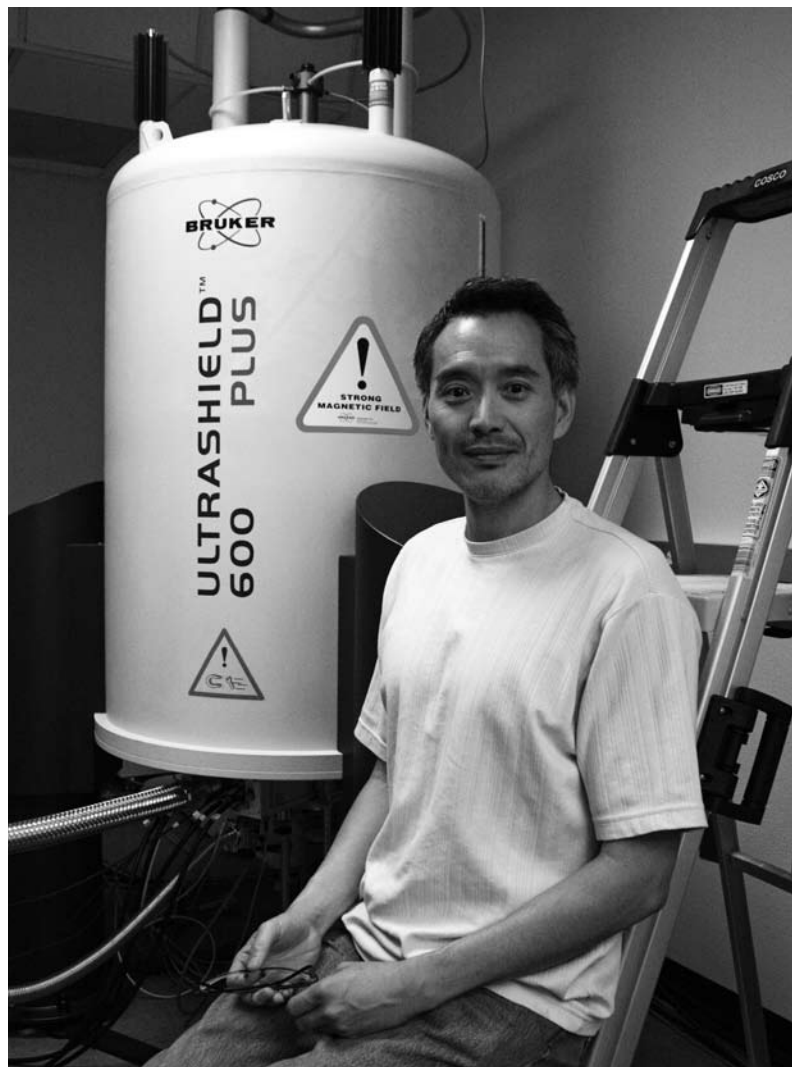
**Total Program Units** 120

\* Freshman Seminar is an optional course; it is not required for Applied Math majors.

\*\* Or ESS 001 Introduction to Earth Systems Science or ESS 005 Introduction to Biological Earth Systems.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

Professor Andy LiWang next to a nuclear magnetic resonance spectrometer.



## ■ Biological Sciences Major

The Biological Sciences address many of the most important and fundamental questions about our world: What is life? How does our brain produce our ideas and emotions? What are the limits to human life and physical capabilities? How do we feed the world's growing population? Could medical science ensure that our children won't have to worry about disease? Moreover, there has never been a more exciting and important time to study biology. From the mapping of the genome to understanding the molecular basis of human disease to predicting the effects of global climate change on ecosystems to understanding fundamental processes that produce and sustain life on Earth, the Biological Sciences are at the forefront of finding answers to some of society's most vexing problems.

The undergraduate major in Biological Sciences is an excellent first step towards exciting careers in biology and the health sciences. Graduates of this program will also be well prepared for positions in the biotechnology and pharmaceutical industries, health care, conservation, environmental law and policy, and natural resources management (including forest and park services), as well as careers such as journalism, public policy and business, which increasingly involve the biological sciences. In addition, the breadth and rigor of this program are an excellent preparation for graduates to teach science at the elementary or high school levels.

This program teaches biology as a multidisciplinary science, reflecting the increasing role of chemistry, physics, mathematics, computer science and advanced technologies in the life sciences. Students majoring in Biological Sciences can choose between five emphasis tracks providing backgrounds in different areas of biology: Molecular and Cell Biology, Ecology and Evolutionary Biology, Human Biology, Developmental Biology and Microbiology and Immunology. These emphasis tracks consist of a sequence of five or six upper division courses that are taken in the second, third and fourth years of the program.

### Requirements for the Biological Sciences Major

In addition to adhering to the UC Merced and School of Natural Sciences requirements, the requirements that must be met to receive the B.S. in Biological Sciences at UC Merced are:

### BIOLOGICAL SCIENCES REQUIREMENTS [63–75 UNITS]

The Biological Sciences major consists of 17 courses (7 lower division and 9 or 10 upper division, depending on the emphasis track) designed to give all students a common foundation of core knowledge specific to the discipline.

### LOWER DIVISION MAJOR REQUIREMENTS [29 UNITS]

Contemporary Biology (BIO 001) . . . . . 4 units  
Contemporary Biology Lab (BIO 001L) . . . . . 1 unit  
The Cell (BIO 110) . . . . . 4 units  
Principles of Organic Chemistry (CHEM 008) . . . . . 4 units  
General Chemistry II (CHEM 010) . . . . . 4 units  
Calculus II for Biological Sciences (MATH 030) . . . . . 4 units  
Probability and Statistics (MATH 032 or 018,  
ENVE 105, PSY 010) . . . . . 4 units  
Introductory Physics II for Biological Sciences (PHYS 019) . . . . . 4 units

### EMPHASIS TRACK COURSES [16–21 UNITS]

*(Details on the Emphasis Tracks are given in next section)*

- Molecular and Cell Biology: 4 courses

- Human Biology: 4 courses
- Ecology and Evolutionary Biology: 4 courses
- Developmental Biology: 5 courses
- Microbiology and Immunology: 5 courses

### UPPER DIVISION ELECTIVE COURSES [8-17 UNITS]

Two to four thematically linked courses chosen from the emphasis track elective list in the next section.

### ADDITIONAL UPPER DIVISION COURSES [3–4 UNITS]

One science or engineering course . . . . . 3-4 units

### Undergraduate Major in Biological Sciences Research

As a capstone to the Biological Sciences Program, all Biological Sciences majors are encouraged to participate in a research experience. Students attend research lectures by UC Merced faculty, and students can elect to go on to participate in research projects during their senior year. The relevant course numbers are BIO 190 and BIO 195.

### Transfer Students

Transfer students who wish to major in Biological Sciences should complete one year of calculus, one semester of calculus based physics, one year of general chemistry, a probability and statistics course and two to three semesters of general biology. Students should consult the online student-transfer information system at [www.assist.org](http://www.assist.org). Students should also consult the Information for Prospective Students link on the School of Natural Sciences web site [naturalsciences.ucmerced.edu](http://naturalsciences.ucmerced.edu) for more information.

### BIOLOGICAL SCIENCES EMPHASIS TRACKS (BIO)

#### I. Molecular and Cell Biology

The Molecular and Cell Biology (MCB) emphasis track provides students with the skills and knowledge to pursue studies in graduate programs and professional schools in preparation for careers in basic and applied biological research and medicine. MCB emphasizes the molecular and cellular principles that underlie all terrestrial life, as well as the genetic and evolutionary concepts explaining the diversity and unity of life. These topics form the foundation of modern health sciences and biomedical research.

### MOLECULAR AND CELL BIOLOGY CORE COURSES [17 UNITS]

Introduction to Molecular Biology (BIO 002) . . . . . 4 units  
Introduction to Molecular Biology Lab (BIO 002L) . . . . . 1 unit  
Genetics (BIO 140) . . . . . 4 units  
Evolution (BIO 141) . . . . . 4 units  
Quantitative Biology Elective . . . . . 4-5 units

#### Quantitative Biology Elective list below:

- BIO 104 Biophysics
- BIO 105 Enzymology
- BIO 142 Genomics
- BIO 175 Biostatistics
- BIO 180 Mathematical Modeling for Biology
- BIO 181 Introduction to Biomolecular Modeling
- BIO 182 Bioinformatics
- BIO 183 Population Genetics

**At least four courses chosen from the Molecular and Cell Biology elective list below:**

One course with Laboratory component . . . . . 5 units  
Three additional courses . . . . . 12 units minimum

**Select one of the courses:**

BIO 101 – Biochemistry  
BIO 102 – Advanced Biochemistry and Molecular Biology  
BIO 104 – Biophysics  
BIO 104L – Biophysics Laboratory  
BIO 105 – Enzymology  
BIO 105L – Enzymology Laboratory  
BIO 107 – Physical Biochemistry  
BIO 111 – Cells, Tissues and Organs  
BIO 120 – General Microbiology  
BIO 120L – General Microbiology Laboratory  
BIO 122 – Pathogenesis  
BIO 124 – Microbial Evolution  
BIO 127 – Virology  
BIO 130 – Plant Biology  
BIO 134 – Marine Sciences Theory and Practice  
BIO 142 – Genome Biology  
BIO 143 – Biodiversity  
BIO 144 – Phylogenetics  
BIO 144L – Phylogenetics Laboratory  
BIO 150 – Embryos, Genes and Development  
BIO 151 – Molecular Immunology  
BIO 151L – Molecular Immunology Laboratory  
BIO 152 – Cancer Genetics and Tumor Biology  
BIO 153 – Evolution and Development  
BIO 160 – Comparative Physiology  
BIO 160L – Comparative Physiology Laboratory  
BIO 161 – Human Physiology  
BIO 163 – Endocrinology  
BIO 170 – Neurobiology  
BIO 170L – Neurobiology Laboratory  
BIO 175 – Biostatistics  
BIO 180 – Mathematical Modeling for Biology  
BIO 181 – Introduction to Biomolecular Simulation  
BIO 182 – Bioinformatics  
BIO 183 – Population Genetics

**II. Human Biology**

The Human Biology (HB) emphasis track provides students with a rich education in the scientific principles that underlie modern health sciences. This major is an excellent preparation for entrance into health-related professional careers including medicine, dentistry, pharmacy, genetic counseling, health education, public

health, clinical psychology, epidemiology, environmental health sciences and health administration, among others. The Human Biology emphasis track also provides a strong foundation for careers in biomedical research, and includes the courses most broadly required for advanced study in health sciences.

**HUMAN BIOLOGY CORE COURSES [16 UNITS]**

Genetics (BIO 140) . . . . . 4 units  
Biochemistry I\* (BIO 101) . . . . . 4 units  
Evolution (BIO 141). . . . . 4 units  
Human Physiology (BIO 161). . . . . 4 units  
\*requires CHEM 100, a 3 unit course

**At least four courses chosen from the Human Biology elective list below:**

One upper division Cognitive Science Course  
(requires COGS 001 or PSY 001) . . . . . 4 units  
Three additional courses . . . . . 2 units minimum

**Select one of the courses:**

ANTH 100 – History of Anthropological Thought and Practice  
ANTH 114 – Social Memory  
ANTH 120 – Introduction to Medical Anthropology  
ANTH 121 – Ethnomedicine  
ANTH 130 – Archaeology of Colonialism  
ANTH 155 – Paleodemography  
ANTH 160 – Human Origins  
ANTH 162 – Growth, Development and Human Evolution  
ANTH 169 – Trends in Biological Anthropology  
ANTH 172 – Ethnohistory  
BIO 104 – Biophysics  
BIO 104L – Biophysics Laboratory  
BIO 105 – Enzymology  
BIO 107 – Physical Biochemistry  
BIO 111 – Cells, Tissues and Organs  
BIO 122 – Microbial Pathogenesis  
BIO 123 – Human Parasitology  
BIO 125 – Emerging Public Health Threats  
BIO 127 – Virology  
BIO 142 – Genome Biology  
BIO 150 – Embryos, Genes and Development  
BIO 151 – Molecular Immunology  
BIO 151L – Molecular Immunology Laboratory  
BIO 152 – Cancer Genetics and Tumor Biology  
BIO 164 - Human Anatomy  
BIO 170 – Neurobiology  
BIO 170L – Neurobiology Laboratory  
BIO 175 – Biostatistics  
BIO 180– Mathematical Modeling for Biology  
BIO 181 – Introduction to Biomolecular Simulation  
BIO 182 – Bioinformatics

- COGS 101 – Mind, Brain and Computation  
(requires COGS 001 or PSY 001)
- COGS 103 – Introduction to Neural Networks in Cognitive  
Science (requires COGS 001 or PSY 001)
- PSY 121 – Cognitive Psychology
- PSY 123 – Alcohol, Drugs and Behavior
- PSY 130 – Developmental Psychology
- PSY 140 – Clinical Psychology
- PSY 145 – Human Sexuality
- PSY 180 – Physiological Psychology

- BIO 160 – Comparative Physiology (L)
- BIO 162 – Biomechanics
- BIO 163 – Endocrinology
- BIO 163 L – Endocrinology Laboratory
- BIO 170 – Neurobiology
- BIO 170L – Neurobiology Laboratory
- BIO 180 – Mathematical Modeling for Biology
- BIO 181 – Introduction to Biomolecular Simulation
- BIO 182 – Bioinformatics
- BIO 183 – Population Genetics
- ESS 120 – Introduction to Ecological and Environmental  
Microbiology
- ESS 124 – Terrestrial Ecosystem Ecology
- ESS 128 – Theoretical Ecology

### III. Ecology and Evolutionary Biology

The Ecology and Evolutionary Biology (EEB) emphasis track prepares students for careers in areas of biology that lead to a more comprehensive understanding of biological processes that range across the mechanistic, organismal, population, community and ecosystem levels. Ecology and Evolutionary Biology incorporates multidisciplinary approaches to address biological questions in an evolutionary framework. Areas of research in Ecology and Evolutionary Biology include behavioral ecology, biomechanics, comparative anatomy and physiology, conservation biology, developmental genetics, ecology, population genetics, plant biology, molecular evolution, organismal interactions (e.g., plant-animal), paleobiology, phylogenetics, quantitative genetics and systematics.

#### ECOLOGY AND EVOLUTIONARY BIOLOGY CORE COURSES [17 UNITS]

Introduction to Molecular Biology (BIO 002) . . . . .	4 units
Introduction to Molecular Biology Lab (BIO 002L) . . . . .	1 unit
Genetics (BIO 140) . . . . .	4 units
Evolution (BIO 141) . . . . .	4 units
Ecology (BIO 148) . . . . .	4 units

#### At least four courses chosen from the Ecology and Evolutionary Biology elective list below:

One course with Field component . . . . .	5 units
One course with Laboratory component . . . . .	5 units
Two additional courses . . . . .	8 units minimum

#### Select one of the courses:

- BIO 107 – Physical Biochemistry
- BIO 111 – Cells, Tissues, Organs
- BIO 124 – Microbial Evolution
- BIO 134 – Marine Sciences (F)
- BIO 142 – Genome Biology (L)
- BIO 143 – Biodiversity
- BIO 143F – Biodiversity and the Tree of Life Field
- BIO 144 – Phylogenetics
- BIO 144L – Phylogenetics Laboratory
- BIO 146 – Paleobiology
- BIO 147 – Astrobiology
- BIO 149 – Conservation Biology
- BIO 149F – Conservation Biology Laboratory (satisfies Field  
component requirement)
- BIO 153 – Evolution & Development

### IV. Developmental Biology

Developmental Biology (DB) emphasis track provides students with an understanding of the mechanisms that govern the generation of unique cell types and the assembly of cells into complex organisms. In addition to a strong foundation in genetics, cell biology and molecular biology, students can choose specialized courses covering topics such as immune system development, nervous system development, and the evolution of developmental mechanisms. Training in DB prepares students for careers in all aspects of the health sciences and biological research, particularly in the fields of stem cell biology, cancer biology, evolutionary biology, and regenerative medicine.

#### DEVELOPMENTAL BIOLOGY CORE COURSES [21 UNITS]

Introduction to Molecular Biology (BIO 002) . . . . .	4 units
Introduction to Molecular Biology Lab (BIO 002L) . . . . .	1 unit
Genetics (BIO 140) . . . . .	4 units
Evolution (BIO 141) . . . . .	4 units
Embryos Genes and Development (BIO 150) . . . . .	4 units
Quantitative Biology Elective . . . . .	4-5 units

#### Quantitative Biology Elective list below:

- BIO 104 – Biophysics
- BIO 105 – Enzymology
- BIO 142 – Genomics
- BIO 175 – Biostatistics
- BIO 180 – Mathematical Modeling for Biology
- BIO 181 – Introduction to Biomolecular Modeling
- BIO 182 – Bioinformatics
- BIO 183 – Population Genetics

#### At least three courses chosen from the Developmental Biology elective list below:

One course with Laboratory component . . . . .	5 units
Two additional courses . . . . .	8 units minimum

#### Select one of the courses:

- BIO 101 – Biochemistry I
- BIO 102 – Advanced Biochemistry and Molecular Biology

BIO 104 – Biophysics  
 BIO 104 – Biophysics Laboratory  
 BIO 107 – Physical Biochemistry  
 BIO 111 – Cells, Tissues and Organs‡  
 BIO 120 – General Microbiology  
 BIO 120L – General Microbiology Laboratory  
 BIO 124 – Microbial Evolution  
 BIO 130 – Plant Biology  
 BIO 142 – Genome Biology  
 BIO 151 – Molecular Immunology  
 BIO 151L – Molecular Immunology Laboratory  
 BIO 152 – Cancer Genetics and Tumor Biology  
 BIO 153 – Evolution and Development‡  
 BIO 160 – Comparative Physiology  
 BIO 160L – Comparative Physiology Laboratory  
 BIO 161 – Human Physiology  
 BIO 163 – Endocrinology  
 BIO 164 – Human Anatomy  
 BIO 170 – Neurobiology  
 BIO 170L – Neurobiology Lab  
 BIO 180 – Mathematical Modeling for Biology  
 BIO 181 – Introduction to Biomolecular Simulation  
 BIO 182 – Bioinformatics  
 BIOE 114 – Tissue Engineering Design

‡ Recommended Elective Courses: at least one of the DB Elective Courses must be from this group.

## V. Microbiology and Immunology

Students in the Microbiology and Immunology (MBI) emphasis track study the diversity, structure, evolution, method of transmission, replication, epidemiology and mechanism of pathogenesis of microorganisms and their interplay with the host immune system. Related topics in bioterrorism, environmental microbiology, drug resistance, development of the immune system, applications in biotechnology and their political and socioeconomic ramifications are also explored. A student in the Microbiology and Immunology emphasis track will have many career options including work in research, education, the pharmaceutical industry, regulatory agencies or health-related professions.

**AT UC MERCED I'VE LEARNED A LOT ABOUT MYSELF. WHAT I CAN CONTRIBUTE TO SOCIETY AND HOW I CAN START.**

—Stacy Vang, Biological Sciences Major

## MICROBIOLOGY AND IMMUNOLOGY CORE COURSES [22 UNITS]

Introduction to Molecular Biology (BIO 002) . . . . . 4 units  
 Introduction to Molecular Biology Lab (BIO 002L) . . . . . 1 unit  
 Biochemistry I\* (BIO 101) . . . . . 4 units  
 General Microbiology (BIO 120) † . . . . . 4 units  
 General Virology (BIO 127) . . . . . 4 units  
 Molecular Immunology (BIO 151) † . . . . . 4 units

\*Requires CHEM 100, a 3 unit course.

† One must be taken with the corresponding Laboratory component 1 unit.

### At least two courses chosen from the Microbiology and Immunology elective list below:

Two additional courses . . . . . 8 units minimum

#### Select one of the courses:

BIO 102 – Advanced Molecular Biology and Biochemistry  
 BIO 105 – Enzymology  
 BIO 107 – Physical Biochemistry  
 BIO 111 – Cells, Tissues and Organs  
 BIO 122 – Microbial Pathogenesis‡  
 BIO 123 – Human Parasitology‡  
 BIO 124 – Microbial Evolution  
 BIO 125 – Emerging Public Health Threats‡  
 BIO 140 – Genetics  
 BIO 141 – Evolution  
 BIO 142 – Genome Biology  
 BIO 150 – Embryos, Genes and Development  
 BIO 152 – Cancer Genetics and Tumor Biology‡  
 BIO 154 – Developmental Immunology‡  
 BIO 170 – Neurobiology  
 BIO 180 – Mathematical Modeling for Biology  
 BIO 181 – Introduction to Biomolecular Simulation  
 BIO 182 – Bioinformatics

‡ Recommended Elective Courses: at least one of the MBI Elective Courses must be from this group.

### Program Learning Outcomes for the Biology Major

Graduates from the Biological Sciences programs will have demonstrated:

1. An understanding of the tenets of modern biology and an understanding of how cellular functions are integrated from the molecular level to the cellular level, through to the level of organism and functioning ecosystems.
2. An ability to develop and critique hypotheses and to design experiments, models, and/or calculations to address these hypotheses.
3. The ability to use appropriate instrumentation and computational tools to collect, analyze and interpret data.
4. The ability to read, evaluate, interpret, and apply numerical and general scientific information.
5. A familiarity with and application of safety in good laboratory and field practices.

## SAMPLE PLAN FOR THE MOLECULAR AND CELL BIOLOGY EMPHASIS TRACK

### SEMESTER 1

BIO 001	Contemporary Biology	4
BIO 001L	Contemporary Biology Lab	1
CORE 001	The World at Home	4
CHEM 002	General Chemistry I	4

**Semester Units 13**

### SEMESTER 2

MATH 021	Calculus of a Single Variable I	4
CHEM 010	General Chemistry II	4
WRI 010	College Reading and Composition	4
	Freshman Seminar*	1

**Semester Units 13**

### SEMESTER 3

BIO 002	Introduction to Molecular Biology	4
BIO 002L	Introduction to Molecular Biology Lab	1
MATH 030	Calculus of a Single Variable II for Biological Sciences	4
CHEM 008	Principles of Organic Chemistry	4
	General Education Elective (Arts/Humanities)	4

**Semester Units 17**

### SEMESTER 4

BIO 110	The Cell	4
	Probability and Statistics	4
PHYS 018	Introductory Physics I for Biological Sciences	4
MATH 015	Introduction to Scientific Data Analysis	2
	Free Elective	4

**Semester Units 18**

### SEMESTER 5

BIO 140	Genetics	4
MCB Elective	Course	4
PHYS 019	Introductory Physics II for Biological Sciences	4
	General Education Elective (communication)	4

**Semester Units 16**

### SEMESTER 6

BIO 141	Evolution	4
	MCB Elective Course	4
CORE 100	The World at Home	4
	General Education Elective (social sciences)	4

**Semester Units 16**

### SEMESTER 7

	MCB Elective Course (w/ Lab)	5
	Computational Biology Elective	4
BIO 195	Research Projects in Biological Sciences*	2
	General Education Elective	4

**Semester Units 15**

### SEMESTER 8

	MCB Elective Course	4
	Science/Math/Engineering Elective	4
BIO 195	Research Projects in Biological Sciences*	2
BIO 190	Research Seminar*	1
	Free Elective	4

**Semester Units 15**

**Total Program Units 123**

\* Optional courses for BIO major.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## SAMPLE PLAN FOR THE HUMAN BIOLOGY EMPHASIS TRACK

### SEMESTER 1

BIO 001	Contemporary Biology	4
BIO 001L	Contemporary Biology Lab	1
CORE 001	The World at Home	4
CHEM 002	General Chemistry I	4

**Semester Units 13**

### SEMESTER 2

MATH 021	Calculus of a Single Variable I	4
CHEM 010	General Chemistry II	4
WRI 010	College Reading and Composition	4

**Semester Units 12**

### SEMESTER 3

BIO 140	Genetics	4
CHEM 008	Principles of Organic Chemistry	4
MATH 030	Calculus of a Single Variable II for Biological Sciences	4
	General Education Elective (Arts/Humanities)	4

**Semester Units 16**

### SEMESTER 4

CHEM 100	Organic Synthesis and Mechanism	3
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PHYS 018	Introductory Physics I for Biological Sciences	4
MATH 015	Introduction to Scientific Data Analysis	2
MATH 032	Probability and Statistics	4
COGS 001	Introduction to Cognitive Science (fulfills Social Science GE)**	4

**Semester Units 17**

### SEMESTER 5

BIO 101	Biochemistry I	4
	HB Elective Course	4
PHYS 019	Introductory Physics II for Biological Sciences	4
	General Education Elective (communication)	4

**Semester Units 16**

### SEMESTER 6

BIO 110	The Cell	4
BIO 141	Evolution	4
	UD Cognitive Science Course	4
CORE 100	The World at Home	4

**Semester Units 16**

### SEMESTER 7

BIO 161	Human Physiology	4
	HB Elective Course	4
	General Education Elective	4
BIO 195	Research Projects in Biological Sciences*	2

**Semester Units 14**

### SEMESTER 8

	HB Elective Course	4
	Math/Science/Engineering Elective	4
	Free Elective	4
BIO 195	Research Projects in Biological Sciences*	2
BIO 190	Research Seminar*	1

**Semester Units 15**

**Total Program Units 120**

\* Optional courses for BIO major.

\*\* Or PSY 001, Introduction to Psychology. COGS 001 is required to take COGS 101.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## SAMPLE PLAN FOR THE ECOLOGY AND EVOLUTIONARY BIOLOGY EMPHASIS TRACK

### SEMESTER 1

BIO 001	Contemporary Biology	4
BIO 001L	Contemporary Biology Lab	1
CHEM 002	General Chemistry I	4

CORE 001	The World at Home	4
	Freshman Seminar*	1

**Semester Units 14**

### SEMESTER 2

MATH 021	Calculus of a Single Variable I	4
CHEM 010	General Chemistry II	4
WRI 010	College Reading and Composition	4
	Computer Science Course**	2

**Semester Units 14**

### SEMESTER 3

BIO 002	Introduction to Molecular Biology	4
BIO 002L	Introduction to Molecular Biology Lab	1
MATH 030	Calculus of a Single Variable II for Biological Sciences	4
CHEM 008	Principles of Organic Chemistry	4
	General Education Elective (Arts/Humanities)	4

**Semester Units 17**

### SEMESTER 4

BIO 110	The Cell	4
	Probability and Statistics	4
PHYS 018	Introductory Physics I for Biological Sciences	4
	General Education Elective (Social Sciences)	4

**Semester Units 16**

### SEMESTER 5

BIO 141	Evolution	4
	Elective EEB Course	4
PHYS 19	Introductory Physics II for Biological Sciences	4
	Free Elective	4

**Semester Units 16**

### SEMESTER 6

BIO 148	Introduction to Ecology	4
	Elective EEB Course (w/ Lab)	5
CORE 100	The World at Home	4
	General Education Elective (Communication)	4

**Semester Units 17**

### SEMESTER 7

BIO 195	Research Projects in Biological Sciences*	1
	Elective EEB Course (w/ Field)	5
	Free Elective	4
	Free Elective	4

**Semester Units 14**

### SEMESTER 8

	Elective EEB Course	5
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	Science/Math/Engineering Elective	4
	Free Elective	4
BIO 195	Research Projects in Biological Sciences*	2
BIO 190	Research Seminar*	1
<b>Semester Units</b>		<b>16</b>
<b>Total Program Units</b>		<b>124</b>

\* Optional courses for BIO major.

\*\* Satisfied by Math 015 or CSE 005.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

### SAMPLE PLAN FOR THE DEVELOPMENTAL BIOLOGY EMPHASIS TRACK

#### SEMESTER 1

BIO 001	Contemporary Biology	4
BIO 001L	Contemporary Biology Lab	1
CORE 001	The World at Home	4
CHEM 002	General Chemistry I	4
CORE 090X	Freshman Seminar	1
<b>Semester Units</b>		<b>14</b>

#### SEMESTER 2

MATH 021	Calculus of a Single Variable I	4
CHEM 010	General Chemistry II	4
WRI 010	College Reading and Composition	4
MATH 015	Introduction to Scientific Data Analysis	2
<b>Semester Units</b>		<b>14</b>

#### SEMESTER 3

BIO 002	Introduction to Molecular Biology	4
BIO 002L	Introduction to Molecular Biology Lab	1
MATH 030	Calculus of a Single Variable II for Biological Sciences	4
CHEM 008	Principles of Organic Chemistry	4
	General Education Elective (Arts/Humanities)	4
<b>Semester Units</b>		<b>17</b>

#### SEMESTER 4

BIO 110	The Cell	4
MATH 032	Probability and Statistics	4
PHYS 018	Introductory Physics I for Biological Sciences	4
	Free Elective	4
<b>Semester Units</b>		<b>16</b>

#### SEMESTER 5

BIO 140	Genetics	4
	DB Elective Course	4
PHYS 019	Introductory Physics II for Biological Sciences	4

	General Education Elective (communication)	4
<b>Semester Units</b>		<b>16</b>

#### SEMESTER 6

BIO 141	Evolution	4
BIO 150	Embryos, Genes and Development	4
CORE 100	The World at Home	4
	General Education Elective (social sciences)	4

<b>Semester Units</b>		<b>16</b>
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#### SEMESTER 7

	DB Elective Course (w/ Lab)	5
	Computational Biology Elective	4
BIO 195	Research Projects in Biological Sciences*	2
	General Education Elective	4

<b>Semester Units</b>		<b>15</b>
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#### SEMESTER 8

	DB Elective Course	4
	Science/Math/Engineering Elective	4
	Free Elective	4
BIO 195	Research Projects in Biological Sciences*	2
BIO 190	Research Seminar*	1

<b>Semester Units</b>		<b>15</b>
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<b>Total Program Units</b>		<b>122</b>
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\* Optional courses for BIO major.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

### SAMPLE PLAN FOR THE MICROBIOLOGY AND IMMUNOLOGY EMPHASIS TRACK

#### SEMESTER 1

BIO 001	Contemporary Biology	4
BIO 001L	Contemporary Biology Lab	1
CORE 001	The World at Home	4
CHEM 002	General Chemistry I	4
	Freshman Seminar*	1

<b>Semester Units</b>		<b>14</b>
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#### SEMESTER 2

MATH 021	Calculus of a Single Variable I	4
CHEM 010	General Chemistry II	4
WRI 010	College Reading and Composition	4
MATH 015	Introduction to Scientific Data Analysis	2

<b>Semester Units</b>		<b>14</b>
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**SEMESTER 3**

BIO 002	Introduction to Molecular Biology	4
BIO 002L	Introduction to Molecular Biology Lab	1
MATH 030	Calculus of a Single Variable II for Biological Sciences	4
CHEM 008	Principles of Organic Chemistry	4
	General Education Elective (Arts/Humanities)	4

**Semester Units 17**

**SEMESTER 4**

BIO 110	The Cell	4
	Probability and Statistics	4
	General Education Elective	4
CHEM 100	Organic Synthesis and Mechanism	3

**Semester Units 15**

**SEMESTER 5**

BIO 101	Biochemistry I	4
BIO 120	General Microbiology	4 (or 5)
PHYS 018	Introductory Physics I for Biological Sciences	4
	General Education Elective (communication)	4

**Semester Units 16 (or 17)**

**SEMESTER 6**

BIO 127	General Virology	4
PHYS 019	Introductory Physics II for Biological Sciences	4
	General Education Elective	4
CORE 100	The World at Home	4

**Semester Units 16**

**SEMESTER 7**

BIO 151	Molecular Immunology	4 (or 5)
	MBI Elective Course	4
BIO 195	Research Projects in Biological Sciences*	2
	General Education Elective (social sciences)	4

**Semester Units 14 (or 15)**

**SEMESTER 8**

	MBI Elective Course	4
	Science/Math/Engineering Elective	4
	General Education Elective	4
BIO 195	Research Projects in Biological Sciences*	2
BIO 190	Research Seminar*	1

**Semester Units 15**

**Total Program Units 122**

\* Optional courses for BIO major.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**Chemical Sciences Major**

Chemistry is often known as “the central science” because of the key position it occupies in modern science and engineering. Most phenomena in the biological and Earth sciences can be described in terms of the chemical and physical behavior of atoms and molecules, and chemical principles also underlie much progress in medicine and engineering. In addition, chemical systems are fascinating and often beautiful in their own right. Recent developments in the chemical sciences are increasingly directed toward the study of phenomena at the nanoscale, the size range intermediate between individual molecules and macroscopic matter. The ability to measure, understand and control the properties of matter on these size scales allows us to draw conceptual and practical connections between the submicroscopic world of atoms and molecules, and the macroscopic world with which we interact.

UC Merced offers an undergraduate major leading to a B.S. degree in the Chemical Sciences. All of our programs are planned to meet the requirements for approval by the American Chemical Society. The curriculum is designed to meet the needs of students who plan to end their formal education with a bachelor's degree as well as those who wish to go on for an advanced degree. We offer both a basic chemistry program and three emphasis tracks in biological chemistry, environmental chemistry and materials chemistry, which allow students to pursue interdisciplinary areas within a degree program that is still focused on chemistry. Chemical Sciences majors are strongly encouraged to undertake independent research projects under faculty supervision (CHEM 095 or CHEM 195) and all emphasis tracks require at least two units of research.

A degree in the chemical sciences opens the door to a wide variety of careers in industry or government service, forensic chemistry in crime laboratories, commercial fields such as patent law and scientific writing, and high school science teaching. Many chemistry majors go on to graduate study to prepare for careers in teaching and/or research at the college or university level, or research positions in the chemical, pharmaceutical, electronics or other high-tech industries. A major in chemistry is also an excellent foundation for medical school or other careers in the health sciences.

**Requirements for the Chemical Sciences Major (CHEM)**

Students majoring in Chemical Sciences must adhere to all UC Merced and School of Natural Sciences requirements. For the Math/Science Preparatory Curricula, students majoring in Chemical Sciences must take:

MATH 021: Calculus of a Single Variable I*	4 units
MATH 032: Probability and Statistics	4 units
CSE 020: Introduction to Computing I**	2 units
CHEM 002: General Chemistry I	4 units
PHYS 008: Introductory Physics I*	4 units

\*ICP 001: Integrated Calculus and Physics (8 units) may be taken in place of MATH 021 and PHYS 008.

\*\*MATH 015: Introduction to Scientific Data Analysis (2 units) or CSE 005: Introduction to Computer Applications (4 units) may be taken in place of CSE 020.

**The additional requirements that must be met to receive the B.S. in Chemical Sciences at UC Merced are:**

**CHEMICAL SCIENCES REQUIREMENTS [61-71 UNITS]**

The Chemical Sciences major consists of 18-20 courses (7 lower division and 11-13 upper division, depending on emphasis track) designed to give all students a common foundation of core knowledge specific to the discipline.

## LOWER DIVISION MAJOR REQUIREMENTS [28 UNITS]

BIO 001: Contemporary Biology*	4 units
CHEM 008: Principles of Organic Chemistry	4 units
CHEM 010: General Chemistry II	4 units
MATH 022: Calculus of a Single Variable II	4 units
MATH 023: Multi-Variable Calculus	4 units
MATH 024: Linear Algebra and Differential Equations	4 units
PHYS 009: Introductory Physics II	4 units

\*BIO 001L (1 unit) is recommended but not required.

## UPPER DIVISION MAJOR REQUIREMENTS [23 UNITS]

CHEM 100: Organic Synthesis and Mechanism	3 units
CHEM 101L: Advanced Synthetic Laboratory	2 units
CHEM 111/BIO 101: Biochemistry I	4 units
CHEM 112: Quantum Chemistry and Spectroscopy	3 units
CHEM 113: Chemical Thermodynamics and Kinetics	3 units
CHEM 114L: Physical Chemistry and Instrumental Analysis Laboratory	2 units
CHEM 115: Instrumental Analysis and Bioanalytical Chemistry	3 units
CHEM 120: Inorganic Chemistry	3 units

## EMPHASIS TRACK REQUIREMENTS

### Requirements for Chemistry Emphasis Track

CHEM 095/195: Research	at least 4 units total
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### Any two of the following in-depth course electives:

BO 102/CHEM 122: Biochemistry & Molecular Biology	4 units
CHEM 130: Organic Spectroscopy and Computation	3 units
CHEM 131: Molecular Spectroscopy	3 units
CHEM 133: Biophysical Chemistry	3 units
CHEM 140: Nanoscale Materials Chemistry	3 units
Any 200-level CHEM course (instructor approval required)	3 units
ESS 100: Environmental Chemistry	4 units
MSE 110: Solid State Materials Properties	4 units
MSE 118: Introduction to Nanotechnology and Nanoscience	3 units

### Requirements for Materials Chemistry Emphasis Track

ENGR 045: Introduction to Materials	4 units
CHEM 095/195: Research	at least 2 units total
CHEM 147: Materials Chemistry Laboratory	3 units

### One of the following materials electives:

CHEM 140: Nanoscale Materials Chemistry	3 units
ENGR 170: Introduction to Electron Microscopy	3 units
MSE 110: Solid State Materials Properties	4 units
MSE 113: Materials Characterization	4 units
MSE 114: Polymeric Materials	4 units
MSE 115: Ceramic Materials	3 units
MSE 116: Composites	3 units
MSE 118: Introduction to Nanotechnology and Nanoscience	3 units
MSE 119: Materials Modeling	3 units

### Requirements for Biological Chemistry Emphasis Track

BIO 140: Genetics	4 units
BIO 102/CHEM 122: Adv Biochemistry and Molecular Biology	4 units
CHEM 095/195: Research	at least 4 units total

### One other upper division biology course selected from the following:

BIO 110: The Cell	4 units
BIO 120: General Microbiology	4 units
BIO 127: General Virology	4 units
BIO 141: Evolution	4 units

BIO 151: Molecular Immunology	4 units
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### One of the following in-depth course electives:

CHEM 130: Organic Spectroscopy and Computation	3 units
CHEM 131: Molecular Spectroscopy	3 units
CHEM 133: Biophysical Chemistry	3 units
Any 200-level CHEM course (requires instructor approval)	3 units
ESS 100: Environmental Chemistry	4 units
MSE 118: Introduction to Nanotechnology and Nanoscience	3 units

### Requirements for Environmental Chemistry Emphasis Track

ESS 100: Environmental Chemistry	4 units
CHEM 095/195: Research	at least 3 units total

### Two of the following environmental course electives:

ESS 102: Chemical Processes in the Soil Environment	3 units
ESS 103: Geochemistry of Earth Systems	3 units
ESS 106: Spectroscopic and Microscopic Methods	3 units
ESS 108: Surface and Colloid Chemistry of Earth Materials	3 units
ENVE 171: Environmental Organic Chemistry	3 units

### Transfer Students

Transfer students who wish to major in Chemical Sciences should complete two semesters of general chemistry with laboratory, two semesters of organic chemistry with laboratory, one year of calculus-based physics with laboratory and mathematics through multivariable calculus.

Students should consult the online student-transfer information system at [www.assist.org](http://www.assist.org). Students should also consult the Information for Prospective Students link on the School of Natural Sciences web site [naturalsciences.ucmerced.edu](http://naturalsciences.ucmerced.edu) for more information.

### Program Learning Outcomes for Chemical Sciences

1. Fundamental knowledge and skills: Students are able to describe the major concepts and theoretical principles in chemistry. They can identify the central ideas underlying the principal subfields of chemistry—analytical, inorganic, organic, and physical chemistry—as well as the broader interdisciplinary subfields of biological, environmental and materials chemistry. Students are able to operate modern chemical instrumentation, perform chemical syntheses and carry out other essential chemical experiments with strict adherence to sound laboratory techniques as well as good safety and hygiene practices. They know how to use modern web-based methods to effectively search the scientific literature.
2. Scientific methodology: Students have developed the ability to integrate the aforementioned fundamental knowledge and skills into scientific inquiries. They can formulate well-defined and quantitative questions, develop testable hypotheses, design and execute experiments, analyze and interpret the results and reach appropriate conclusions. They are also able to critically analyze the work of other scientists and assess its correctness, importance, and relevance.
3. Communication and teamwork skills: Students are able to write organized and concise reports and present technical information using electronic media, posters and oral presentations. They have developed the communication and teamwork skills that allow them to work effectively both as leaders and as team members in a group.
4. Citizenship, ethics, role of chemistry in society: Students have an appreciation for the role of chemistry in the global society as well as the central role chemistry plays in other scientific disciplines such as biology, medicine, environmental science, and engineering sciences. They conduct themselves ethically and responsibly in science-related professions.

**SAMPLE PLAN OF STUDY FOR CHEMICAL SCIENCES  
DEGREE - CHEMISTRY EMPHASIS****SEMESTER 1**

BIO 001	Contemporary Biology	4
CHEM 002	General Chemistry I	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2

**Semester Units** **14**

**SEMESTER 2**

MATH 021	Calculus I	4
PHYS 008	Physics I	4
CHEM 010	General Chemistry II	4
	Free Elective	4

**Semester Units** **16**

**SEMESTER 3**

MATH 022	Calculus II	4
CHEM 008	Principles of Organic Chemistry	4
PHYS 009	Introductory Physics II	4
WRI 010	College Reading and Composition	4

**Semester Units** **16**

**SEMESTER 4**

CHEM 100	Organic Synthesis and Mechanism	3
MATH 032	Probability and Statistics	4
MATH 023	Multi-Variable Calculus	4
	General Education Elective (Social Science)	4

**Semester Units** **15**

**SEMESTER 5**

MATH 024	Differential Equations and Linear Algebra	4
CHEM 112	Quantum Chemistry and Spectroscopy	3
	General Education Elective (Communication)	4
CHEM 101L	Advanced Synthetic Lab	2
CHEM 195	Research	1

**Semester Units** **14**

**SEMESTER 6**

CHEM 113	Chemical Thermodynamics and Kinetics	3
	General Education Elective (Humanities/Arts)	4
CORE 100	The World at Home	4
	In-Depth Course Elective	4
CHEM 195	Research	1

**Semester Units** **16**

**SEMESTER 7**

CHEM 111	Biochemistry I	4
CHEM 120	Inorganic Chemistry	3
CHEM 115	Instrumental Analysis and Bioanalytical Chemistry	3

CHEM 195	Research	1
	Free Elective	4

**Semester Units** **15**

**SEMESTER 8**

CHEM 114L	Physical/Instrumental Lab	2
	General Education Elective	4
	In-Depth Course Elective	4
CHEM 195	Research	2
	Free Elective	4

**Semester Units** **16**

**Total Program Units** **122**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**SAMPLE PLAN OF STUDY FOR CHEMICAL SCIENCES  
DEGREE - MATERIALS EMPHASIS****SEMESTER 1**

BIO 001	Contemporary Biology	4
CHEM 002	General Chemistry I	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2

**Semester Units** **14**

**SEMESTER 2**

MATH 021	Calculus I	4
PHYS 008	Physics I	4
CHEM 010	General Chemistry II	4
	Free Elective	4

**Semester Units** **16**

**SEMESTER 3**

MATH 022	Calculus II	4
CHEM 008	Principles of Organic Chemistry	4
PHYS 009	Introductory Physics II	4
WRI 010	College Reading and Composition	4

**Semester Units** **16**

**SEMESTER 4**

CHEM 100	Organic Synthesis and Mechanism	3
MATH 032	Probability and Statistics	4
MATH 023	Multi-Variable Calculus	4
	General Education Elective (Social Science)	4

**Semester Units** **15**

**SEMESTER 5**

MATH 024	Differential Equations and Linear Algebra	4
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CHEM 112	Quantum Chemistry and Spectroscopy	3
	General Education Elective (Communication)	4
CHEM 101L	Advanced Synthetic Lab	2
CHEM 195	Research	1

**Semester Units 14**

### SEMESTER 6

CHEM 113	Chemical Thermodynamics and Kinetics	3
	General Education Elective (Humanities/Arts)	4
CORE 100	The World at Home	4
ENGR 045	Introduction to Materials	4

**Semester Units 15**

### SEMESTER 7

CHEM 111	Biochemistry I	4
CHEM 1200	Inorganic Chemistry	3
CHEM 115	Instrumental Analysis and Bioanalytical Chemistry	3
	Materials elective	3
CHEM 195	Research	2

**Semester Units 15**

### SEMESTER 8

CHEM 114L	Physical/Instrumental Lab	2
	General Education Elective	4
CHEM 147	Materials Chemistry Lab	3
CHEM 195	Research	2
	Free Elective	4

**Semester Units 15**

**Total Program Units 120**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## SAMPLE PLAN OF STUDY FOR CHEMICAL SCIENCES DEGREE - BIOLOGICAL EMPHASIS

### SEMESTER 1

BIO 001	Contemporary Biology	4
CHEM 002	General Chemistry I	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2

**Semester Units 14**

### SEMESTER 2

MATH 021	Calculus I	4
PHYS 008	Physics I	4
CHEM 010	General Chemistry II	4
	General Education Elective (Social Sciences)	4

**Semester Units 16**

### SEMESTER 3

MATH 022	Calculus II	4
CHEM 008	Principles of Organic Chemistry	4
	General Education Elective (Humanities/Arts)	4
WRI 010	College Reading and Composition	4

**Semester Units 16**

### SEMESTER 4

CHEM 100	Organic Synthesis and Mechanism	3
MATH 032	Probability and Statistics	4
MATH 023	Multi-Variable Calculus	4
PHYS 009	Introductory Physics II	4

**Semester Units 15**

### SEMESTER 5

MATH 024	Differential Equations and Linear Algebra	4
CHEM 112	Quantum Chemistry and Spectroscopy	3
	General Education Elective (Communication)	4
CHEM 101L	Advanced Synthetic Lab	2
CHEM 195	Research	2

**Semester Units 15**

### SEMESTER 6

CHEM 113	Chemical Thermodynamics and Kinetics	3
BIO 140	Genetics	4
CORE 100	The World at Home	4
CHEM 111	Biochemistry I	4

**Semester Units 15**

### SEMESTER 7

CHEM 115	Instrumental Analysis and Bioanalytical Chemistry	3
CHEM 120	Inorganic Chemistry	3
	In-Depth Course Elective	3
CHEM 122	Biochemistry & Molecular Biology	4
CHEM 195	Research	1

**Semester Units 14**

### SEMESTER 8

CHEM 114L	Physical/Instrumental Lab	2
	General Education Elective	4
	Upper division biology course	4
CHEM 195	Research	2
	Free Elective	4

**Semester Units 16**

**Total Program Units 121**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**SAMPLE PLAN OF STUDY FOR CHEMICAL SCIENCES  
DEGREE - ENVIRONMENTAL EMPHASIS****SEMESTER 1**

BIO 001	Contemporary Biology	4
CHEM 002	General Chemistry I	4
CORE 001	The World at Home	4
CSE 020	Introduction to Computing I	2

**Semester Units** **14**

**SEMESTER 2**

MATH 021	Calculus I	4
PHYS 008	Physics I	4
CHEM 010	General Chemistry II	4
	Free Elective	4

**Semester Units** **16**

**SEMESTER 3**

MATH 022	Calculus of a Single Variable II	4
CHEM 008	Principles of Organic Chemistry	4
PHYS 009	Introductory Physics II	4
WRI 010	College Reading and Composition	4

**Semester Units** **16**

**SEMESTER 4**

CHEM 100	Organic Synthesis and Mechanism	3
MATH 032	Probability and Statistics	4
MATH 023	Multi-Variable Calculus	4
	General Education Elective (Social Science)	4

**Semester Units** **15**

**SEMESTER 5**

MATH 024	Differential Equations and Linear Algebra	4
CHEM 112	Quantum Chemistry and Spectroscopy	3
	General Education Elective (Communication)	4
CHEM 101L	Advanced Synthetic Lab	2
CHEM 195	Research	1

**Semester Units** **14**

**SEMESTER 6**

CHEM 113	Chemical Thermodynamics and Kinetics	3
	General Education Elective (Humanities/Arts)	4
ESS 100	Environmental Chemistry	4
CORE 100	The World at Home	4
CHEM 195	Research	1

**Semester Units** **16**

**SEMESTER 7**

CHEM 120	Inorganic Chemistry	3
	Environmental Course Elective	3
CHEM 115	Instrumental Analysis and Bioanalytical Chemistry	3

CHEM 111	Biochemistry I	4
CHEM 195	Research	1

**Semester Units** **14**

**SEMESTER 8**

	Environmental Course Elective	3
	General Education Elective	4
CHEM 114L	Physical/Instrumental Lab	2
CHEM 195	Research	2
	Free Elective	4

**Semester Units** **15**

**Total Program Units** **120**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

I WILL NEVER FORGET THE BEAUTIFUL RAINBOW THAT APPEARED ONE AFTERNOON SHORTLY AFTER I TRANSFERRED TO UC MERCED. IT STRETCHED OVER THE CLASSROOM & OFFICE BUILDING AND SCIENCE & ENGINEERING. IT WAS AS IF IT WERE PROCLAIMING THAT THIS IS A SPECIAL PLACE, WHICH IS SOMETHING I HAVE FOUND TO BE TRUE.

—Janice Gatzke, Cellular and Molecular Biology

## ■ Earth Systems Science Major

The undergraduate major in Earth Systems Science prepares students to understand and solve critical challenges facing our environment, including:

- climate change
- water and soil pollution
- conservation of biological diversity
- management of natural resources.

The major is highly interdisciplinary, integrating the study of fundamental physical, chemical, and biological processes that shape our environment with practical applications to real-world problems. Core courses within the major provide students with a firm foundation in the fundamentals of chemistry, biology, hydrology, ecology and Earth sciences, while upper division elective courses allow students the flexibility to pursue a variety of topics related to Earth and environmental systems. This major emphasizes an integrated approach to Earth Systems Science, incorporating field studies, laboratory experiments and computations. Coursework in the social sciences exposes students to the political, economic and societal implications of human interactions with the environment.

Graduates of this major will have a strong background in the theory and application of Earth Systems Science. They will be well prepared for either graduate studies or jobs in the areas of environmental conservation and consulting, ecosystem and natural resource management and science, and many aspects of agricultural sciences. Additionally, Earth Systems Science is an excellent foundation for professional careers in law, policy and administration that increasingly involve the environmental sciences.

The location of UC Merced in the San Joaquin Valley near the Sierra Nevada offers an excellent and diverse real-world laboratory for studying the natural environment and how it is affected by human activity. Additionally, the UC Merced Sierra Nevada Research Institute provides a rich milieu of faculty expertise, research seminars and other activities, and provides opportunities for undergraduate internships.

A hallmark of the Earth Systems Science major is its breadth and flexibility. Lower division coursework emphasizes foundation courses in physical, chemical and biological sciences, and mathematics, with a choice of a lower division elective science course. Upper division requirements consist of five core courses that provide students with a balance of key concepts in Earth Systems Science, and exposure to environmental science and policy. In the upper division, students choose three elective courses to tailor their program to their individual interests. An upper division seminar highlights the latest research in interdisciplinary Earth Systems Science. General education coursework in communications and economics prepares majors to apply their quantitative science skills in the job market or in further studies at the graduate level. Students participate in research, internship, or service learning activities with faculty as part of their undergraduate studies.

### MATH/SCIENCE PREPARATORY CURRICULA [18-20 UNITS]

Calculus of a Single Variable I (MATH 021)\* . . . . . 4 units  
 Probability and Statistics (MATH 018, MATH 032, or ENVE 105) . 4 units  
 Introductory Physics I (PHYS 008\* or PHYS 018) . . . . . 4 units  
 General Chemistry I (CHEM 002). . . . . 4 units  
 Computer Science (MATH 015, CSE 005, or CSE 020). . . . . 2-4 units

\*ICP: Integrated Calculus and Physics (8 units) may be taken in place of MATH 021 and PHYS 008.

### Additional requirements that must be met to receive the B.S. in Earth Systems Science (ESS) at UC Merced are:

#### EARTH SYSTEMS SCIENCE REQUIREMENTS [65-57 UNITS]

The Earth Systems Science program consists of a minimum of 14 courses (6 lower division and 8 upper division plus a seminar course) designed to give all students a common foundation of core knowledge specific to the discipline.

#### LOWER DIVISION MAJOR REQUIREMENTS [24 UNITS]

Introduction to Earth Systems Science (ESS 001) or Contemporary Biology (BIO 001/001L) . . . . . 4-5 units  
 Soil Foundations of Terrestrial Ecosystems (ESS 070) . . . . . 4 units  
 General Chemistry II (CHEM 010) . . . . . 4 units  
 Calculus of a Single Variable II (MATH 022) . . . . . 4 units  
 Introductory Physics II (PHYS 009 or 019) . . . . . 4 units  
 One additional science or engineering course\* . . . . . 4 units

#### UPPER DIVISION MAJOR REQUIREMENTS [30-33 UNITS]

Environmental Chemistry (ESS 100). . . . . 4 units  
 Hydrology and Climate (ESS 110) . . . . . 4 units  
 Introduction to Ecological and Environmental Microbiology (ESS 120) . . . . . 4 units  
 Fundamentals of Ecology (BIO 148). . . . . 4 units  
 Environmental Science and Policy (ESS 141) or equivalent course (by approval) . . . . . 4 units  
 Three elective courses in ESS or related fields . . . . . 9-12 units  
 Undergraduate Seminar (ESS 190). . . . . 1 unit

#### ADDITIONAL DEGREE REQUIREMENTS [10-13 UNITS]

Intermediate Microeconomic Theory (ECON 100) or Engineering Economic Analysis (ENGR 155). . . . . 3-4 units  
 Two upper division electives in Natural Sciences or Engineering\* . . . . . 6-8 units  
 Research (ESS 095 or ESS 195) and/or Service Learning (ENGR 097 or ENGR 197) . . . . . 1-3 units

\*Relevant courses outside of Natural Sciences or Engineering by approval

#### Upper Division Elective Courses in ESS or related fields

Elective courses in the major can be selected from among upper division ESS courses (3 or 4 units) or from related courses offered in other areas, such as Biology (BIO), Environmental Engineering (ENVE), Engineering (ENGR), geography (GEOG), and management (MGMT). A list of approved courses offered each semester is available in the Natural Sciences office. Example elective courses include:

Applied Climatology (ESS 132) . . . . . 3 units  
 Astrobiology (ESS 147) . . . . . 3 units  
 Chemical Processes in the Soil Environment (ESS 102) . . . . . 3 units  
 Conservation Biology (ESS 149). . . . . 3 units  
 Environmental Organic Geochemistry (ENVE 171). . . . . 4 units  
 Evolution (BIO 141). . . . . 4 units  
 Field Methods in Snow Hydrology (ENVE 181). . . . . 3 units  
 Field Methods in Subsurface Hydrology (ENVE 183). . . . . 3 units  
 Geochemistry of Earth Systems (ESS 103) . . . . . 3 units  
 Genome Biology (BIO 142) . . . . . 5 units  
 Global Change (ENVE 118) . . . . . 4 units  
 Remote Sensing of the Environment (ENVE 152). . . . . 3 units  
 Microbial Ecology (ESS 125) . . . . . 4 units

Mountain Hydrology of the Western U.S. (ENVE 114) . . . . .	4 units
Subsurface Hydrology (ESS 112) . . . . .	4 units
Terrestrial Ecosystem Ecology (ESS 124) . . . . .	4 units
Watershed Biogeochemistry (ESS 105) . . . . .	3 units

### Transfer Students

Transfer students who wish to major in Earth Systems Science should complete one year of calculus, one year of physics, one year of general chemistry, and two to three semesters of general biology, organic chemistry, or Earth or environmental science courses. Students should consult the online student-transfer information system at [www.assist.org](http://www.assist.org). Students should also consult the Information for Prospective Students link on the School of Natural Sciences web site [naturalsciences.ucmerced.edu](http://naturalsciences.ucmerced.edu) for more information.

### Program Learning Outcomes for the Earth Systems Science Major

Students in the Earth Systems Science major will achieve the following:

1. Foundational knowledge of physics, chemistry, biology, and mathematics related to Earth systems that supports a working knowledge of basic research methodologies, data analysis, and interpretation for a variety of Earth-related data.
2. Knowledge of major concepts, theoretical principles, experimental findings, and areas of study related to Earth systems science, and comprehension of the interactions between natural Earth systems and human economic, political, and social systems.
3. An ability to employ critical thinking, quantitative and numerical analyses, and hypothesis-driven methods of scientific inquiry in the formulation of research questions, experimental design, application and use of laboratory and field instrumentation, and analysis and interpretation of data related to Earth systems.
4. Effective written and oral communication skills, especially the ability to transmit complex technical information.
5. An ability to work effectively individually and in teams in classroom, laboratory, and field settings.

### SAMPLE PLAN OF STUDY FOR EARTH SYSTEMS SCIENCE DEGREE

#### SEMESTER 1

ESS 001	Introduction to Earth Systems Science	4
CHEM 002	General Chemistry I	4
CORE 001	The World at Home	4
MATH 015	Introduction to Scientific Data Analysis	2

**Semester Units** **14**

#### SEMESTER 2

CHEM 010	General Chemistry II	4
MATH 021	Calculus of a Single Variable I	4
WRI 010	College Reading and Composition	4
	General Education Elective	4

**Semester Units** **16**

#### SEMESTER 3

MATH 022	Calculus of a Single Variable II	4
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PHYS 008	Introductory Physics I	4
	Lower Division Science or Engineering	4
	Free Elective	4

**Semester Units** **16**

#### SEMESTER 4

ESS 070	Soil Foundations of Terrestrial Ecosystems	4
PHYS 009	Introductory Physics II	4
MATH 018	Statistics for Scientific Data Analysis	4
	Free Elective	4

**Semester Units** **16**

#### SEMESTER 5

ESS 100	Environmental Chemistry	4
ESS 110	Hydrology and Climate	4
	General Education Elective (Communication)	4
ENGR 155	Engineering Economic Analysis	3

**Semester Units** **15**

#### SEMESTER 6

ESS 120	Introduction to Ecological and Environmental Microbiology	4
ESS 141	Environmental Science and Policy	4
CORE 100	The World at Home	4
	General Education Elective (Arts/Humanities)	4

**Semester Units** **16**

#### SEMESTER 7

ESS 180	Fundamentals of Ecology	4
	ESS Upper Division Elective	3
	General Education Elective (Social Sciences)	4
	Natural Sciences or Engineering Elective	4
ESS 190	Undergraduate Seminar	1

**Semester Units** **16**

#### SEMESTER 8

	ESS Upper Division Elective	4
	ESS Upper Division Elective	3
	Natural Sciences or Engineering Elective	4
	Research or Service Learning (ESS 195 or ENGR 197)	1
	Free Elective	4

**Semester Units** **16**

**Total Program Units** **125**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## ■ Physics Major

Physics is the study of nature at its most fundamental. Its scope covers everything from the tiniest particles of matter—such as atoms, electrons, and quarks—to the structure of the entire universe, encompassing innumerable galaxies and stars.

Physicists seek to understand complex phenomena in terms of simple, unifying principles. Their queries have ranged from the seemingly innocuous, like “What causes an object to fall?” to the more elemental, like “What is the true nature of light?” Such questions led to the discovery of the gravitational force, which governs the motion of planets and stars, as well as to the biggest breakthrough of the twentieth century—quantum mechanics—which governs the very small. Answers to physicists’ questions have revolutionized society, not only altering our basic understanding of the universe, but also profoundly affecting our day-to-day lives, laying the foundation for numerous technological innovations such as the laser, computer, and cellular phone. And physics continues to evolve and excite us, with unanswered questions from a multitude of active and emerging fields of research, such as Quantum Computation, Superconductivity, Chaos, Biophysics, and String Theory, to name a few.

The Physics Program at UC Merced provides a strong foundation in the fundamentals of theoretical and applied physics, while also emphasizing the increasingly interdisciplinary role played by physicists in the scientific and technological community. This is reflected in the “core plus emphasis track” model of the major. The core is a rigorous grounding in fundamental physical principles, including electricity and magnetism, quantum and classical mechanics, and thermodynamics. The emphasis tracks consist of flexible specialization options. They include, but are not limited to Atomic, Molecular, and Optical (AMO) Physics; Mathematical Physics; Biophysics; and Condensed Matter and Materials Physics.

Physics students develop excellent quantitative and analytical skills, enabling them to approach new and complex problems that arise in any field. These fundamental skills are essential preparation for a wide range of careers in such fields as aerospace, biotechnology, computers, engineering, medicine, education, law, finance, business, and consulting.

Students majoring in Physics must meet the School of Natural Sciences Math/Science preparatory curricula with the following courses.

### **MATH/SCIENCE PREPARATORY CURRICULA [18 UNITS]**

MATH 021: Calculus of a Single Variable I*	4 units
MATH 032: Probability and Statistic	4 units
PHYS 008: Introductory Physics I*	4 units
CHEM 002: General Chemistry I	4 units
CSE 020: Introduction to Computing I	2 units

\*ICP: Integrated Calculus and Physics (8 units) may be taken in place of MATH 021 and PHYS 008.

**In addition to adhering to the UC Merced and School of Natural Sciences requirements, the requirements that must be met to receive the B.S. in Physics (PHYS) at UC Merced are (57-60 units):**

### **REQUIRED LOWER DIVISION MATH/SCIENCE COURSES [20 UNITS]**

MATH 022: Calculus of a Single Variable II	4 units
MATH 023: Vector Calculus	4 units

MATH 024: Linear Algebra and Differential Equations	4 units
PHYS 009: Introductory Physics II	4 units
PHYS 010: Introductory Physics III	4 units

### **REQUIRED UPPER DIVISION CORE PHYSICS COURSES [24 UNITS]**

PHYS 105: Analytic Mechanics Core	4 units
PHYS 110: Electrodynamics Core	4 units
PHYS 112: Statistical Mechanics Core	4 units
PHYS 137: Quantum Mechanics Core	4 units
PHYS 160: Modern Physics Lab	4 units
PHYS 122: Waves Minicourse	2 units
One additional minicourse of student’s choice	2 units

### **ADDITIONAL REQUIRED COURSES [13-16 UNITS]:**

One “breadth” science or engineering elective (either upper or lower division) that is not physics or math. . . . . 3-4 units  
Two upper division physics electives . . . . . 6-8 units

Here, two minicourses are counted as one upper division elective. Appropriate nonphysics courses may be substituted, with faculty approval, as part of an emphasis track.

PHYS 195: Undergraduate Research—Senior Thesis (Research from other programs may be substituted as appropriate). . . . . at least 4 units

### **Minicourses**

The minicourses are half-semester courses designed to round out a student’s core training in physics. Current minicourses are: Electromagnetic Radiation (PHYS 111), Waves (PHYS 122), Special Relativity (PHYS 126), and Rotational Mechanics (PHYS 124). Students are required to take two minicourses, one of which must be the Waves minicourse. For students planning to attend graduate school in physics, all four minicourses (PHYS 111, 122, 124 and 126) are recommended.

### **Senior Research**

All students are required to complete a senior thesis (PHYS 195) consisting of independent research performed under the tutelage of a faculty advisor. Typically, this research is the culmination of a student’s emphasis track (see below). The thesis advisor may be a faculty member in either physics or another discipline, allowing for the possibility of cross-disciplinary research projects.

### **Emphasis Tracks**

Students are encouraged to choose their electives to form an emphasis track in an area of physics or interdisciplinary study. The established emphasis tracks are: Atomic, Molecular, and Optical (AMO) Physics; Mathematical Physics; Biophysics; and Condensed Matter and Materials Physics (CMMP). Students may also propose and design their own customized emphasis tracks, with the assistance of their faculty advisors. A customized track must consist of at least 12 units. Typically, the track includes the two upper division physics electives and culminates with the student’s senior thesis (PHYS 195). Other upper division courses may be substituted for the two physics electives if they are deemed appropriate to the track. Any customized emphasis track must be approved by the student’s faculty advisor. A student may also choose not to participate in the track program at all, although the senior thesis and physics electives are still degree requirements.

### **Examples of Emphasis Tracks**

Below are the requirements for students who wish to select their Physics electives to form an established emphasis track. Note that students are not required to follow an established track.



Modifications to the suggestions below may be made with faculty approval, and customized tracks may also be developed.

### ATOMIC/MOLECULAR/OPTICAL (AMO) PHYSICS

PHYS 148: Modern Optics . . . . . 4 units  
 PHYS 144: Modern Atomic Physics . . . . . 4 units  
 PHYS 195: Undergraduate Research (in AMO physics) . . . . . 4 units

In addition it is strongly recommended that students use a free elective to take PHYS 141.

### BIOPHYSICS

PHYS 104: Biophysics . . . . . 4 units  
 BIO 100: Molecular Machinery of Life . . . . . 4 units  
 PHYS 195: Undergraduate Research (in biophysics) . . . . . 4 units

In addition it is strongly recommended that students use at least one of their free electives to take a course from the following list: BIO: 106, 107, 110, 140, 141, 145, 180, 181, 182; BIOE: 102, 104, 113. The sample plan shows BIO 181 (Introduction to Biomolecular Simulation) in place of one free elective.

### CONDENSED MATTER AND MATERIALS PHYSICS (CMMP)

PHYS 141: Condensed Matter Physics . . . . . 4 units  
 MSE 110: Solid State Materials Properties . . . . . 4 units  
 PHYS 195: Undergraduate Research (in CMMP) . . . . . 4 units

In addition it is strongly recommended that students use free electives to take PHYS 144 and/or PHYS 148.

### MATHEMATICAL PHYSICS

Any two of the following:

MATH 121: Applied Math Methods I:  
 Introduction to Partial Differential Equations . . . . . 4 units  
 MATH 122: Applied Math Methods II: Complex Variables and  
 Applications . . . . . 4 units  
 MATH 131: Numerical Analysis I . . . . . 4 units  
 MATH 132: Numerical Analysis II . . . . . 4 units

Plus:

PHYS 195: Undergraduate Research (in math physics; MATH 195 may be substituted) . . . . . 4 units

### Transfer Students

Transfer students who wish to major in Physics should complete four semesters of calculus, covering the topics of single variable calculus, multi-variable calculus, differential equations and preferably linear algebra. In addition, transfer students should complete one semester of general chemistry with laboratory and three semesters of calculus-based physics with laboratory. Students should consult the online student-transfer information system at [www.assist.org](http://www.assist.org). Students should also consult the Information for Prospective Students link on the School of Natural Sciences web site [naturalsciences.ucmerced.edu](http://naturalsciences.ucmerced.edu) for more information.

### Physics Programmatic Learning Outcomes

Graduates from the Physics B.S. program will have demonstrated the following:

1) Physical Principles. Students will be able to apply basic physical principles—including classical mechanics, electricity and magnetism, quantum mechanics, and statistical mechanics—to explain, analyze, and predict a variety of natural phenomena.

2) Mathematical Expertise. Students will be able to apply advanced mathematical techniques (e.g., calculus, linear algebra, probability, and statistics) in their explanations, analyses, and predictions of physical phenomena.

3) Experimental Techniques. Students will be able to take physical measurements in an experimental laboratory setting and analyze these results to draw conclusions about the physical system under investigation, including whether their data supports or refutes a given physical model.

4) Communication and Teamwork Skills. Students will be able to clearly explain their mathematical and physical reasoning, both orally and in writing, and will be able to communicate and work effectively in groups on a common project.

5) Research Proficiency. Students will be able to formulate personal research questions that expand their knowledge of physics. Students will be able to apply sound scientific research methods to address these questions, either by researching the current literature or developing independent results.

### SAMPLE PLAN OF STUDY FOR PHYSICS DEGREE– ATOMIC, MOLECULAR AND OPTICAL EMPHASIS

#### SEMESTER 1

PHYS 008	Introductory Physics I	4
MATH 021	Calculus of a Single Variable I	4
CSE 020	Introduction to Computing I	2
CORE 001	The World at Home	4
	Freshman Seminar*	1

**Semester Units** **15**

#### SEMESTER 2

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Introductory Physics II	4
WRI 010	College Reading and Composition	4
CHEM 002	General Chemistry I	4

**Semester Units** **16**

#### SEMESTER 3

MATH 023	Vector Calculus	4
BIO 001	Contemporary Biology	4
PHYS 010	Introductory Physics III	4
	General Education Elective (Arts/Humanities)	4

**Semester Units** **16**

#### SEMESTER 4

MATH 024	Linear Algebra and Differential Equations	4
PHYS 105	Analytic Mechanics Core	4
	General Education Elective (Social/Cognitive Sciences)	4
	Free Elective	4

**Semester Units** **16**

#### SEMESTER 5

PHYS 137	Quantum Mechanics Core	4
PHYS 110	Electrodynamics Core	4
MATH 032	Probability and Statistics	4
	General Education Elective (Communications)	4

**Semester Units** **16**

**SEMESTER 6**

PHYS 160	Modern Physics Lab	4
PHYS 122	Waves Minicourse	2
PHYS 124	Rotational Mechanics Minicourse	2
CORE 100	The World at Home	4
	Free Elective	4

**Semester Units** 16

**SEMESTER 7**

PHYS 112	Statistical Mechanics Core	4
PHYS 148	Modern Optics	4
	General Education Elective	4
PHYS 195	Undergraduate Research	3

**Semester Units** 15

**SEMESTER 8**

PHYS 144	Modern Atomic Physics	4
PHYS 141	Condensed Matter Physics	4
PHYS 195	Undergraduate Research	3
	Free Elective	4

**Semester Units** 15

**Total Program Units** 125

\* Freshman Seminar is an optional course; it is not required for Physics majors.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**SAMPLE PLAN OF STUDY FOR PHYSICS DEGREE—BIOPHYSICS EMPHASIS****SEMESTER 1**

PHYS 008	Introductory Physics I	4
MATH 021	Calculus of a Single Variable I	4
CSE 020	Introduction to Computing I	2
CORE 001	The World at Home	4
	Freshman Seminar*	1

**Semester Units** 15

**SEMESTER 2**

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Introductory Physics II	4
WRI 010	College Reading and Composition	4
CHEM 002	General Chemistry I	4

**Semester Units** 16

**SEMESTER 3**

MATH 023	Vector Calculus	4
BIO 001	Contemporary Biology 4	
PHYS 010	Introductory Physics III	4
	General Education Elective (Arts/Humanities)	4

**Semester Units** 16

**SEMESTER 4**

MATH 024	Linear Algebra and Differential Equations	4
PHYS 105	Analytic Mechanics Core	4
	General Education Elective (Social/Cognitive Sciences)	4
	Free Elective	4

**Semester Units** 16

**SEMESTER 5**

PHYS 137	Quantum Mechanics Core	4
PHYS 110	Electrodynamics Core	4
MATH 032	Probability and Statistics	4
	General Education Elective (Communications)	4

**Semester Units** 16

ATTENDING A SMALL SCHOOL HAS HELPED ME REMAIN FOCUSED ON THE TRUE REASON FOR ATTENDING COLLEGE, AND THAT IS TO EXPAND MY KNOWLEDGE THROUGH EDUCATION, INTERNSHIPS, PROJECTS AND RESEARCH POSITIONS.

I WOULD ADVISE ALL FRESHMEN TO REMEMBER THAT COLLEGE IS SUPPOSED TO BE SOME OF THE BEST YEARS OF YOUR LIFE, BOTH SOCIALLY AND ACADEMICALLY. DON'T FORGET THAT THE FIRST REASON FOR BEING HERE, THOUGH, IS EDUCATION. I KNOW THAT THE SOCIAL ASPECTS SEEM MUCH MORE APPEALING, BUT MAKE SURE YOU TAKE CARE OF YOU ACADEMICS FIRST. GET INVOLVED. YOU DON'T WANT TO WASTE AWAY YOUR TIME IN COLLEGE WISHING YOU HAD JOINED THAT CLUB OR STARTED THAT PROJECT. IT WILL TRULY HELP WHEN APPLYING FOR INTERNSHIPS, JOBS, AND GRADUATE SCHOOL.

—Bethany Robinson, Mechanical Engineering

**SEMESTER 6**

PHYS 160	Modern Physics Lab	4
PHYS 122	Waves Minicourse	2
PHYS 124	Rotational Mechanics Minicourse	2
CORE 100	The World at Home	4
BIO 100	Molecular Machinery of Life	4

**Semester Units** **16**

**SEMESTER 7**

PHYS 112	Statistical Mechanics Core	4
PHYS 104	Biophysics	4
PHYS 195	Undergraduate Research	3
	General Education Elective	4

**Semester Units** **15**

**SEMESTER 8**

BIO 181	Introduction to Biomolecular Simulation	4
PHYS 195	Undergraduate Research	3
	Free Elective	4
	Free Elective	4

**Semester Units** **15**

**Total Program Units** **125**

\* Freshman Seminar is an optional course; it is not required for Physics majors.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**SAMPLE PLAN OF STUDY FOR PHYSICS DEGREE—  
CONDENSED MATTER AND MATERIALS PHYSICS  
EMPHASIS****SEMESTER 1**

PHYS 008	Introductory Physics I	4
MATH 021	Calculus of a Single Variable I	4
CSE 020	Introduction to Computing I	2
CORE 001	The World at Home	4
	Freshman Seminar*	1

**Semester Units** **15**

**SEMESTER 2**

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Introductory Physics II	4
WRI 010	College Reading and Composition	4
CHEM 002	General Chemistry I	4

**Semester Units** **16**

**SEMESTER 3**

MATH 023	Vector Calculus	4
BIO 001	Contemporary Biology	4
PHYS 010	Introductory Physics III	4
	General Education Elective (Arts/Humanities)	4

**Semester Units** **16**

**SEMESTER 4**

MATH 024	Linear Algebra and Differential Equations	4
PHYS 105	Analytic Mechanics Core	4
ENGR 045	Introduction to Materials	4
	General Education Elective (Social/Cognitive Sciences)	4

**Semester Units** **16**

**SEMESTER 5**

PHYS 137	Quantum Mechanics Core	4
PHYS 110	Electrodynamics Core	4
MATH 032	Probability and Statistics	4
	General Education Elective (Communications)	4

**Semester Units** **16**

**SEMESTER 6**

PHYS 160	Modern Physics Lab	4
PHYS 122	Waves Minicourse	2
PHYS 124	Rotational Mechanics Minicourse	2
CORE 100	The World at Home	4
	Free Elective	4

**Semester Units** **16**

**SEMESTER 7**

PHYS 112	Statistical Mechanics Core	4
MSE 110	Solid State Materials Properties	4
PHYS 148	Modern Optics	4
PHYS 195	Undergraduate Research	3

**Semester Units** **15**

**SEMESTER 8**

PHYS 144	Condensed Matter Physics	4
	General Education Elective	4
PHYS 195	Undergraduate Research 3	4
	Free Elective	4

**Semester Units** **15**

**Total Program Units** **125**

\* Freshman Seminar is an optional course; it is not required for Physics majors.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## SAMPLE PLAN OF STUDY FOR PHYSICS DEGREE— MATHEMATICAL PHYSICS EMPHASIS

### SEMESTER 1

PHYS 008	Introductory Physics I	4
MATH 021	Calculus of a Single Variable I	4
CSE 020	Introduction to Computing I	2
CORE 001	The World at Home	4
	Freshman Seminar*	1

**Semester Units 15**

### SEMESTER 2

MATH 022	Calculus of a Single Variable II	4
PHYS 009	Introductory Physics II	4
WRI 010	College Reading and Composition	4
CHEM 002	General Chemistry I	4

**Semester Units 16**

### SEMESTER 3

MATH 023	Vector Calculus	4
BIO 001	Contemporary Biology	4
PHYS 010	Introductory Physics III	4
	General Education Elective (Arts/Humanities)	4

**Semester Units 16**

### SEMESTER 4

MATH 024	Linear Algebra and Differential Equations	4
PHYS 105	Analytic Mechanics Core	4
	General Education Elective Social/Cognitive Sciences)	4
	Free Elective	4

**Semester Units 16**

### SEMESTER 5

PHYS 137	Quantum Mechanics	4
PHYS 110	Electrodynamics Core	4
MATH 032	Probability and Statistics	4
	General Education Elective (communications)	4

**Semester Units 16**

### SEMESTER 6

PHYS 122	Waves Minicourse	2
PHYS 111	Electromagnetic Radiation	2
PHYS 160	Modern Physics Lab	4
CORE 100	The World at Home	4
	Free Elective	4

**Semester Units 16**

### SEMESTER 7

PHYS 112	Statistical Mechanics Core	4
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PHYS 195	Undergraduate Research	3
MATH 121	Applied Math Methods I	4
	General Education Elective	4

**Semester Units 15**

### SEMESTER 8

PHYS 195	Undergraduate Research	3
MATH 122	Applied Math Methods II	4
	Free Elective	4
	Free Elective	4

**Semester Units 15**

**Total Program Units 125**

\* Freshman Seminar is an optional course; it is not required for Physics majors.

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

MY EXPERIENCES HERE AT UC MERCED  
HAVE GIVEN ME THE OPPORTUNITY TO  
THINK OUTSIDE THE BOX AND UNDERSTAND  
NEW IDEAS THAT I NEVER THOUGHT I  
WOULD HAVE UNDERSTOOD. THESE IDEAS  
WILL STAY WITH ME AS I MOVE FORWARD  
WITH GRADUATE STUDIES.

— Daniel Titcher, Psychology

## ■ Natural Sciences Minors

To declare a minor, students must have an overall grade-point average of 2.0 (C) or better. Students should consult an advisor in the School of Natural Sciences to officially declare the minor and plan their courses.

The following guidelines must be adhered to:

- At least five courses, four of which must be upper division, must be taken for a letter grade.
- At least three of the required courses must be taken at UC Merced.
- Only one course may be used to satisfy two minor programs' requirements.
- Only one course may be used to satisfy both a minor and a major requirement.
- Work for the minor must be completed within the 150 unit maximum limit for graduation.
- If the student's major and minor are in different schools, the higher unit maximum will apply.
- Students must consult the UC Merced General Catalog for prerequisites to required courses.
- The minor will appear on the student's transcript and diploma.

### ■ NATURAL SCIENCES EDUCATION MINOR

The Natural Sciences Education (NSED) minor is designed to prepare UC Merced students for admission to the teacher credential program or pursue graduate studies in education. Students who complete the coursework and the fieldwork associated with this program can be eligible for admission to the teacher credential programs at many local institutions. The NSED minor must be pursued in conjunction with a Natural Sciences or Engineering major. Additional support and resources for students interested in teaching careers are available through the Science and Mathematics Initiative (SMI) program with the School of Natural Sciences.

#### Students graduating with a minor in Natural Sciences Education will have demonstrated the following learning outcomes:

Upon completion of the NSED minor program students are expected to:

1. Comprehensively articulate what constitutes a profession of a science or mathematics teacher including being able to address the following questions:
  - a. What constitutes responsibilities and duties of a teacher?
  - b. What skills and knowledge are necessary to become a successful professional?
2. Demonstrate skills of a beginning teacher such as:
  - a. Ability to develop a lesson plan and deliver an effective lesson at the secondary school level,
  - b. Design different types of assessments to evaluate students learning,
  - c. Distinguish between students with different learning abilities and needs and adapt their teaching methodology to address this diversity.
3. Demonstrate familiarity with requirements, special aspects and

structure of California educational system such as:

- a. Credentialing process,
- b. Instructional state standards and requirements,
- c. Strategies to address diverse demographics of California schools such as instruction to English Learners.

#### Minimum Requirements:

Two of the following CalTeach courses:

- NSED 023: Introduction to Teaching Science in Elementary School (1 unit)
- NSED 043: Introduction to Teaching Science in Middle School (1 unit)
- NSED 063: Introduction to Teaching Science in High School (1 unit)
- NSED 033: Introduction to Teaching Mathematics in Elementary School (1 unit)
- NSED 053: Introduction to Teaching Mathematics in Middle School (1 unit)
- NSED 073: Introduction to Teaching Mathematics in High School (1 unit)

Two CalTeach Fieldwork Courses—total 100 hours fieldwork:

- NSED 024: Fieldwork - Introduction to Teaching Science in Elementary School (1 unit)
- NSED 044: Fieldwork - Introduction to Teaching Science in Middle School (1 unit)
- NSED 064: Fieldwork - Introduction to Teaching Science in High School (1 unit)
- NSED 034: Fieldwork - Introduction to Teaching Mathematics in Elementary School (1 unit)
- NSED 054: Fieldwork - Introduction to Teaching Mathematics in Middle School (1 unit)
- NSED 074: Fieldwork - Introduction to Teaching Mathematics in High School (1 unit)

The additional required courses, all of which must be taken for a letter grade are:

- PSY 121: Cognitive Psychology (4 units) or PSY 130: Developmental Psychology (4 units) (Prerequisite: PSY 001 for both)
- NSED 100: Introduction to Instruction, Assessment, and Management for Beginning Teachers (4 units)
- NSED 120: Diversity in Education (4 units)
- WRI 115: Topics in Science Writing (4 units), or another approved upper division writing course (4 units)
- HIST 16: Forging of the US (4 units) or POLI 001: Introduction to Political Science (4 units)

### ■ PHYSICS MINOR

Physics is the study of nature at its most fundamental. It addresses the underlying principles that govern all phenomena in the universe, both within everyday life as well as within the most exotic situations. The physics minor equips students with a broad foundation to understand these diverse phenomena, including such topics as dynamics, planetary motion, quantum mechanics, atomic structure, special relativity, electricity, optics, and much more. The minor also

provides an opportunity for a student to develop significant depth and explore modern topics in a few areas of his or her choosing. The physics minor may be useful for any student studying science or engineering who would like an enhanced foundation in his or her discipline. It may also appeal to any student who simply wishes to understand better the beauty and logic that governs the world around us and our place within it.

### **Students graduating with a minor in Physics will have demonstrated the following learning outcomes:**

1. Physical Principles. Students will be able to apply basic physical principles—including classical mechanics, electricity and magnetism, quantum mechanics, and statistical mechanics—to explain, analyze, and predict a variety of natural phenomena.

2. Mathematical Expertise. Students will be able to apply advanced mathematical techniques (e.g., calculus, linear algebra, probability, and statistics) in their explanations, analyses, and predictions of physical phenomena.

To receive a minor in physics, a student must complete the following requirements, all of which must be taken for a letter grade (32 units total):

### **REQUIRED LOWER-DIVISION PHYSICS/MATH COURSES [16 UNITS]**

MATH 023: Vector Calculus (4)

MATH 024: Introduction to Linear Algebra and Differential Equations (4)

MATH 032: Probability and Statistics (4)

PHYS 010: Introductory Physics III (4)

Note that co- and prerequisites for these courses must also be completed (namely, PHYS 8, PHYS 9, MATH 21 and MATH 22, or their equivalents).

### **REQUIRED UPPER-DIVISION CORE PHYSICS COURSES [8 UNITS]**

A student must take any two of the following four core physics courses:

PHYS 105: Analytic Mechanics Core (4)

PHYS 110: Electrodynamics Core (4)

PHYS 112: Statistical Mechanics Core (4)

PHYS 137: Quantum Mechanics Core (4)

### **REQUIRED ADDITIONAL UPPER-DIVISION PHYSICS COURSES [8 UNITS]**

A student must take at least two additional upper division physics courses, of his/her choice, totaling at least 8 units.

### **■ APPLIED MATHEMATICS MINOR**

Mathematics has been a central feature of humanity's intellectual achievements over the past several centuries. It is well established that mathematics provides the underlying framework to develop theory in the physical sciences and engineering. Moreover, mathematics is becoming increasingly important in the development of new knowledge in the social sciences and life sciences. These new application areas for applied mathematical sciences are undergoing remarkable growth. The Applied Mathematics minor gives students an opportunity to learn the fundamentals of modeling, analysis

and scientific computing that make up the foundation of applied mathematics. The Applied Mathematics minor may be useful to students seeking to strengthen their educational experience in their major through building additional skills in quantitative reasoning and problem solving.

### **Students graduating with a minor in Applied Mathematics will have demonstrated the following learning outcomes:**

Upon graduating, we expect students completing the Applied Mathematical Sciences minor to be able to:

1. Solve mathematical problems using analytical and/or computational methods.

2. Identify the usefulness of applying mathematics to solve real-world problems.

3. Give clear and organized written and verbal explanations of mathematical ideas to a variety of audiences.

4. Recognize the relationships between different areas of mathematics and the connections between mathematics and other disciplines.

To receive a minor in Applied Mathematics, a student must complete the following requirements (20 units total), and follow the Natural Sciences guidelines on minors.

### **REQUIRED LOWER DIVISION MATH COURSES [4 UNITS]**

MATH 018 Statistics (4) or MATH 032: Probability and Statistics (4)

### **REQUIRED UPPER DIVISION CORE APPLIED MATHEMATICS COURSES [4 UNITS]**

MATH 121: Applied Mathematics Methods I (4)

Note that the following courses are prerequisites to the required course MATH 121: MATH 021: Calculus of a Single Variable I (4), MATH 022: Calculus of a Single Variable II (4), MATH 023: Vector Calculus (4), and MATH 024: Introduction to Linear Algebra and Differential Equations (4).

### **REQUIRED ADDITIONAL UPPER DIVISION APPLIED MATHEMATICS COURSES [12 UNITS]**

A student must take at least three additional upper division Applied Mathematics courses, of his/her choice, totaling at least 12 units.

Possible courses are:

MATH 122: Applied Mathematics methods II (4)

MATH 131: Numerical Analysis I (4)

MATH 132: Numerical Analysis II (4)

MATH 141: Linear Analysis I (4)

MATH 142: Linear Analysis II (4)

MATH 150: Mathematical Modeling (4)

MATH 198: Independent Study (4)

# School Of Social Sciences, Humanities And Arts

## A WELCOME FROM THE SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS

Dear Students:

Welcome to the School of Social Sciences, Humanities and Arts! Our school embraces many disciplines, including economics, management, cognitive science, history, political science, literature, psychology, philosophy, anthropology, sociology, and the global arts. Our faculty are among the very best scholars in the world in their respective disciplines and they have joined UC Merced to create exciting new programs that appeal to our leaders of the future.

In our school, you will encounter many different approaches to our understanding of human nature, and become prepared for a lifetime of learning in an ever-changing world. The areas covered in our School will prepare you for future careers in many fields, including business, law, media, psychology, social work, and government. In a world of rapid changes, one of the primary goals of education is to learn how to learn. The tools of the social sciences, humanities and the arts are at your disposal.

Many opportunities for growth await you. Your academic classes and labs will challenge and stimulate you. You will broaden your horizons and share your ideas with fellow students from different disciplines. Our School offers undergraduate and graduate programs that allow flexible courses of study and opportunities for research at the intersections where the interesting questions lie. We encourage you to take classes outside of your chosen focus area and to get involved in activities outside of the classroom. Experience shows that students who are involved in such activities and balance their academic work with out-of-the-classroom experiences are happier, better-adjusted, enjoy life more, and are better prepared for life after the university.

At UC Merced you have a unique opportunity to get to know your professors and to work with them on research projects. Our School is still small and informal. It provides a rare opportunity to have the advantages of a world-class research university as well as the intimacy of a smaller institution.

It is our wish that many of you will fully realize the unique possibilities and near limitless opportunities offered to those who wish to join us in laying the foundations of the first research university of the twenty-first century, and we whole-heartedly welcome you to UC Merced.

*The Faculty of the School of Social Sciences, Humanities and Arts*

*The educational mission of our School is to create a rich learning environment by looking at people and society through the lenses of the many disciplines comprising the social sciences, humanities and arts.*

## EDUCATIONAL PHILOSOPHY

Our educational philosophy can be captured by the following principles which guide the way that the School of Social Sciences, Humanities and Arts constructs a learning foundation for our students:

Doing is the basis for learning. Students are encouraged to create the forms they are studying—whether they are plays, maps, persuasive essays or social surveys. We believe that developing writing skills leads to critical reading; being an articulate speaker leads to becoming a better listener; and developing models of decision-making from a holistic multidisciplinary perspective leads to a better appreciation of how policy is developed. We invite students to participate in the research programs of our faculty, to create student-led teams and to embark on individual, mentored research projects. Through their research, students learn to evaluate and use evidence and construct persuasive arguments based upon actual events and previous experience.

Learning is ubiquitous. Some of the best learning occurs outside of the classroom around peers and in communities. Diverse learning environments allow students to make connections between books and the world. Human beings are natural learners, and our job as educators is to provide an environment where students can engage these natural instincts. Courses are the anchors, but a lot of exciting learning depends upon students' own discovery of the links between formal academic programs and other endeavors such as foreign travel, artistic performance, political or business internship or community service.

Citizenship is founded in community. When we develop an informed and critical engagement with our own community, we can make better sense of what is happening there, and we can begin to see how our home is related to the globe. We live in a world where we are globally interdependent. Political borders, which change over time, determine citizenship and affect life opportunities. Ideas, diseases, languages, goods and individuals have always moved around the region and the world, but they do not reach all destinations with equal ease; they do not have equivalent effects when they alight in different places; and they are transformed by their new environments. We envision our community of students as developing a zone of comfort that allows them to act simultaneously as local and global citizens.

As a new campus, UC Merced has the singular opportunity to foster an integrative environment that draws from these disciplinary research traditions, but is not limited by their boundaries. The School of Social Sciences, Humanities and Arts offers a broad range of undergraduate and graduate programs dedicated to preparing students for varied roles as responsible and thoughtful citizens and leaders. We offer research and academic programs in anthropology, the arts, cognitive science, economics, foreign languages, history, literatures and cultures, management, philosophy, political science, psychology, sociology and world heritage that:

- prepare students for meaningful careers and professions;
- encourage intellectual and moral growth;
- promote sound decision-making;
- instill the values of lifelong learning; and
- encourage civic responsibility, public service, and understanding in a diverse, global society.

Students have the opportunity to follow personal paths of discovery in disciplinary or interdisciplinary curricula, while at the same time gaining depth and expertise in methodological domains such as social statistics, historiography, Geographic Information Systems, economics, cultural analysis and cognitive science.

Culture, society, and artistic expression differ widely on the basis of their historical era and geographical location. Individuals and their cultures are affected by diverse natural environments, the questions we ask about ourselves and the world, the changing ways in which the world has been measured and envisioned, and the legacies of contacts, migrations or isolation. As students learn to understand the ways that time and place have shaped lives, institutions and works of the imagination, they develop perspectives that enable them to better understand and shape our futures.

### SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS REQUIREMENTS

All students in the School of Social Sciences, Humanities and Arts, regardless of major, are expected to meet the minimum requirements for a degree. The School of Social Sciences, Humanities and Arts degree requirements are:

#### At least 120 units to include the following:

- At least 45 semester units of general education courses. Courses graded with a pass/no pass grading option are limited to one third of the total number of units required.
- At least 60 semester units of upper division courses. Courses graded with a pass/no pass option are limited to one-third of the total number of units required.
- Students must complete all course prerequisites with a C- or better.
- Students must complete all major requirements with a C- or better and maintain a 2.0 GPA in all major course work.
- Students must complete all major requirements with a letter grade option unless the course is only offered on a pass/no pass basis.
- Students are not permitted to take more than one third of SSHA general education and major requirements at institutions other than UC Merced and approved University of California programs including Education Abroad, The University of California Center at Sacramento and The University of California at Washington Center.
- Students must obtain pre-approval through the SSHA Advising Office for all courses completed at institutions other than UC Merced.

### GENERAL EDUCATION REQUIREMENTS [48 UNITS]

Students in the School of Social Sciences, Humanities and Arts are required to complete the following list of general education courses. Consult a SSHA advisor or the SSHA website for approved courses which meet SSHA GE Requirements.

#### LOWER DIVISION UCM GENERAL EDUCATION REQUIREMENTS

College One Core course sequence,  
The World at Home (CORE 001) . . . . . 4 units  
College Reading and Composition (WRI 010) . . . . . 4 units  
Mathematical/Quantitative Reasoning course . . . . . 4 units

#### LOWER DIVISION SSHA GENERAL EDUCATION REQUIREMENTS

Natural Sciences or Engineering Introductory course with laboratory, field or studio . . . . . 4 units  
Second Natural Sciences or Engineering course with or without laboratory, field or studio\* . . . . . 4 units  
Humanities, Arts, or Foreign Language course (outside of your major(s)) . . . . . 4 units  
Social Sciences course (outside of your major(s)) . . . . . 4 units

\*May also be satisfied by ANTH 005 for non-Anthropology majors.

#### UPPER DIVISION UCM GENERAL EDUCATION REQUIREMENTS

Core Course Sequence, The World at Home (CORE 100). . . . . 4 units

#### UPPER DIVISION SSHA GENERAL EDUCATION REQUIREMENTS

Four Upper Division General Education courses outside area of emphasis or major(s) . . . . . 16 units

The first course of the Core Course sequence, CORE 001, The World at Home, is common for all UC Merced freshmen. This course lays the foundation in skills and ideals articulated in the UC Merced Guiding Principles for General Education (see General Education section of this catalog). These include decision-making, communication, ethics, responsibility, leadership, teamwork, aesthetic understanding, creativity and an appreciation of diverse perspectives in both the global and community contexts. All UC Merced students also take CORE 100, The World at Home, in their junior year.

#### TRANSFER STUDENTS

Please review the "General Education for Transfer Students" section on the UC Merced General Education page. Transfer students are strongly encouraged to complete IGETC in order to prepare for work within the School of Social Sciences, Humanities and Arts. Students who do not complete IGETC before transferring are required to complete SSHA Foundations, an IGETC-like general education pattern. Please contact the SSHA Advising Office for more information at [ssha.advising@ucmerced.edu](mailto:ssha.advising@ucmerced.edu).

#### FOREIGN LANGUAGE PLACEMENT AT UC MERCED

To ensure proper placement in our foreign language courses, students with previous academic instruction in the language that they would like to study are encouraged to take the placement exam for that language. However, students wishing to use language proficiency to satisfy a major, minor or general education requirement must have their placement scores confirmed by the foreign language program. Please contact the Foreign Language Program Coordinator or a UC Merced academic advisor for more information.

Note: Students may not complete placement exams after they have enrolled in a UC Merced course in that language.



## Social Sciences, Humanities And Arts Majors

Major area upper division courses and emphasis track requirements are unique to each major. These are presented in the following section on majors.

The School of Social Sciences, Humanities and Arts also offers several minor programs (Anthropology, American Studies, Arts, Cognitive Science, Economics, History, Literatures and Cultures, Management, Philosophy, Political Science, Psychology, Services Science, Sociology, Spanish and Writing). Detailed descriptions of each minor, as well as minor requirements, are listed following the overview of major programs.

### ■ Anthropology Major\*

Anthropology is dedicated to understanding humankind's diversity as well as what makes us uniquely human. Through the specific perspectives and methods of socio-cultural, archaeological, and biological anthropology, students learn how the human experience (past and present) is constituted through the interaction of social, cultural, political, material, historical, environmental, and biological factors. Anthropology strives for a holistic understanding of humankind and, depending on the questions asked and the means used to discover answers, anthropological knowledge can straddle the social sciences, humanities, and natural sciences.

The undergraduate major in Anthropology emphasizes how topics and issues central to the human experience such as migration, gender, power, health, kinship, race, and identity are examined and understood through diverse anthropological methodologies. In upper division courses, students explore particular socio-cultural, archaeological, and biological perspectives on such issues in greater depth, and these courses may specifically engage perspectives from two or more sub fields. Other courses may consider a range of topics within a specific geographical area, while acknowledging certain limitations to the area studies configuration of knowledge.

Undergraduate majors in Anthropology develop critical skills in thought, written and oral expression, and the application of knowledge, as well as a valuable understanding of human cultural diversity. In an increasingly globalized world in which interaction with people of diverse cultures is becoming the norm, developing a cross cultural understanding about the complexities of human societies past and present is what makes Anthropology an ideal education for the 21st century. A bachelor's degree in Anthropology is valuable preparation for a career in law, medicine, education, business, government, museums, and various areas of non profit, public, and international service, including public policy and cultural resource management. The Anthropology program also provides a strong foundation for graduate study in any sub field of anthropology. By offering undergraduate majors opportunities to work with faculty research and apply knowledge and skills to local communities, agencies, and business through service learning and internships, students are further prepared for advanced study and successful careers.

#### Requirements for the B.A. in Anthropology (ANTH)

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the Anthropology major requires at least 48 units in Anthropology courses, as

well as one additional 4-unit quantitative reasoning course and one additional 4-unit upper division interdisciplinary thematic articulation course that may simultaneously fulfill General Education Requirements. Courses in the major must be taken for a letter grade, and specifically may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. Required courses are:

#### LOWER DIVISION MAJOR REQUIREMENTS [16 UNITS]

Introduction to Socio-cultural Anthropology (ANTH 001) . . . . . 4 units  
 Introduction to Anthropological Archaeology (ANTH 003) . . . . . 4 units  
 Introduction to Biological Anthropology (ANTH 005)\* . . . . . 4 units

\*Does not satisfy the Natural Sciences or Engineering course with laboratory, field or studio General Education requirement.

#### One lower division quantitative methods course from the following\*:

Statistical Inference (ECON 010) . . . . . 4 units  
 Statistics for Scientific Data Analysis (MATH 018) . . . . . 4 units  
 Analysis of Political Data (POLI 010) . . . . . 4 units  
 Analysis of Psychological Data (PSY 010) . . . . . 4 units  
 Statistics for Sociology (SOC 010) . . . . . 4 units

\*Meets the Quantitative Reasoning General Education requirement.

#### UPPER DIVISION MAJOR REQUIREMENTS [40 UNITS]

History of Anthropological Thought and Practice (ANTH 100) . . . 4 units

#### One upper division field methods course selected from the following:

Ethnographic Methods (ANTH 170) . . . . . 4 units  
 Archaeological Field Methods (ANTH 176) . . . . . 4 units

#### One upper division laboratory or archival methods course selected from the following:

Ethnohistory (ANTH 172) . . . . . 4 units  
 Lithic Analysis (ANTH 174) . . . . . 4 units  
 Human Osteology (ANTH 178) . . . . . 4 units  
 Bioarchaeology (ANTH 179) . . . . . 4 units

#### One upper division anthropology course from each of the following three fields:

Socio-cultural anthropology (ANTH 110 through ANTH 129) . . . 4 units  
 Anthropological archaeology (ANTH 130 through ANTH 149) . . . 4 units  
 Biological anthropology (ANTH 150 through ANTH 169) . . . . . 4 units

#### ADDITIONAL DEGREE REQUIREMENTS [16 UNITS]

At least three additional upper division courses in Anthropology . . . . . 12 units

At least one upper division interdisciplinary thematic articulation course outside of Anthropology . . . . . 4 units

(Please consult a SSHA advisor or the SSHA web site for approved courses).

The upper division field methods requirement may be satisfied by taking an archaeological Field School from an approved institution.

#### Transfer Students

Transfer students who wish to major in Anthropology should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. In addition, students should complete at least two UC transferable introductory courses in anthropology, one of which must be introductory socio-cultural anthropology, and one UC-transferable statistics course.

\*Pending the approval of our accreditation agency, the Western Association of Schools and Colleges (WASC).

## Anthropology Program Learning Outcomes

Upon graduation, students majoring in Anthropology will:

- Possess and apply fundamental anthropological knowledge, including terminology, concepts, intellectual traditions, and theoretical approaches;
- Identify and analyze common topics of research shared by the sub-fields of anthropology;
- Understand ethics and responsibility in the practice of anthropology and in our roles as citizens;
- Recognize and appreciate what it means to be human and how ethnographic, archaeological, and biological knowledge contribute to that understanding;
- Understand both qualitative and quantitative research methods as they apply to anthropological inquiry;
- Possess skills to communicate anthropological knowledge effectively through writing, oral presentation, and data presentation in various formats for diverse audiences.

## SAMPLE PLAN OF STUDY FOR B.A. DEGREE IN ANTHROPOLOGY

### SEMESTER 1

CORE 001	The World at Home	4
WRI 010	College Reading and Composition	4
ANTH 001	Introduction to Socio-cultural Anthropology	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

### SEMESTER 2

ANTH 003	Introduction to Anthropological Archaeology	4
	Natural Sciences or Engineering course	4
	Lower Division Humanities, Arts or Foreign Language course outside ANTH	4
	Lower Division Social Sciences course outside ANTH	4
<b>Semester Units</b>		<b>16</b>

### SEMESTER 3

ANTH 005	Introduction to Biological Anthropology	4
	Upper Division ANTH socio-cultural anthropology course	4
	Natural Sciences/Engineering course w/ Lab, Field or Studio	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

### SEMESTER 4

	Upper Division ANTH archaeological archaeology course	4
	Upper Division ANTH biological anthropology course	4
	Quantitative Methods course	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

### SEMESTER 5

ANTH 100	History of Anthropological Thought and Practice	4
	Upper Division ANTH field methods course	4
	Upper Division General Education course outside Anthropology I	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

### SEMESTER 6

CORE 100	The World at Home	4
	Upper Division ANTH lab/archival methods course	4
	Upper Division ANTH elective I	4
	Upper Division General Education course outside Anthropology II	4
<b>Semester Units</b>		<b>16</b>

### SEMESTER 7

	Upper Division ANTH elective II	4
	Upper Division General Education course outside Anthropology III	4
	Upper Division Interdisciplinary Thematic Course	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

### SEMESTER 8

	Upper Division ANTH elective III	4
	Upper Division General Education course outside Anthropology IV	4
	Elective	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

### Total Program Units

**128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

I LIKE UC MERCED BECAUSE I HAVE GREAT FRIENDS HERE! WE STUDY TOGETHER AND COME UP WITH MANY RANDOM THINGS TO DO AND IT MAKES MY TIME MORE WORTHWHILE.

—Maira Alcalá, Orosi, Psychology Major

## ■ Cognitive Science Major

Cognitive Science is the interdisciplinary study of human thought and behavior. It combines methods, theories, and applications from many disciplines, including philosophy, psychology, linguistics, computer science, neuroscience, and biology. The Cognitive Science majors, B.A. and B.S., provide a broad knowledge of cognitive science, including language and communication, reasoning, memory, categorization, cognitive modeling, perception and action, philosophical foundations, artificial intelligence, cognitive engineering, and cognitive science applications for the business setting. A degree in Cognitive Science provides in-depth training in research methods, data analysis, modeling, and lab-based research, and it provides excellent training for jobs in high-tech companies. It is ideal for students who want to pursue graduate work in cognitive science, neuroscience, psychology, computer science and engineering, information sciences and information management, communications, medicine, business, management, law, and education. Students can work with cognitive science faculty to tailor their own program of study to emphasize one or two specific areas within cognitive science. Example specializations include cognitive neuroscience, cognitive linguistics, computational modeling, decision sciences, and philosophy of cognitive science.

### Requirements for the B.A. in Cognitive Science (COGS)

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the Cognitive Science major, B.A., requires 50-52 units (some of which simultaneously meet general education requirements). Courses in the major must be taken for a letter grade, and may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. All major course requirements must be completed with a grade of C- or better. Required courses include:

### LOWER DIVISION MAJOR REQUIREMENTS [22-24 UNITS]

Introduction to Cognitive Science (COGS 001) . . . . . 4 units

*Two additional introductory courses chosen from the following:*

Introduction to Language and Linguistics (COGS 005) . . . . . 4 units

Introduction to Economics (ECON 001)\* . . . . . 4 units

Introduction to Philosophy (PHIL 001)<sup>#</sup> . . . . . 4 units

Introduction to Psychology (PSY 001)\* . . . . . 4 units

\*Meets Social Science course outside of major General Education requirement.

<sup>#</sup>Meets Humanities, Arts or Foreign Language course outside of major General Education requirement.

Analysis of Psychological Data (PSY 010)\* . . . . . 4 units

\*ECON 010 or MATH 032 may also be considered by petition. (Meets the Quantitative Reasoning General Education requirement.)

Calculus of a Single Variable I (MATH 021) . . . . . 4 units

An introductory lower division computing course (e.g., CSE 005 or CSE 020) . . . . . 2-4 units

### UPPER DIVISION MAJOR REQUIREMENTS [28 UNITS]

Mind, Brain, and Computation (COGS 101) . . . . . 4 units

Research Methods for Cognitive Scientists (COGS 105) . . . . . 4 units

At least four additional upper division courses in Cognitive Science\* . . . . . 16 units

\*One upper division course in Philosophy may be substituted.

One additional upper division course in Cognitive Science, Philosophy, Political Science, Psychology, Arts, Management, Economics, Biology or Computer Science and Engineering. . . . . 4 units

### Transfer Students

Transfer students planning to major in Cognitive Science, B.A. should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. They must also complete at least three UC-transferable introductory social sciences courses, including one introductory psychology or philosophy course, two lower division natural sciences or engineering courses, including one with a lab, field, or studio component, one computer science course, one semester of calculus and one UC-transferable statistics course.

### Cognitive Science Program Learning Outcomes

Upon graduation, students majoring in Cognitive Science will be able to:

- Explain and apply knowledge of landmark findings and theories in cognitive science.
- Design, interpret, and evaluate simple behavioral and neuroscientific experiments.
- Interpret and appreciate formal and computational approaches in cognitive science.
- Argue for or against theoretical positions in cognitive science.
- Use a cognitive science education outside of the undergraduate classroom, particularly in the service of careers.

### SAMPLE STUDY PLAN FOR COGNITIVE SCIENCE B.A.

#### SEMESTER 1

CORE 001	The World at Home	4
COGS 001	Introduction to Cognitive Science	4
WRI 010	College Reading & Composition	4
	Elective	4

**Semester Units** **16**

#### SEMESTER 2

	Additional introductory course I	1
MATH 021	Calculus of a Single Variable I	4
	Natural Sciences or Engineering course w/ Lab, Field or Studio	4
	Elective	4

**Semester Units** **16**

#### SEMESTER 3

	Lower Division Humanities, Arts or Foreign Language course	4
	Introductory Computing course	4
PSY 010	Analysis of Psychological Data	4
	Elective	4

**Semester Units** **16**

Cognitive Science Professor Teenie Matlock lecturing to a student group.



**SEMESTER 4**

	Natural Sciences or Engineering course	4
	Additional introductory course II	4
	Elective	4
	Elective	4

**Semester Units** **16**

**SEMESTER 5**

	Upper Division COGS course I	4
COGS 105	Research Methods for Cognitive Science	4
	Upper Division GE course outside COGS I	4
	Elective	4

**Semester Units** **16**

**SEMESTER 6**

CORE 100	The World at Home	4
	Upper Division COGS course II	4
	Upper Division GE course outside COGS II	4
	Elective	4

**Semester Units** **16**

**SEMESTER 7**

	Upper Division COGS course III	4
	Upper Division course from COGS, PSY, PHIL, ARTS, MGMT, ECON, BIO, or CSE	4
COGS 101	Mind, Brain and Computation	4
	Upper Division GE course outside COGS III	4

**Semester Units** **16**

**SEMESTER 8**

	Upper Division COGS course IV	4
	Upper Division GE course outside COGS IV	4
	Elective	4
	Elective	4

**Semester Units** **16**

**Total Program Units** **128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**Requirements for the B.S. in Cognitive Science (COGS)**

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, students in the Cognitive Science major, B.S., must complete 60-65 units (some of which simultaneously meet general education requirements). Compared to the B.A., the B.S. requires three additional lower division courses, one each in math, science and computing. In addition, B.S. students are encouraged to pursue upper division courses in Biology or Computer Science and Engineering. Courses in the major must be taken for a letter grade, and may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. Required courses include:

**LOWER DIVISION MAJOR REQUIREMENTS [32-37 UNITS]**

Introduction to Cognitive Science (COGS 001) . . . . . 4 units

*Two introductory courses chosen from the following:*

Introduction to Language and Linguistics (COGS 005) . . . . . 4 units

Introduction to Economics (ECON 001)\* . . . . . 4 units

Introduction to Philosophy (PHIL 001)# . . . . . 4 units

Introduction to Psychology (PSY 001)\* . . . . . 4 units

\*Meets Social Science course outside of major General Education requirement.

#Meets Humanities, Arts or Foreign Language course outside of major General Education requirement.

Analysis of Psychological Data (PSY 010)\* . . . . . 4 units

\*ECON 010 or MATH 032 may also be considered by petition. (Meets the Quantitative Reasoning General Education requirement).

Calculus of a Single Variable I (MATH 021) and  
Calculus of a Single Variable II (MATH 022) . . . . . 8 units

Two lower division computing courses (e.g., CSE 020 and CSE 021; CSE 005 will not meet this requirement) . . . . . 4-8 units

Science Introductory Course with Laboratory, Field, or Studio Component (In addition to 8 units required for the General Education Natural Sciences/Engineering Requirement). Designated courses include BIO 001+BIO 001L, BIO 003, CHEM 002, CHEM 008, PHYS 008, PHYS 009. . . . . 4-5 units

Consult SSHA Advising for current list of designated natural sciences/engineering courses.

**UPPER DIVISION MAJOR REQUIREMENTS [28 UNITS]**

Mind, Brain, and Computation (COGS 101) . . . . . 4 units

Research Methods for Cognitive Scientists (COGS 105) . . . . . 4 units

At least four additional upper division courses in Cognitive Science\* . . . . . 16 units

\*One upper division course in Biology, Computer Science and Engineering, or Philosophy may be substituted.

One additional upper division course in Cognitive Science, Philosophy, Political Science, Psychology, Arts, Management, Economics, Biology or Computer Science and Engineering. . . . . 4 units

### Transfer Students

Transfer students planning to major in Cognitive Science, B.S. should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. They must also complete at least three UC-transferable introductory social sciences courses, including one introductory psychology or philosophy course, three lower division natural sciences or engineering courses, including two with a lab, field, or studio component, two computer science courses, two semesters of calculus and one UC-transferable statistics course.

### SAMPLE STUDY PLAN FOR COGNITIVE SCIENCE B.S.

#### SEMESTER 1

CORE 001	The World at Home	4
COGS 001	Introduction to Cognitive Science	4
WRI 010	College Reading & Composition	4
	Natural Sciences or Engineering course w/ Lab, Field or Studio I	4
<b>Semester Units</b>		<b>16</b>

#### SEMESTER 2

	Additional introductory course I	4
MATH 021	Calculus of a Single Variable I	4
	Natural Sciences or Engineering course w/ Lab, Field or Studio II	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

#### SEMESTER 3

	Lower Division Humanities, Arts or Foreign Language course	4
PSY 010	Analysis of Psychological Data	4
CSE 020	Introduction to Computing I	2
MATH 022	Calculus of a Single Variable II	4
<b>Semester Units</b>		<b>14</b>

#### SEMESTER 4

	Natural Sciences or Engineering course	4
	Additional introductory course II	4
CSE 021	Introduction to Computing II	2
	Elective	4
<b>Semester Units</b>		<b>14</b>

#### SEMESTER 5

	Upper Division COGS course I	4
COGS 105	Research Methods for Cognitive Science	4
	Upper Division GE course outside COGS I	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

#### SEMESTER 6

CORE 100	The World at Home	4
	Upper Division COGS course II	4
	Upper Division GE course outside COGS II	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

#### SEMESTER 7

	Upper Division COGS course III	4
	Upper Division course from COGS, PSY, PHIL, POLI, ARTS, MGMT, ECON, BIO, or CSE	4
COGS 101	Mind, Brain and Computation	4
	Upper Division GE course outside COGS III	4
<b>Semester Units</b>		<b>16</b>

#### SEMESTER 8

	Upper Division General Education course outside COGS IV	4
	Upper Division COGS course IV	4
	Elective	4
	Elective	4
<b>Semester Units</b>		<b>16</b>

#### Total Program Units

**128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.



Professor Kathleen Hull at UC Merced's 2008 Commencement Ceremony.

## ■ Economics Major

Economists study how scarce resources are allocated so that the well-being of individuals is maximized. Whether the resource that is being allocated is income, time, or a precious commodity, there is always some tradeoff associated with allocating the resource for one use and not another. Individuals, businesses, and governments face these tradeoffs in countless ways everyday. The most important thing students learn from studying economics is how to identify, measure, and understand the essential elements of this tradeoff.

The Economics major is built on a foundation of strong theoretical and statistical training. The major provides students solid grounding in microeconomic and macroeconomic theory, statistical and econometric methodology, as well as applied economic analysis. The Economics major emphasizes the role of incentives and institutions in shaping economic outcomes and how public policies influence economic performance and individual outcomes. Special emphases in the program include labor economics, public economics, political economy, law and economics, environmental economics, empirical methods, and U.S. economic history.

In addition to having a solid understanding of economic theory, our program has a special emphasis on empirical research methods in economics. All students engage in research (with faculty, in teams, and independently) that involves analyzing data and answering well formulated questions related to public policies. With these research experiences, our students are competitive for research internships, fellowships, and pre-graduate summer programs while still in school.

Because students with a degree in economics develop strong analytical and quantitative skills and the ability to solve complex problems effectively, studying economics is excellent preparation for many careers in business, law, management consulting, education, or public service. Businesses of all types and sizes, financial institutions, consulting firms, government agencies, non-governmental organizations, as well as graduate business and law schools actively seek graduates with bachelor's degrees in economics. In addition, many of our students go on to do graduate study in economics, law, public policy, or business.

### Requirements for the B.A. in Economics (ECON)

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the Economics major requires 48 units (some of which simultaneously fulfill general education requirements). Courses in the major must be taken for a letter grade and may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. Students must complete all major course prerequisites with a C- or better. Students in the Economics major must maintain a 2.0 grade point average in all major coursework.

### LOWER DIVISION MAJOR REQUIREMENTS [16 UNITS]

Introduction to Economics (ECON 001) . . . . . 4 units  
 One introductory course chosen from\*: . . . . . 4 units

- Introduction to Cognitive Science (COGS 001)
- Introduction to Psychology (PSY 001)
- Introduction to Political Science (POLI 001)
- Introduction to Sociology (SOC 001)

\* Meets Social Sciences course outside of major General Education requirement.

Statistical Inference (ECON 010)# . . . . . 4 units

Calculus of a Single Variable I (MATH 021)# . . . . . 4 units

#Meets Quantitative Reasoning General Education requirement.

### UPPER DIVISION MAJOR REQUIREMENTS [32 UNITS]

Intermediate Microeconomic Theory (ECON 100) . . . . . 4 units

Intermediate Macroeconomic Theory (ECON 101) . . . . . 4 units

Econometrics (ECON 130) . . . . . 4 units

At least five additional upper division courses in Economics. . . . 20 units

### Transfer Students

Transfer students planning to major in Economics should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. They must also complete at least two UC-transferable introductory social sciences courses, including introductory macroeconomics and microeconomics courses and one semester of a UC-transferable calculus course.

### Economics Program Learning Outcomes

Upon graduation, students majoring in Economics will be able to:

- Understand the role of organizations and institutions in a society; understand the impact of organizations and institutions on the economic environment and outcomes; and to understand how incentives influence individual and organizational behavior and performance.
- Recognize how government actions affects economic performance and how economic interests influence government decisions.
- Design and conduct research that will inform managerial and policy decision-making; be able to collect, analyze, and interpret data using familiar software packages.
- Define problems and identify multifaceted explanations for complex economic phenomena; use information and data from multiple sources to answer the questions at hand.
- Think critically about the information that they encounter, whether it is in their work or reported in the media.
- Have an ability to communicate clearly and cogently in written and oral form using modern technology.
- Engage in life-long learning.

### SAMPLE PLAN OF STUDY FOR B.A. DEGREE IN ECONOMICS

#### SEMESTER 1

CORE 001	The World at Home	4
ECON 001	Introduction to Economics	4
WRI 010	College Reading & Composition	4
MATH 021	Calculus of a Single Variable I	4

**Semester Units** **16**

#### SEMESTER 2

	Natural Sciences or Engineering course w/ Lab, Field or Studio	4
	Lower Division Humanities, Arts or Foreign Language course	4
	Elective	4
	Lower Division Social Sciences course outside ECON	4

**Semester Units** **16**

**SEMESTER 3**

ECON 100	Intermediate Microeconomic Theory	4
ECON 010	Statistical Inference	4
	Natural Sciences or Engineering course	4
	Elective	4

**Semester Units** **16**

**SEMESTER 4**

	Upper Division General Education course outside ECON I	4
ECON 130	Econometrics	4
	Elective	4
	Elective	4

**Semester Units** **16**

**SEMESTER 5**

	Upper Division ECON course I	4
	Upper Division General Education course outside ECON II	4
	Elective	4
	Elective	4

**Semester Units** **16**

**SEMESTER 6**

	Upper Division ECON course II	4
ECON 101	Intermediate Macroeconomic Theory	4
	Elective	4
CORE 100	The World at Home	4

**Semester Units** **16**

**SEMESTER 7**

	Upper Division ECON course III	4
	Upper Division ECON course IV	4
	Upper Division General Education course outside ECON III	4
	Elective	4

**Semester Units** **16**

**SEMESTER 8**

	Upper Division ECON course V	4
	Upper Division General Education course outside ECON IV	4
	Elective	4
	Elective	4

**Semester Units** **16**

**Total Program Units** **128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**History Major**

The Greek historian Thucydides wrote many centuries ago that the study of history is of value to any "who desire an exact knowledge of the past as an aid to the interpretation of the future." In a diverse and interdependent world, the study of History provides students with the tools to make sense of both the past and present, and to prepare for the future. We cannot hope to address America's contemporary racial dilemmas without understanding the history of slavery and Manifest Destiny. Nor can we grasp today's global patterns of poverty and prosperity without grappling with the history of empire and the spread of capitalism. The long history of immigration that has made California's Central Valley such a diverse region is intertwined with both global and national histories of war, revolution, commerce, culture, and politics.

Though rooted in the study of the past, the tools employed by historians are useful in a broad array of modern careers and professions. History, with its focus on research, writing, and argumentation, is well known as an excellent preparation for graduate school, law school, and other professions. History majors may also find employment related to their degrees in schools, museums, editing and publishing, archives, historic preservation, federal, state and local agencies, and as consultants and contractors.

History majors at UC Merced choose a field of concentration in either United States History or World History. They apply their classroom learning to research problems outside the classroom, where they can contribute to expanding public knowledge and awareness of cultural issues. Students may explore thematic topics such as environmental history, the history of science and technology, the history of migration and cultural intersections, as well as issues of world, national, state and local history.

Current UC Merced faculty members' areas of expertise include archives and museums, the study of global conflict and diplomacy, American history, world history, political geography, and the digital mapping of historical and cultural phenomena.

**Requirements for the B.A. in History (HIST)**

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the History major requires 64 units. Courses in the major must be taken for a letter grade and may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. Students must complete all major course prerequisites with a C-or better. All major course requirements must be completed with a grade of C-or better. Students in the History major must maintain a 2.0 grade point average in all major coursework.

**LOWER DIVISION MAJOR REQUIREMENTS [24 UNITS]**

A two-semester lower division introductory sequence in area of concentration . . . . . 8 units

*Please choose one of the following combinations:*

**Concentration in World History:**

Introduction to World History to 1500 (HIST 010) and Introduction to World History since 1500 (HIST 011)

**Concentration in United States History:**

The Forging of the United States, 1607-1877 (HIST 016) and The Modern United States, 1877-Present (HIST 017)

(Additional introductory region/nation sequence courses in History may be taken to meet this requirement as those courses are developed in future years. Please consult a SSHA advisor and/or visit SSHA's web site to check for approved new course sequence additions).

Two other lower division courses, at least one of which is from HIST 010, 011, HIST 016, or 017 . . . . . 8 units  
 One Year of College-level Courses in a Language other than English. . . . . 8 units

(Students must take one year of the same language. This requirement may be satisfied through alternative means, such as proficiency testing and/or prior college-level course work. Does not meet the lower division Humanities, Arts or Foreign Language General Education requirement\*).

### UPPER DIVISION MAJOR REQUIREMENTS [32 UNITS]

The Historian's Craft (HIST 100) (must be taken in junior year) . . . 4 units  
 Applied Research (HIST 190) . . . . . 4 units  
 Senior Thesis (HIST 191) . . . . . 4 units  
 At least five additional Upper Division courses in History including: . . . . . 20 units

- At least two upper division History courses in area of concentration
- At least two upper division History courses outside area of concentration

### BREADTH REQUIREMENT [8 UNITS]:

Two non-History courses (lower or upper division) from within the chosen concentration.

(Consult a SSHA advisor or the SSHA web site for approved courses).

### Transfer Students

Transfer students who wish to major in History should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. In addition, students should complete at least one full-year, of a UC-transferable introductory course sequence selected from their intended concentration, either United States or world history, two additional introductory history courses in topics outside their concentration as well as introductory courses in anthropology, art history, economics, literature, political science and/or sociology. Students should complete the equivalent of one year of college-level courses in one language other than English.

### ■ CONCENTRATIONS

Currently, two concentrations are available within the History major. Students choosing to concentrate in U.S. History take courses exploring the development of America and its peoples from the centuries before European colonization through the present day. Courses within the U.S. History concentration range from African American history to the history of the Cold War and American foreign policy. Students in this concentration also take two courses in other disciplines that will broaden their understanding of U.S. history. Thus students might take a course in contemporary U.S. literature or Asian American music as a way of broadening their understanding of the diverse cultures that have historically shaped the development of the United States.

Students choosing to concentrate in World History take a one year introductory sequence exploring themes of human cultural and social development and the connections among peoples from the emergence of the human species until the present day. Following this course, students will have the opportunity to take upper division courses of global scope on topics such as trade, mapping, or the environment; and also courses focusing on some aspect of the history of a particular part of the world. Students in this concentration also take two courses in other disciplines that broaden their understanding of World History. Thus students might take an Anthropology course in Transnationalism, or an advanced course in a language other than English.

### History Honors Program

UCM History majors may petition to join the Honors Program, which will have additional requirements beyond the standard History major. Undergraduate majors who are accepted and successfully complete the Honors Program will receive a notation to that effect upon their diploma at graduation.

To be eligible for the Honors Program, a History major must achieve a minimum overall GPA of 3.3, a minimum GPA of 3.5 in the major and a minimum grade of A- in the major induction course, HIST 100: The Historian's Craft. Applications from qualified students will be considered by the History Honors Committee (composed of Academic Senate faculty in History). Please contact SSHA Advising for more information.

### History Program Learning Outcomes

Upon graduation, students majoring in History will be able to:

- Recognize the processes by which societies, cultures, and institutions change over time.
- Describe particular historical developments and explain their wider context.
- Critically read, analyze, and synthesize primary and secondary sources.
- Use methods of narrative and analysis appropriately for communicating historical phenomena.
- Identify the various contexts that shape the construction and use of historical sources and knowledge.

### SAMPLE STUDY PLAN: CONCENTRATION IN WORLD HISTORY

#### Semester 1

CORE 001	The World at Home	4
WRI 010	College Reading & Composition	4
HIST 010	Introduction to World History to 1500	4
	Foreign Language I	4

**Semester Units** **16**

#### Semester 2

	Elective	4
	Natural Sciences or Engineering course w/ Lab, Field, or Studio	4
HIST 011	Introduction to World History since 1500	4
	Foreign Language II	4

**Semester Units** **16**

#### Semester 3

	Lower Division HIST course outside concentration I	4
	Quantitative Reasoning course	4
	Lower Division Humanities, Arts or Foreign Language course outside HIST	4
	Elective	4

**Semester Units** **16**

#### Semester 4

	Lower Division HIST Course outside concentration II	4
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Natural Sciences or Engineering course	4
Lower Division Social Science course	4
Elective	4
<b>Semester Units</b>	<b>16</b>

**Semester 5**

HIST 100	The Historian's Craft	4
	Upper Division HIST course I	4
	Breadth Requirement I	4
	Upper Division General Education course outside of HIST I	4

<b>Semester Units</b>	<b>16</b>
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**Semester 6**

HIST 190	Applied Research	4
	Upper Division HIST course II	4
CORE 100	The World at Home	4
	Upper Division General Education course outside of HIST II	4

<b>Semester Units</b>	<b>16</b>
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**Semester 7**

	Upper Division HIST course III	4
	Upper Division HIST course IV	4
	Breadth Requirement II	4
	Upper Division General Education course outside of HIST III	4

<b>Semester Units</b>	<b>16</b>
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**Semester 8**

HIST 191	Senior Thesis	4
	Upper Division HIST course V	4
	Upper Division General Education course outside of HIST IV	4
	Elective	4

<b>Semester Units</b>	<b>16</b>
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**Total Program Units 128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**SAMPLE STUDY PLAN: CONCENTRATION IN U.S. HISTORY****Semester 1**

CORE 001	The World at Home	4
WRI 010	College Reading & Composition	4
HIST 016	The Forging of the United States, 1607-1877	4
	Foreign Language I	4

<b>Semester Units</b>	<b>16</b>
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**Semester 2**

	Elective	4
	Natural Sciences or Engineering course w/ Lab, Field or Studio	4
HIST 017	The Modern United States, 1877-Present	4
	Foreign Language II	4

<b>Semester Units</b>	<b>16</b>
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**Semester 3**

	Lower Division HIST course outside concentration I	4
	Quantitative Reasoning course	4
	Lower Division Humanities, Arts or Foreign Language course outside HIST	4
	Elective	4

<b>Semester Units</b>	<b>16</b>
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**Semester 4**

	Lower Division HIST course outside Concentration II	4
	Natural Sciences or Engineering course	4
	Lower Division Social Science Course	4
	Elective	4

<b>Semester Units</b>	<b>16</b>
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**Semester 5**

HIST 100	The Historian's Craft	4
	Upper Division HIST course I	4
	Breadth Requirement I	4
	Upper Division General Education course outside of HIST I	4

<b>Semester Units</b>	<b>16</b>
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**Semester 6**

HIST 190	Applied Research	4
	Upper Division HIST course II	4
CORE 100	The World at Home	4
	Upper Division General Education course outside of HIST II	4

<b>Semester Units</b>	<b>16</b>
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**Semester 7**

	Upper Division HIST course III	4
	Upper Division HIST course IV	4
	Breadth Requirement II	4
	Upper Division General Education course outside of HIST III	4

<b>Semester Units</b>	<b>16</b>
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**Semester 8**

HIST 191	Senior Thesis	4
	Upper Division HIST course V	4

Upper Division General Education course outside of HIST IV	4
Elective	4

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<b>Semester Units</b>	<b>16</b>
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<b>Total Program Units</b>	<b>128</b>
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The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## ■ Literatures and Cultures Major

The major in Literatures and Cultures at the University of California, Merced asks students to recognize the complex interactions of history, culture, and literature, and in doing so, to ask questions of gender and minority thought and discourse, and of intersections with other fields such as cognitive science, social sciences, and information science. Literatures and Cultures offers a program of study that develops in students the critical skills most necessary to understand how culture shapes and is shaped by the production, dispersal, and consumption of literary and cultural texts; it seeks to ensure that students understand the basic notion of cultural production, and that they are, through a variety of courses, familiarized with the inherent relationship between society and literature, between reading and thinking, and between individual and societal forms of expression. In keeping with the campus' primary directive of interdisciplinary approaches, the Literatures and Cultures major situates itself at a disciplinary crossroads, both inviting collaboration with the other schools and disciplines within the School of Social Sciences, Humanities and Arts and across the campus, and illustrating, within its own precepts, a wide ranging set of disciplinary approaches and interests.

Currently, the major asks students to select one of two concentrations, consisting of three overlapping interdisciplinary areas, each of which can be understood as a distinct geographic, intellectual, linguistic, and aesthetic territory, and which can also be studied in relation to the others. They are as follows: Literatures of the Spanish Speaking World, focusing on Mexico and the U.S., South and Central American countries and European countries such as Spain and Portugal; and Literatures of the English Speaking World, emphasizing literatures, both oral and written, produced within the United States and England, but also encompassing geographic terrains such as Australia and South Africa. The Literatures of the Spanish Speaking World concentration has a global reach and interest, which includes Peninsular, American, African, and Asian literatures in Spanish, as well as a Portuguese component. Courses in this area are taught in Spanish (with some eventually in Portuguese), and are available to students interested in cultural and linguistic proficiency in Spanish. The Literatures of the English Speaking World concentration also has global reach and interest, and includes colonial and postcolonial literatures, and indigenous literatures, including a focus on American regional literature and environmental literatures, including literature of the Great Central Valley, California literatures, and the literature of Yosemite. Additionally, a third area is encompassed by an overlap both geographical and cultural, and comprises courses students take within both concentrations. This

History Professors Gregg Herken and Sean Malloy listen to students' presentations.

area of study, Literatures and Cultures of the Americas, will enable a bold hemispheric approach, exploring commonalities and differences between native and postcolonial cultures in North America, Central America, South America and the Caribbean.

Overall, UC Merced's highly comparative approach to literature enables the interdisciplinary training of students in literature, cultural studies, theory and comparative studies. Upon graduation, students will find themselves prepared for a number of career possibilities, including education, graduate and professional programs, including the fields of law, medicine and business, as well as advertising, editing and publishing, journalism, communications and mass media.

### Requirements for the B.A. in Literatures and Cultures (LITC)

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the Literatures and Cultures major requires 52-60 units (some of which simultaneously fulfill general education requirements). Courses in the major must be taken for a letter grade and may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. Students must complete all major course prerequisites with a C- or better. All major course requirements must be completed with a grade of C- or better. Students in the Literatures and Cultures major must maintain a 2.0 grade point average in all major coursework.

### LOWER DIVISION LITERATURES AND CULTURES MAJOR REQUIREMENTS [32-40 UNITS]

Two lower division introduction courses in area of concentration (preferably within a sequence).



- Concentration in Literatures of the English Speaking World . . . . 8 units
- Introduction to World Literature I (LIT 020)
  - Introduction to World Literature II (LIT 021)
  - Introduction to American Literature I (LIT 030)
  - Introduction to American Literature II (LIT 031)
  - Introduction to British Literature I (LIT 040)
  - Introduction to British Literature II (LIT 041)

- Concentration in Literatures of the Spanish Speaking World . . . . 8 units
- Introduction to Hispanic Literature I (LIT 050)
  - Introduction to Hispanic Literature II (LIT 051)

- Two additional lower division LIT courses. . . . . 8 units
- Foreign Language Requirement. . . . . 8–16 units
- Literatures of the English Speaking World (at least 2 semesters of college-level foreign language)\*
  - Literatures of the Spanish Speaking World (at least 4 semesters of college-level Spanish)\*

\*Students must take at least one year of the same language. This requirement may be satisfied through alternative means, such as proficiency testing and/or prior college-level course work. Does not meet the lower division Humanities, Arts or Foreign Language General Education requirement.

**UPPER DIVISION LITERATURES AND CULTURES MAJOR REQUIREMENTS [20 UNITS]**

- Engaging Texts: Introduction to Critical Practice (LIT 100) . . . . . 4 units
- Senior Project (LIT 190) . . . . . 4 units
- At least 3 concentration-specific upper division courses in Literature . . . . . 12 units

**BREADTH REQUIREMENT [8 UNITS]:**

Two non-literature courses from within the student’s chosen concentration. These may be either upper- or lower-division courses.

(Please consult a SSHA advisor or the SSHA web site for approved courses).

Students interested in a concentration other than those listed above (for example, a thematic concentration in gender or race or a geographical location in US literature or Literature of the Americas) may submit a petition with a proposed list of courses that would constitute their concentration. Over time, additional approved concentrations may be added to the list above.

**Transfer Students**

Transfer students who wish to major in Literatures and Cultures should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. In addition, students should complete at least one full-year UC-transferable introductory course sequence selected from their intended concentration, two additional introductory literature courses as well as introductory courses in anthropology, art history, economics, history, political science and/or sociology. Students should complete the equivalent of one year of a college-level courses in one language other than English; students with a Literatures of the Spanish speaking world concentration should complete two years of courses in Spanish language.

**Literatures and Culture Program Learning Outcomes**

Upon graduation, students majoring in Literatures and Cultures will be able to:

- Interpret texts with due sensitivity to both textual and contextual cues;

- Appreciate and evaluate the aesthetic qualities of texts and the cultures from which they are drawn;
- Take positions on the ethical questions raised by texts, and defend those positions;
- Apply to other contexts various interpretive strategies developed in literary study;
- Articulate, cogently and with sensitivity to context, in both speech and writing, her/his interpretations and evaluations.

**SAMPLE STUDY PLAN: CONCENTRATION IN LITERATURES OF THE ENGLISH SPEAKING WORLD**

**Semester 1**

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LIT 030/ LIT 040/LIT 020	Introduction to American Literature I or Introduction to British Literature I or Introduction to World Literature I	4
WRI 010	Reading & Composition	4
CORE 001	The World at Home	4
	Foreign Language I	4

**Semester Units 16**

**Semester 2**

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LIT 031/LIT 041/LIT 021	Introduction to American Literature II or Introduction to British Literature II or Introduction to World Literature II	4
	Natural Sciences or Engineering course w/ Lab, Field or Studio	4
	Foreign Language II	4
	Elective	4

**Semester Units 16**

**Semester 3**

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	Lower Division LIT course I	4
	Quantitative Reasoning Course	4
	Lower Division Humanities, Arts or Foreign Language course outside of LIT	4
	Elective	4

**Semester Units 16**

**Semester 4**

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	Lower Division LIT course II	4
	Lower Division Social Science course	4
	Natural Sciences or Engineering course	4
	Elective	4

**Semester Units 16**

**Semester 5**

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LIT 100	Engaging Texts	4
	Upper Division LIT Course I	4
	Breadth Requirement I	4
	Elective	4

**Semester Units 16**

**Semester 6**

	Upper Division LIT Course II	4
	Upper Division General Education course outside of LIT I	4
CORE 100	The World at Home	4
	Elective	4

**Semester Units 16**

**Semester 7**

	Upper Division LIT Course III	4
	Upper Division General Education course outside of LIT II	4
	Breadth Requirement II	4
	Elective	4

**Semester Units 16**

**Semester 8**

LIT 190	Senior Project	4
	Upper Division General Education course outside of LIT III	4
	Upper Division General Education course outside of LIT IV	4
	Elective	4

**Semester Units 16**

**Total Program Units 128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**SAMPLE STUDY PLAN: CONCENTRATION IN LITERATURES OF THE SPANISH SPEAKING WORLD****Semester 1**

CORE 001	The World at Home	4
WRI 010	Reading & Composition	4
LIT 050	Introduction to Hispanic Literature I	4
	Foreign Language I	4

**Semester Units 16**

**Semester 2**

	Natural Sciences or Engineering course w/ Lab, Field or Studio	4
	Foreign Language II	4
	Quantitative Reasoning Course	4
LIT 051	Introduction to Hispanic Literature II	4

**Semester Units 16**

**Semester 3**

	Natural Sciences or Engineering course	4
	Foreign Language III	4
	Lower Division LIT Course I	4

Lower Division Humanities, Arts or Foreign Language course outside of LIT 4

**Semester Units 16**

**Semester 4**

	Lower Division Social Sciences course	4
	Foreign Language IV	4
	Lower Division LIT course II	4
	Elective	4

**Semester Units 16**

**Semester 5**

LIT 100	Engaging Texts	4
	Breadth Requirement I	4
	Upper Division LIT Course I	4
	Elective	4

**Semester Units 16**

**Semester 6**

CORE 100	The World at Home	4
	Upper Division LIT Course II	4
	Upper Division General Education course outside of LIT I	4
	Elective	4

**Semester Units 16**

**Semester 7**

	Upper Division LIT Course III	4
	Breadth Requirement II	4
	Upper Division General Education course outside of LIT II	4
	Elective	4

**Semester Units 16**

**Semester 8**

LITC 190	Senior Project	4
	Upper Division General Education course outside of LIT III	4
	Upper Division General Education course outside of LIT IV	4
	Elective	4

**Semester Units 16**

**Total Program Units 128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## ■ Management Major

The Management major responds to the growing needs of California's business environment. UC Merced's Management major provides rigorous analytical and quantitative training from a blend of fields including economics, management theory and other social sciences. Real-life management problems do not fit neatly into subject areas. Today's managers tackle issues that involve a number of management functions—so solutions need to draw on expertise from a variety of different areas. The UC Merced approach is to step away from thinking of management as a set of separate functions drawing from single disciplines. Instead, students learn to integrate key ideas from across subject areas to understand all the dimensions of a given issue. Creativity, innovation and entrepreneurship are emphasized.

The major is based on the premise that organizations of different kinds— for-profit, non-profit, technological and governmental— require employees who are trained in analytical and quantitative decision-making, who work effectively in teams and on projects, who are comfortable in various cultures, who are “well rounded” in sciences and humanities, and who have learned the art of self-directed learning.

The Management major prepares students for a broad range of management-related careers. Students will learn the analytical tools that are needed to succeed in a modern, volatile business environment. The curriculum provides a strong foundation in economics, organization, business, finance, accounting and quantitative methods. It focuses on analysis and problem solving across a wide spectrum of management activities. The theoretical underpinning for the undergraduate program comes from economics and management science disciplines that use tools and techniques based on applied mathematics and statistics to solve problems in virtually all areas of business and government. The typical undergraduate student develops skills to build quantitative models of complex operations and competitive markets and be able to use those models to facilitate decision-making.

### Requirements for the B.S. in Management (MGMT)

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the Management major requires 56 units (some of which simultaneously fulfill general education requirements). Courses in the major emphasis must be taken for a letter grade and may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. For limits on pass/no pass grading, please contact the SSHA advising office. Students must complete all major course prerequisites with a C- or better. All major course requirements must be completed with a grade of C- or better. Students in the Management major must maintain a 2.0 grade point average in all major coursework.

### LOWER DIVISION MAJOR REQUIREMENTS [24 UNITS]

Introduction to Economics (ECON 001) . . . . . 4 units  
 Introduction to Finance (MGMT 025) . . . . . 4 units  
 Introduction to Accounting (MGMT 026) . . . . . 4 units  
 Statistical Inference (ECON 010)\* . . . . . 4 units  
 Calculus of a Single Variable I (MATH 021)\* . . . . . 4 units

\*Meets the Quantitative Reasoning General Education requirement.

Introduction to Computer Applications (CSE 005) . . . . . 4 units

### UPPER DIVISION MAJOR REQUIREMENTS [32 UNITS]

Intermediate Microeconomic Theory (MGMT 100) . . . . . 4 units

IF YOU'RE LOOKING TO APPLY TO GRADUATE SCHOOL IN THE FUTURE, GET TO KNOW YOUR PROFESSORS NOW. UC MERCED OFFERS THE BEST OPPORTUNITIES TO WORK WITH FACULTY MEMBERS ON THEIR RESEARCH PROJECTS. YOU EVEN HAVE THE OPPORTUNITY TO HAVE YOUR NAME PUBLISHED IN A RESEARCH JOURNAL, SOMETHING TYPICALLY ONLY GRADUATE STUDENTS GET THE HONOR OF DOING, AND SOMETHING THAT WILL DEFINITELY RAISE SOME EYEBROWS WHEN YOU PUT IT ON YOUR GRADUATE SCHOOL APPLICATION.

— William Ngo, Cognitive Science

Intermediate Macroeconomic Theory (MGMT 101) . . . . . 4 units  
 Econometrics (MGMT 130) . . . . . 4 units  
 Marketing (MGMT 120) . . . . . 4 units  
 Intermediate Finance (MGMT 165) . . . . . 4 units  
 One additional upper division course chosen from the following: . . . . . 4 units

- Organizational Strategy (MGMT 116)
- Industrial and Organizational Psychology (PSY 170)

Two additional MGMT Courses\* . . . . . 8 units

\* Students may substitute a Management-related course for one of these courses. Students should contact SSHA Advising for an updated list of appropriate course substitutions.

### Transfer Students

Transfer students who wish to major in Management should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. In addition, students should complete at least two UC-transferable introductory courses, one each selected from the humanities/arts and the social sciences; two lower division natural sciences or engineering courses, at least one of which has a lab, field or studio component; principles of economics; a course in financial accounting; a course in introductory finance (if available); and one UC transferable course in calculus.

### Management Program Learning Outcomes

Upon graduation, students majoring in Management will:

- Analyze information, solve problems, and make decisions from a holistic, multidisciplinary perspective.
- Apply theories and concepts in management and related fields (accounting, economics, statistics, finance, marketing, human resource management, strategic planning and business law) to various management situations.
- Use effective written and oral communication consistent with the management and professional environment.
- Apply appropriate information technology to analyze problems, develop business research, report key data, and recommend management strategies and actions.
- Evaluate ethical, social, cultural, and political issues as they relate to the organization, operations, human resources, and business ventures.

**SAMPLE PLAN OF STUDY FOR MANAGEMENT DEGREE**

**Semester 1**

CORE 001	The World at Home	4
ECON 001	Introduction to Economics	4
WRI 010	College Reading & Composition	4
MATH 021	Calculus of a Single Variable I	4

**Semester Units 16**

**Semester 2**

	Lower Division Social Sciences course outside ECON	4
	Lower Division Humanities, Arts or Foreign Language course	4
CSE 005	Introduction to Computer Applications	4
	Natural Sciences or Engineering course w/ Lab, Field or Studio	4

**Semester Units 16**

**Semester 3**

MGMT 100	Intermediate Microeconomic Theory	4
	Natural Sciences or Engineering course	4
MGMT 026	Introduction to Finance	4
ECON 010	Statistical Inference	4

**Semester Units 16**

**Semester 4**

MGMT 025	Introduction to Accounting	4
MGMT 130	Econometrics	4
MGMT 101	Introduction to Macroeconomic Theory	4
	Elective	4

**Semester Units 16**

**Semester 5**

	Upper Division General Education course outside MGMT I	4
	MGMT 116 or PSY 170	4
	Elective	4
	Elective	4

**Semester Units 16**

**Semester 6**

	Upper Division MGMT course II	4
MGMT 165	Intermediate Finance	4
	Elective	4
CORE 100	The World at Home	4

**Semester Units 16**

**Semester 7**

MGMT 120	Marketing	4
	Upper Division General Education course outside MGMT I	4

Upper Division General Education course outside MGMT II	4
Elective	4

**Semester Units 16**

**Semester 8**

Upper Division General Education course outside MGMT IV	4
Upper Division MGMT course III	4
Elective	4
Elective	4

**Semester Units 16**

**Total Program Units 128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**Political Science Major**

Political Science is the social scientific study of political institutions and political behavior. The study of political institutions includes topics such as the effect of the design of electoral systems on the quality of representation in government, the formal and informal elements of the legislative process and their implications for the making of law, and the impact of domestic political institutions on the incidence of international conflict. Under the rubric of political behavior, political scientists study how and why people choose to participate in politics, the determinants of vote choice, and the nature and origins of public opinion. Students studying political science at UC Merced develop a strong substantive understanding of both political institutions and behavior. Students also learn the theories that help us better understand the political world and the methods by which these theories are tested and refined.

Political Science majors choose courses from three subfields of the discipline: American Politics, Comparative Politics, and International Relations. The study of institutions and behavior is central to all three of these subfields, although the substantive emphasis differs. Courses in American Politics focus on domestic politics in the U.S., while courses in Comparative Politics examine government and politics in other nations. International Relations classes address issues in foreign policy, international conflict, and the institutions intended to govern the interactions between nations. Students focus on one of these three subfields, although they also are able to take courses in the two subfields outside of their focus. Due to both the broad intellectual roots of political science as a scholarly field and the interdisciplinary nature of UC Merced's School of Social Sciences, Humanities and Arts, Political Science majors also take at least two selected upper division classes in Cognitive Science, Economics, History, Philosophy, Psychology or Sociology.

The knowledge and skills acquired with the Political Science Major should provide a strong foundation for graduate training in law, political science or other social sciences. Students graduating with a degree in political science can also pursue a wide variety of other careers, such as public administration, campaign management or consultation, grassroots political organization, corporate governmental affairs, Foreign Service, journalism, lobbying or teaching.

**Requirements for the B.A. in Political Science (POLI)**

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the Political Science major requires 48 units, some of which may simultaneously meet general education requirements. Courses in the major must be taken for a letter grade, and may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. All major course requirements must be completed with a grade of C- or better. Students in the Political Science major must maintain a 2.0 GPA or better in all major coursework. Required courses include:

**LOWER DIVISION MAJOR REQUIREMENTS [16 UNITS]**

Introduction to American Politics (POLI 001) . . . . . 4 units

Two courses chosen from . . . . . 8 units

- Contemporary Problems in American Politics (POLI 002)
- Introduction to Comparative Politics (POLI 003)
- Introduction to International Relations (POLI 005)
- Global Issues (POLI 006)
- Community Mobilization and Politics (POLI 009)

Analysis of Political Data (POLI 010). . . . . 4 units

(Meets the Quantitative Reasoning General Education requirement.)

**UPPER DIVISION MAJOR REQUIREMENTS [32 UNITS]**

Three upper division Political Science courses from one of the following three subfields . . . . . 12 units

- American Politics (POLI 100-127)
- Comparative Politics (POLI 130-140)
- International Relations (POLI 150-160)

At least three additional upper division courses in Political Science. . . . . 12 units

Two Political Science-related courses selected from the following . . . . . 8 units

- Political Anthropology (ANTH 112)
- Cognitive Psychology (COGS 121/PSY 160)
- Judgment and Decision Making (COGS 153/MGMT 153)
- Thinking and Reasoning (COGS 172)
- Intermediate Microeconomic Theory (ECON 100/MGMT 100)
- Intermediate Macroeconomic Theory (ECON 101/MGMT 101)
- American Economic History (ECON 111)
- Econometrics (ECON 130)
- Labor Economics (ECON 140)
- Public Economics (ECON 151)
- Law and Economics (ECON 152)
- Political Economics (ECON 155)
- Game Theory (ECON 170)
- Essence of Decision (HIST 120)
- The United States and the Vietnam War (HIST 128)
- The Cold War, 1941-1991 (HIST 130)
- Intelligence and National Security (HIST 132)
- Political Philosophy (PHIL 108)
- Social Psychology (PSY 131)

**GREAT MINDS THINK ALIKE, THAT'S WHY THEY'RE AT UC MERCED.**

—Julia Zhou, San Jose, Cognitive Science Major

- Social Movements, Protest, and Collective Action (SOC 110)
- Political Sociology (SOC 115)
- Urban Inequality (SOC 131)
- Advanced Issues in Race and Ethnicity (SOC 180)

(Consult the SSHA web site for an updated list of courses)

**Transfer Students**

Transfer students planning to major in Political Science must complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. In addition, students must complete at least two UC-transferable introductory political science courses, including one introductory course in American politics and one introductory course in either comparative politics or international relations.

**Political Science Program Learning Outcomes**

Upon graduation, students majoring in Political Science will be able to:

- Understand the processes, theories, and empirical regularities of political institutions and political behavior in the student's chosen emphasis area: American politics, comparative politics, or international relations.
- Employ critical thinking and demonstrate social scientific literacy, including basic quantitative literacy.
- Utilize contemporary social science research methods to conduct rigorous research on political phenomena.
- Write effectively, particularly to convey complex concepts and information in a clear and concise manner.
- Apply abstract theory and research methods to understand contemporary political events and public policies.

**SAMPLE PLAN OF STUDY FOR POLITICAL SCIENCE DEGREE****Semester 1**

CORE 001	The World at Home	4
POLI 001	Introduction to American Politics	4
WRI 010	College Reading & Composition	4
	Elective	4

**Semester Units****16****Semester 2**

	Lower Division POLI course I	4
	Natural Sciences or Engineering course w/ Lab, Field or Studio	4
	Lower Division Humanities, Arts or Foreign Language course	4
MATH 005	Preparatory Calculus	4

**Semester Units****16**

**Semester 3**

POLI 010	Analysis of Political Data	4
	Lower Division POLI course II	4
	Lower Division Social Science course outside of POLI	4
	Elective	4

**Semester Units 16****Semester 4**

	Upper Division POLI course from single subfield I	4
	Upper Division POLI course I	4
	Natural Sciences or Engineering course	4
	Elective	4

**Semester Units 16****Semester 5**

	Upper Division POLI course II	4
	Upper Division POLI-Related course I	4
	Upper Division General Education course outside POLI I	4
	Elective	4

**Semester Units 16****Semester 6**

CORE 100	The World at Home	4
	Upper Division POLI course from single subfield II	4
	Upper Division General Education course outside POLI II	4
	Elective	4

**Semester Units 16****Semester 7**

	Upper Division POLI course from single subfield III	4
	Upper Division POLI-Related course II	4
	Upper Division General Education course outside POLI III	4
	Elective	4

**Semester Units 16****Semester 8**

	Upper Division POLI course III	4
	Upper Division General Education course outside POLI IV	4
	Elective	4
	Elective	4

**Semester Units 16****Total Program Units 128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**Psychology Major**

The undergraduate major in Psychology provides students with an understanding of the major questions and methodologies across Psychology, including a common core of statistical and experimental methods courses. Upper division courses and projects allow students to explore the various substantive specialties in psychology, and to identify the areas of psychology that they might wish to pursue further. Many students with an undergraduate degree in psychology go on to graduate study in psychology or closely related fields such as cognitive science or organizational behavior. The psychology program strongly encourages further graduate study, and supports its undergraduate majors in reaching this goal by providing opportunities to work with faculty on research.

The Psychology major also prepares undergraduates for many other careers even without further graduate training. The American Psychological Association reports that only about 5% of 1997 and 1998 bachelor's degree psychology major graduates had taken a job that is actually in psychology. Most psychology major graduates—about two thirds—took employment in private sector business settings. Graduates with an undergraduate psychology major are highly marketable because they are trained to have good research and writing skills, to be effective problem solvers in both team and individual settings, and to use critical thinking skills to analyze, synthesize, and evaluate information. Specific examples of employment include administrative support, public affairs, education, business, sales, service industries, health, the biological sciences, computer programming, employment counselors, correction counselor trainees, interviewers, personnel analysts, probation officers, and writers. The same APA report finds that two thirds of psychology major graduates believe their job is closely or somewhat related to their psychology background and that their jobs hold career potential.

**Requirements for the B.A. in Psychology (PSY)**

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the Psychology major requires 48 units (some of which simultaneously fill General Education Requirements as indicated below). Courses in the major emphasis must be taken for a letter grade, and may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. Required courses include:

**LOWER DIVISION MAJOR REQUIREMENTS [16 UNITS]**

Introduction to Psychology (PSY 001)	4 units
One Introductory course chosen from the following*	4 units
• Introduction to Cognitive Science (COGS 001)	
• Introduction to Economics (ECON 001)	
• Introduction to Political Science (POLI 001)	
• Introduction to Public Policy (PUBP 001)	
• Introduction to Sociology (SOC 001)	
• Introduction to Socio-cultural Anthropology (ANTH 001)	

\* Meets Social Science course outside of major General Education requirement.

Analysis of Psychological Data (PSY 010)\* . . . . . 4 units

\*Meets Quantitative Reasoning General Education requirement.

Research Methods (PSY 015). . . . . 4 units

**UPPER DIVISION MAJOR REQUIREMENTS [32 UNITS]**

Writing in the Disciplines: Psychology (WRI 101) . . . . . 4 units



One upper division psychology course from each of the following three groups . . . . . 12 units

- Group A (Cognition, Brain and Behavior): PSY 160-169, PSY 180-189, or any upper division COGS course
- Group B (Social-Personality, Development): PSY 130-139 or PSY 150-159
- Group C (Applied Psychology): PSY 120-129, PSY 140-149 or PSY 170-179

At least four additional upper division courses in Psychology. . . 16 units

### EXIT EXAMINATION REQUIREMENT

Psychology majors must take an exit examination in their last year of study in order to graduate. The purpose of the examination is to help assess the effectiveness of the Psychology undergraduate program in achieving its Program Learning Outcomes. The examination is not intended to assess individual students, and students cannot fail the examination. Nonetheless, we encourage students to do their best on the examination so that the faculty can accurately assess how well Program Learning Outcomes are being achieved.

### Transfer Students

Transfer students who wish to major in Psychology should complete the IGETC at their community college. In addition, students should complete at least two UC-transferable introductory social sciences courses, one of which must be introductory psychology, a UC-transferable statistics course as well as a UC-transferable psychological research methods course and two lower division natural science or engineering courses, at least one of which has a lab, field, or studio component.

### Psychology Program Learning Outcomes

Upon graduation, students majoring Psychology will be able to:

- Content: show knowledge of the key substantive content of the field of psychology.
- Research Methods: demonstrate understanding of the basic principles of and correctly interpret applications of both the designs and methods that psychologists use to gather data and the statistical analyses they use to analyze data.
- Writing: show understanding and application of the writing style used in psychological literature (APA style).

OUR MAJOR IN LITERATURES AND CULTURES REALLY EMBRACES MY RESEARCH, WHICH LOOKS AT NON TRADITIONAL LITERATURES AND EVEN NON TEXTUAL FORMS OF LITERATURE. I LOVE BEING ABLE TO BRING THIS APPROACH INTO MY CLASSES, AND I'VE ENJOYED THE RESEARCH OPPORTUNITIES IT HAS CREATED WITH UNDERGRADUATES. MY WORK CROSSES A LOT OF DISCIPLINARY BOUNDARIES, AND I FEEL THAT MERCED IS THE PERFECT PLACE TO DO THAT.

— Professor Jan Goggans, Literatures and Cultures

## SAMPLE PLAN FOR B.A. IN PSYCHOLOGY

### Semester 1

CORE 001	The World at Home	4
PSY 001	Introductory Psychology	4
WRI 010	College Reading & Composition	4
	Elective	4

**Semester Units** **16**

### Semester 2

PSY 010	Analysis of Psychological Data	4
	Natural Sciences or Engineering course w/ Lab, Field or Studio	4
	Elective	4
	Elective	4

**Semester Units** **16**

### Semester 3

PSY 015	Methods	4
	Natural Sciences or Engineering course	4
WRI 101	Writing in the Disciplines: Psychology	4
	Elective	4

**Semester Units** **16**

### Semester 4

	Lower Division Social Science course outside PSY 4	
	Lower Division Humanities, Arts or Foreign Language course	4
	Elective	4
	Elective	4

**Semester Units** **16**

### Semester 5

	PSY Group A course	4
	Upper Division PSY course I	4
	Upper Division General Education course outside PSY I	4
	Elective	4

**Semester Units** **16**

### Semester 6

CORE 100	The World at Home	4
	PSY Group B course	4
	Upper Division PSY course II	4
	Upper Division General Education course outside PSY II	4

**Semester Units** **16**

### Semester 7

	PSY Group C course	4
	Upper Division PSY course III	4

Upper Division General Education course outside PSY III	4
Elective	4
<b>Semester Units</b>	<b>16</b>
<b>Semester 8</b>	
Upper Division PSY course IV	4
Upper Division General Education course outside PSY IV	4
Elective	4
Elective	4
<b>Semester Units</b>	<b>16</b>
<b>Total Program Units</b>	<b>128</b>

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

## ■ Sociology Major\*

Sociology is the scientific study of society, social institutions and social relationships. A key contribution of the discipline is that social factors matter; our lives are not only shaped by personal psychology, but also by our place in the social world. Sociology's areas of inquiry range from intimate family relationships to ties between nation-states; from divisions by race, class, gender and sexuality to shared ideas of common culture; and from understanding the influence of broad-scale social movements to analyzing how adolescents become productive adults. Sociologists help develop theories to understand how the social world works and also use analytic tools to craft policies and create programs that address important social issues, such as neighborhood and educational inequality. Few disciplines offer such a broad scope of relevance for understanding individual and collective relations in society.

The substantive breadth and skills in conducting and analyzing research that sociology majors obtain can be useful for a range of career paths including: business and marketing, criminal justice, education, environment and technology, graduate school, law, public health, leadership in faith communities, non-profit and social service organizations, public policy, social welfare and social work. Students will leave the major with research skills developed in conjunction with knowledge of substantive material relevant to a variety of social service and non-profit research positions. They also will have an excellent basis for pursuing graduate studies in law, sociology and other social and cultural studies programs.

### Requirements for the B.A. in Sociology (SOC)

In addition to adhering to the UC Merced and School of Social Sciences, Humanities and Arts requirements, the Sociology major requires at least 56 units in Sociology and related courses. Courses in the major emphasis must be taken for a letter grade, and specifically may not be taken on a pass/no pass basis unless the course is only offered on a pass/no pass basis. Required courses are:

\*Pending the approval of our accreditation agency, the Western Association of Schools and Colleges (WASC).

### LOWER DIVISION MAJOR REQUIREMENTS [16 UNITS]

Introduction to Sociology (SOC 001)	4 units
Statistics for Sociology* (SOC 010)	4 units

\*Meets Quantitative Reasoning General Education requirement.

Sociological Research Methods (SOC 015)	4 units
At least one additional lower division Sociology course <sup>#</sup>	4 units

<sup>#</sup>Not including courses numbered in the 090s.

### UPPER DIVISION MAJOR REQUIREMENTS [36 UNITS]

Sociological Theory (SOC 100)	4 units
At least 6 additional upper division Sociology courses*	24 units

\*Not including courses numbered in the 190s.

At least three additional upper division related courses outside of Sociology	12 units
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(See a SSHA advisor or the program website for a list of acceptable courses).

### Transfer Students

The Sociology major is not available to incoming transfer students until the 2011-2012 school-year. At that time, transfer students who wish to major in Sociology should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. In addition, students should complete at least two UC transferable introductory courses in sociology, one of which must be introductory sociology and one UC-transferable pre-calculus course.

### Sociology Program Learning Outcomes

Upon graduation, students majoring in Sociology will be able to:

- Think critically about the causes and consequences of social inequality.
- Design and evaluate empirical sociological research.
- Explain and apply the major theoretical perspectives in sociology.
- Communicate orally and in writing about sociological concepts.
- Use their sociological education outside of the undergraduate classroom, particularly in their careers or further education.

### SAMPLE PLAN FOR B.A. IN SOCIOLOGY

#### Semester 1

CORE 001	The World at Home	4
SOC 001	Introduction to Sociology	4
WRI 010	College Reading & Composition	4
	Elective	4

**Semester Units** **16**

#### Semester 2

	Lower Division SOC course	4
	Natural Sciences/Engineering course w/ Lab, Field or Studio	4
MATH 005	Preparatory Calculus	4
	Elective	4

**Semester Units** **16**

**Semester 3**

SOC 015	Sociological Research Methods	4
	Introductory Humanities, Arts or Foreign Language course	4
	Introductory Social Science course outside of SOC	4
	Elective	4

**Semester Units** **16**

**Semester 4**

SOC 010	Statistics for Sociology	4
	Natural Sciences or Engineering course	4
	Upper Division SOC course I	4
	Elective	4

**Semester Units** **16**

**Semester 5**

SOC 100	Sociological Theory	4
	Upper Division SOC course II	4
	Upper Division GE course outside SOC I	4
	Upper Division related course outside of SOC I	4

**Semester Units** **16**

**Semester 6**

CORE 100	The World at Home	4
	Upper Division SOC course III	4
	Upper Division SOC course IV	4
	Upper Division GE course outside SOC II	4

**Semester Units** **16**

**Semester 7**

	Upper Division SOC course V	4
	Upper Division GE course outside SOC III	4
	Upper Division related course outside of SOC II	4
	Elective	4

**Semester Units** **16**

**Semester 8**

	Upper Division SOC course VI	4
	Upper Division GE course outside SOC IV	4
	Elective	4
	Elective	4

**Semester Units** **16**

**Total Program Units** **128**

The four-year plans presented in this catalog demonstrate the recommended sequencing and timing of the required and elective components within each major. In many cases, a student's academic background will require variations in the timing of the coursework listed in the plan. All students are expected to work with their academic advisor to find their best pathway through the degree requirements of their chosen program.

**SSHA Programs**

The following programs represent loci of research and instructional excellence within the School of Social Sciences, Humanities and Arts. While these programs do not have specific curricula, and may not be degree-granting disciplinary areas, we encourage students to broaden their horizons by considering courses from these areas during their undergraduate studies at UC Merced.

**THE GLOBAL ARTS STUDIES PROGRAM**

The Global Arts Studies Program (GASP) defines the arts broadly in order to promote an interdisciplinary study of the arts. GASP offers a unique curriculum by integrating subjects conventionally housed in disparate departments, including art history, music and ethnomusicology, media studies, and cultural and ethnic studies. GASP students gain a broad multicultural understanding of the arts by investigating the effects of industrialization, colonialism, commercialism and globalization on art practices in a balanced, inclusive range of critical perspectives. GASP students can seek a variety of graduate studies and employment opportunities in teaching, arts and music management, museums and galleries, the recording industry, publishing, broadcasting, and public relations.

The focus in GASP on research and scholarly work recognizes the important role in which culture participates in the larger social world inside and outside of academe. Students will develop a set of critical skills and specialized knowledge through an interdisciplinary yet rigorous curriculum. While concentrating on a particular area of study such as visual culture or music studies, GASP students are required to take courses outside of their focus, which broadens their perspectives. For example, a student on the music studies track whose main interest is jazz history will have the opportunity to take classes on Latin American or Asian Pacific visual art. Additionally, students are required to take courses outside of GASP, becoming the flexible yet critical thinkers prepared to participate in the opportunities, as well as meet the challenges of the future.

**Global Arts Studies Program Learning Outcomes**

Students participating in the Global Arts Studies Program (GASP) will be able to:

- Describe artworks in technical or theoretical terms.
- Enlarge technical/theoretical vocabulary.
- Analyze art works.
- Engage with artworks critically.

**FOREIGN LANGUAGES**

To be able to communicate in a foreign language is a fundamental asset in any profession, from careers in education, translating, and interpreting, to those in international studies, health, business or law. The knowledge of a foreign language is also useful for traveling and research in many parts of the world. The School of Social Sciences, Humanities and Arts offers four foreign languages for UC Merced students: Chinese, French, Japanese and Spanish.

PEOPLE HERE MAKE ME FEEL AT HOME.  
IT'S FAMILY. FRIENDS I'VE MADE HERE ARE  
FRIENDS THAT I WILL KEEP THROUGHOUT  
MY LIFE.

—Jennifer Tseng, Torrance, Management Major

All lower division courses in Chinese, French, Japanese and Spanish are content-based, learner-oriented and follow the communicative learning approach. In addition to helping students develop skills to communicate at an introductory and intermediate level in the target language, these courses attempt to promote a cultural awareness of the countries and communities where the languages are spoken.

The Spanish language program at UC Merced offers courses at the lower and upper division level plus a minor in Spanish. Lower division course offerings include introductory and intermediate courses and courses for Spanish heritage speakers who would like to improve their oral, writing and reading skills. At the upper division level, the Spanish program offers a wide variety of courses that provide students with the opportunity to broaden their knowledge of the language and of Hispanic cultures, as well as to learn the vocabulary and expressions commonly used in specific professions. Consult the Minors section of this catalog for information on the minor in Spanish.

To ensure appropriate placement in our foreign language courses, students with previous academic instruction in the language that they would like to study are encouraged to take the placement exam for that language. Spanish heritage speakers who wish to improve their oral, writing and reading skills should not take the Spanish placement exam, but register in SPAN 10-11. Students should have fulfilled the requirements (SPAN 4 or SPAN 11) or equivalent to register in an upper division Spanish course. For information about placement exams please go to [orientation.ucmerced.edu](http://orientation.ucmerced.edu) or speak to a UC Merced academic advisor. You can also contact the Foreign Languages Program Coordinator for questions related to the placement exam or any other foreign language issues.

### Foreign Language Learning Outcomes

After completing two years (Intermediate level II) of the foreign language of their choice, students will be able to identify and analyze cultural traits and concepts relevant to the country and communities where the target language is spoken. In addition, they will have developed intermediate writing, reading, listening and oral proficiency in that foreign language, which means that students will:

- Possess listening skills equivalent at least to the Intermediate-Mid level of the ACTFL Proficiency Guidelines: Ability to understand main ideas and some facts from interactive exchanges and aural texts.
- Posses speaking skills equivalent at least to the Intermediate-Mid level of the ACTFL Proficiency Guidelines: Ability to handle successfully a variety of uncomplicated communicative tasks in straightforward social situations.
- Possess reading skills equivalent at least to the Intermediate-Mid level of the ACTFL Proficiency Guidelines: Ability to read consistently with increased understanding simple, connected texts dealing with a variety of basic and social needs.
- Possess writing skills equivalent at least to the Intermediate-Mid level of the ACTFL Proficiency Guidelines: Able to meet a number of practical writing needs. They can write short, simple communications, compositions, descriptions, and requests for information in loosely connected texts that are based on personal preferences, daily routines, common events, and other topics related to personal experiences and immediate Surroundings.
- Demonstrate in their oral presentations, compositions,

and other class assignments a reasonable knowledge of the ways of thinking, behavioral practices, and the cultural products of the country and communities where the target language is spoken.

Students that complete Foreign Language courses at the upper division level will be able to identify and analyze cultural traits and concepts relevant to the country and communities where the target language is spoken. In addition, they will develop skills in critical thinking and advanced writing, reading, listening and oral proficiency in the target language.

### MEDIA ARTS TECHNIQUE PROGRAM

Art has the potential to illuminate all aspects of life. As a form of creativity, art is distinguished by its metaphoric attributes. Art has an immense capability to transform and transcend. Dedication to diversity, cross cultural exploration, interdisciplinary collaboration, as well as belief in the value of freedom to explore characterizes Media Arts Technique Program curriculum.

The goal of the Media Arts Technique Program is to offer students the opportunity to sample multiple art techniques, from traditional to experimental, and to allow them to find their own individual ways of integrating art into their lives. Courses are designed to provide students with tools that will enhance their ability to grow, to adjust to new environments and to new ideas throughout their lives. Access to multiple art techniques aims to give students the opportunity to develop holistic understanding of art media as well as respect for the diverse ways in which art is manifested in different cultures. Media Arts Technique Program is designed to develop capacity to create new forms of expression and communication.

Media Arts Technique Program curriculum strives to help students integrate specialized art techniques into their chosen fields of study. Students are encouraged to enroll in courses that suit their personal interests. Students are able to choose courses according to applicability to their majors, or in order to gain perspective on their own disciplines. In addition, students may choose courses in order to strengthen their cognitive abilities, to learn to understand art and creativity better, to develop heuristic methods of learning, to access intuitive holistic thinking, to sharpen their powers of inquiry, to enhance their cultural literacy, or to develop empathy.

Courses in the following art media are offered: architecture, digital arts, fine arts, music, performing arts, and photography. The Artist in Residence Program, which is part of Media Arts Technique Program, provides students with opportunity to study the practice of art with professional artists. Past Artists in Residence included Latina theater director and actress, African American choreographer specializing in West African dance, and sculptor recognized for pioneering work in feminist art.

Enrollment in Media Arts Technique Program courses is open to all students, regardless of major or prior art experience.

### Media Arts Technique Program Learning Outcomes

Students participating in the Media Arts Technique Program (MAP) will be able to:

- Understand and acquire (through hands-on projects) the principal attributes and mechanics of art technique(s) in their medium of choice.
- Enhance visual, aural, and physical perception and cognition through the acquisition of art technique.

- Understand, think and communicate critically the aesthetic, historical, cultural, social and contemporary aspects of the medium (media) they are studying.
- Understand the multicultural environment that typifies contemporary art production.
- Understand the relationship between the physical aspects of works of art and aesthetic principles.
- Understand principles that guide artistic creativity and be prepared to apply them imaginatively, as well as practically.
- Express ideas through an art medium.
- Be able to apply their knowledge of art technique and practice outside of the classroom.

## PHILOSOPHY PROGRAM

UC Merced's philosophy program combines traditional approaches to philosophy with interdisciplinary and applied approaches, which are on the leading edge of the field. The program has special emphases in (1) applied ethics and political philosophy, and (2) philosophy of mind and cognitive science. Students are expected to demonstrate mastery of the material they study in traditional ways, including critical written analyses and written exams, but are also expected to make use of non-traditional methods.

Examples include incorporating readings from outside of the philosophy literature, conceptual analysis of non-philosophical texts (such as scientific texts and policy analyses), and in some cases computer and mathematical modeling projects.

### Philosophy Program Learning Outcomes

Upon graduation, students participating in philosophy will be able to:

- Criticize philosophical arguments, including arguments presented in classic texts and in contemporary philosophical literature.
- Present well-defined claims of one's own, to give clear philosophical arguments in defense of these claims, and to respond to critical objections others might raise against these claims.
- Distinguish between logically valid and invalid deductive arguments, and be able to identify additional premises or logical relationships that could transform an invalid argument into a valid argument.
- Use philosophy in an interdisciplinary way, for example, by philosophically analyzing non-philosophical texts (e.g. texts from literature, history, psychology, or physics), or by using formal methodological tools, such as mathematical and computer models, in the analysis of philosophical problems.

Additionally, we expect students to have gained experience in and be capable of doing at least two of the following:

- Provide and assess evidence for causal claims and identify various fallacies in inductive reasoning (e.g. sample bias)
- Distinguish between descriptive and normative philosophical claims, and to use certain descriptive claims either to support or to criticize certain normative claims.
- Appreciate how the discipline of philosophy has developed over time in response to internal challenges and to advances in science and changes in social life. (E.g., the renaissance in philosophy of mind was stimulated in part by the development of contemporary artificial intelligence).

SINCE WE'RE A FAIRLY SMALL CAMPUS, CONNECTING WITH THE STUDENTS HERE ON CAMPUS IS EASY AND HAS PROBABLY BEEN ONE OF MY MOST LIFE CHANGING EXPERIENCES.

— Kristin Tran, Management Major

## THE KAREN MERRITT WRITING PROGRAM

The Karen Merritt Writing Program is charged with carrying out the university's mission "to convey information to and communicate and interact effectively with multiple audiences, using advanced skills in written and other modes of communication" (Guiding Principles for General Education at UC Merced).

The Karen Merritt Writing Program offers an array of courses in which students explore the art of critical thinking, craft their written expression, and address a variety of issues and audiences. Students learn to use language actively, inventively, and responsibly by exchanging their work at all stages of their writing process while building cumulative portfolios. The faculty's interdisciplinary approach to writing offers students the opportunity to reflect broadly on their college education as well as to consider a range of pre-professional and academic opportunities.

Writing classes generally feature about twenty students per section; teacher-student conferences; frequent written and verbal feedback on writing and ideas; interdisciplinary teaching, ranging from scientific literacy to aesthetic appreciation; conversational and collaborative in-class projects; portfolio projects that emphasize process and product in writing; and detailed assessment of student learning and teaching effectiveness. For more details, please visit [writingprogram.ucmerced.edu](http://writingprogram.ucmerced.edu).

### Writing Program Learning Outcomes

After completing the Writing Minor curriculum, students will be able to:

- Collaborate successfully as members of an academic community;
- Analyze and apply the requisite styles, structures, and standards of relevant professions, genres, and academic disciplines;
- Apply ethical standards to the practice of academic research and public discourse;
- Demonstrate thorough engagement with the iterative processes of reading, writing, and speaking;
- Craft language that reveals aesthetic awareness.

## WORLD HERITAGE PROGRAM

World Heritage is an emerging interdisciplinary and cross-disciplinary area that includes architecture, history, archaeology, art history, geography, anthropology, management, law, environmental sciences and other disciplines. Thus, faculty in this field brings together the humanities, social sciences, policy, and management, consistent with the interdisciplinary intent of the World Cultures program within SSHA.

The key feature of the program, a strong technology orientation, will permit us to create a new discipline and innovative profiles for new

jobs in the field of the humanities, cultural resource management, economics, computer science, educational purposes and many others.

The challenge for our contemporary classroom work is to construct a curriculum that blends humanistic interests and technology. Students will learn that the codes, metadata, and interfaces of today are in constant change and thus the fundamental task will be to determine how to set up a sustainable management system for digital media and global heritage study.

The learning outcome from such teaching should be the acquisition of a methodology aimed at understanding and communicating information about tangible and intangible heritage, cultural and natural sites. Each student in the World Heritage Program should learn to apply this methodology to the specialization of their field or to specific case studies within their field.

### World Heritage Program Learning Outcomes

The main task is to study the evolving technologies and methodologies of analysis, interpretation, communication and presentation of heritage sites (natural and cultural), evaluating their potential to enrich contemporary societies in the light of the reconstruction of the past. Students will be able to:

- Define the concept of World Heritage and explain its implications for contemporary society.
- Dialogue with different disciplines such as architecture, history, art history, geography, anthropology, management, cognitive science, computer science.
- Understand how multiple academic disciplines and methodologies contribute to World Heritage.
- Use integrated computer technologies to complete heritage case studies and understand the appropriate context for the use of different technologies in the heritage field.
- Evaluate the key principles and policies of cultural heritage protection and management through international heritage institutions, conventions and charters.
- Experience and understand a visit to a monument, a landscape, or a site.

## ■ SSHA Minors

The School of Social Sciences, Humanities and Arts offers fifteen minors: American Studies, Anthropology, Arts, Cognitive Science, Economics, History, Literatures and Cultures, Management, Philosophy, Political Science, Psychology, Services Science, Sociology, Spanish and Writing.

### The following guidelines pertain to all SSHA minors:

- To complete any SSHA minor, students must complete a minimum of five courses, at least four of which must be upper division.
- All courses must be taken for a letter grade.
- A minimum overall grade point average of 2.0 (C) in upper division courses is required. The only exception is a minor in Arts, for which the minimum GPA in upper division courses is 2.7 (B-).
- At least three of the five required courses must be taken at UC Merced.
- Only one course may be used simultaneously to satisfy requirements for two minors.
- Only one course may be used to satisfy both a minor and a major requirement.
- Students must consult the UC Merced General Catalog for prerequisites to required courses.

## ■ MINOR IN AMERICAN STUDIES

The American Studies minor builds on the tradition of an interdisciplinary field of study that promotes a broad humanistic understanding of American culture, past and present. By incorporating economics, history, literature, sociology, art history, anthropology, ethnic studies and public policy (among other areas), this minor encourages students and faculty within those fields to exchange ideas on scholarship as it relates to the American experience. In addition, the American Studies minor seeks to move beyond traditional limitations of American Studies, by allowing students to take relevant courses in engineering or the natural sciences. Inclusion of these courses is based on the rationale that cultural practices often stem from our understanding of and research in those sciences.

### Minimum Requirements

One of the following courses:

- HIST 016 The Forging of the United States, 1607-1877
- HIST 017 The Modern United States, 1877-Present
- LIT 030 Introduction to American Literature I
- LIT 031 Introduction to American Literature II

One upper division American history course

One upper division American literature course

One upper division non-HIST/LIT course on American topics (Please choose from the following or check with the SSHA Advising Office for other appropriate courses):

- ANTH 146 Archaeology of Native California
- ANTH 142 Archaeology of Colonialism
- ARTS 120 American Music of the 20th Century
- GASP 175 Race and Nationalism in American Art
- NSED 120 Diversity in Education

- POLI 102 Judicial Politics
- POLI 110 Government Power and the Constitution
- POLI 160 U.S. Foreign Policy
- SOC 110 Social Movement, Protest and Collective Action
- SOC 131 Urban Inequality

One of the following upper division courses in American ethnicity, race or gender:

- ANTH 110 Migration, Diaspora, and Transnational Belonging
- GASP 135 African American Music
- HIST 124 African American History from Slavery to Civil Rights
- HIST 133 Topics in the History of Migration and Immigration (only if focused on US topics)
- LIT 120 Topics in Literature of Difference
- LIT 169 U.S. Latino Literature
- SCS 145 Second Language Learning and Bilingualism

### ■ MINOR IN ANTHROPOLOGY

Students taking the Anthropology minor learn how the human experience in both the past and present involves the interaction of many factors including social, cultural, political, economic, historical, environmental, and biological factors. Thus, the holistic understanding provided by anthropology draws on knowledge that encompasses the social sciences, humanities, and natural sciences. Through coursework, students learn basic anthropological concepts and methods of study, while also exploring various topics in depth from socio-cultural, archaeological and biological anthropology.

#### Minimum Requirements

ANTH 001 Introduction to Socio-cultural Anthropology

One additional lower division course from the following:

- ANTH 003 Introduction to Anthropological Archaeology
- ANTH 005 Introduction to Biological Anthropology

One upper division methods course within ANTH 170 through ANTH 179 series

Three additional upper-division courses in at least two of the following subfields:

- Socio-cultural anthropology (within ANTH 110 through ANTH 129 series)
- Anthropological archaeology (within ANTH 130 through ANTH 149 series)
- Biological anthropology (within ANTH 150 through ANTH 169 series)

### ■ MINOR IN ARTS

A minor is by definition a form of study that can truly be referred to as enrichment. The minor in Arts provides students the opportunity to explore courses from the three parallel tracks in the Arts curriculum: history (interpreting works of art from all media within their context and purpose), theory (concentrating on research) and art technique and practice (acquiring and applying art techniques in fine arts, music and performing arts). ARTS 007 is a survey course of arts around the globe, with an integrated and comparative approach to studying the history and ideas of arts from antiquity to the twentieth century. This course serves as the foundation for all students pursuing the Arts minor.

#### Minimum Requirements

ARTS 007 ArtsCore or any GASP 001-005 course

One additional lower division ARTS course

A minimum of four upper division ARTS or GASP courses

### ■ MINOR IN COGNITIVE SCIENCE

Cognitive Science is the study of human thought and its relation to human activities, including the study of language, perception, memory and reasoning. The Cognitive Science minor increases students' knowledge of the mind and how it is studied from various perspectives, and helps them to acquire critical skills in scientific research and formal areas such as computer science and mathematics. Students are encouraged to become involved with faculty research.

#### Minimum Requirements

COGS 001 Introduction to Cognitive Science

COGS 101 Mind, Brain and Computation or COGS 121/PSY 160 Cognitive Psychology

A minimum of three additional upper division COGS courses (one PSY course may be substituted)

A semester of lab-based research (e.g. COGS 095, COGS 098, COGS 099, COGS 195, COGS 198, COGS 199) is encouraged, but not required.

### ■ MINOR IN ECONOMICS

Students with an interest in developing a solid grounding in economic theory are encouraged to consider the minor in Economics. The minor provides students with an understanding of how incentives and institutions shape society. Students in the Economics minor have opportunities for strong theoretical and statistical training in areas of labor economics, public economics, environmental economics, political economy and economic data analysis.

#### Minimum Requirements

ECON 001 Introduction to Economics

ECON 010 Statistical Inference

A minimum of four upper division ECON courses.

### ■ MINOR IN HISTORY

Students find that a minor in History makes an invaluable contribution to their studies. A knowledge of history provides an appreciation of the context within which important developments in politics, art, literature, philosophy and science or technology take place, and is necessary to an understanding both of their origins and their implications.

#### Minimum Requirements

Two lower division HIST survey courses (courses can be in combination, but a completion of a full sequence is encouraged):

- HIST 010 Introduction to World History to 1500
- HIST 011 Introduction to World History Since 1500
- HIST 016 The Forging of the United States, 1607-1877
- HIST 017 The Modern United States, 1877-Present
- HIST 030 Early European History
- HIST 031 Modern European History

A minimum of four upper division HIST courses.

## ■ MINOR IN LITERATURES AND CULTURES

The Literatures and Cultures minor enables students who are majoring in other disciplines to nonetheless develop strong skills in literary and cultural analysis, critical reading, and effective writing. Literary study asks questions of history and culture, of gender and minority thought and discourse, of intersections with other fields such as cognitive science, social science, and information science. The UC Merced Minor in Literatures and Cultures seeks to ensure both that students understand the basic notion of cultural production and reception, and that they are, through a variety of courses, familiarized with the relationships between society and literature, between reading and thinking, and between self and societal forms of expression.

### Minimum Requirements

Students must complete a minimum of five Literature courses, including at least one lower division LIT course and at least four must be upper division. While the major requires a field of concentration, the minor may be drawn from all Literatures and Cultures offerings. Students are encouraged to develop a focus in consultation with faculty and with SSHA advising staff. All courses must be taken for a letter grade. An exception can be made for one course with written permission from LIT faculty.

## ■ MINOR IN MANAGEMENT

The Management minor at UC Merced provides an opportunity for students who are majoring in another field, such as the sciences or engineering, to learn the fundamental analytical and quantitative tools necessary for management decision-making. Students receive training in economic theory, statistics, accounting, and fields including human resources, strategy, finance, and organizational theory.

### Minimum Requirements

MGMT 026 Introduction to Accounting

ECON 010 Statistical Inference

A minimum of four upper division MGMT courses.

## ■ MINOR IN PHILOSOPHY

The minor in Philosophy provides students with an understanding of the principles, methods, and areas of application of contemporary philosophy. Philosophers study conceptual questions within and between the humanities, arts and sciences: What is art? What is justice? What is the relation between mind and brain? Philosophy at UC Merced combines a traditional curriculum with an emphasis on these interdisciplinary linkages. Because of this, students should be able to use their training in philosophy to complement their other coursework and to identify connections between their various areas of study.

### Minimum Requirements

PHIL 001 Introduction to Philosophy

PHIL 005 Logic and Critical Reasoning

A minimum of four additional upper-division PHIL courses.\*

\*Pre-approved courses from other areas may be substituted. Pre-approval should be sought from Philosophy faculty.

## ■ MINOR IN POLITICAL SCIENCE

The Political Science minor offers broad coverage of the study of politics. Political science is the social scientific study of political processes involving political institutions and political behavior. The study of political institutions includes topics such as the effect

of the design of electoral systems on the quality of representation in government, the formal and informal elements of the legislative process and their implications for the making of law, and the impact of domestic political institutions on the incidence of international conflict. Under the rubric of political behavior, political scientists study how and why people choose to participate in politics, the determinants of vote choice, and the nature and origins of public opinion. Students studying political science at UC Merced develop a strong substantive understanding of both political institutions and behavior. Students also learn the theories that help us better understand the political world and the methods by which these theories are tested and refined.

### Minimum Requirements

One of the following courses:

- POLI 001 Introduction to American Politics
- POLI 003 Introduction to Comparative or
- POLI 005 Introduction to International Relations

A minimum of four upper-division POLI courses.

## ■ MINOR IN PSYCHOLOGY

Psychology is a social science that helps students better understand and interpret scientific information and ways to apply quantitative tools such as statistics. Psychology is often of inherent interest to students. Taking a psychology minor provides an interesting exposure to novel and exciting ideas that students would not otherwise encounter and can be of great use to students who are majoring in other fields. For example, students taking a pre-med curriculum find a psychology minor useful for understanding the social and psychological aspects of medical care or as preparation for a career in psychiatry. Students in management and economics find coursework in social psychology, decision-making and organizational and industrial psychology to be of particular use to their careers.

### Minimum Requirements

PSY 001 Introduction to Psychology

PSY 010 Analysis of Psychological Data

A minimum of four upper-division PSY area courses, at least one course each from Group A, Group B and Group C

- **Group A** (Cognition, Brain and Behavior): Any PSY course in the 160s or 180s
- **Group B** (Social-Personality, Development): Any PSY course in the 130s or 150s
- **Group C** (Applied Psychology): Any PSY course in the 120s, 140s, or 170s.

(More course options may be added to this list over time. Please check with the SSHA Advising Office for updates).

Students taking a psychology minor must take an exit examination in their last year of study in order to graduate. The purpose of the examination is to help assess the effectiveness of the Psychology undergraduate program in achieving its Program Learning Outcomes. The examination is not intended to assess individual students, and students cannot fail the examination. Nonetheless, we encourage students to do their best on the examination so that the faculty can accurately assess how well Program Learning Outcomes are being achieved.



## ■ MINOR IN SERVICES SCIENCE

The economies of most developed countries are dominated by services; even traditional manufacturing companies such as General Electric and IBM are adding high-value services to grow their businesses. Improving productivity in services often requires combining technical, social and business innovations. Effective combinations of these innovations often develop naturally together. Cross-disciplinary knowledge and skills relevant to services are becoming necessary for most college graduates. The minor in Services Science aims to provide these skills by drawing together cross-disciplinary courses to understand services from management, economics, engineering and/or cognitive science perspectives.

### Minimum Requirements

MGMT 150 Services Science and Management

One upper-division MGMT-project course.

Three additional courses, one from each of the following areas (at least two must be upper-division):

- Cognitive Sciences
- Computer Sciences and Engineering
- Economics

## ■ MINOR IN SOCIOLOGY

The minor in Sociology gives students the ability to understand the complexities of today's society by examining human behavior and social actions. In examining how social structures (such as work, the family, religion, etc.) help shape social rules, processes, and agency, students gain a better understanding of the entirety of today's world—from poverty, to gender, to race, to organizational behavior, to politics. In studying these issues, students learn to use analytical reasoning and apply sociological theories to explain a wide range of social phenomena.

### Minimum Requirements

SOC 001 Introduction to Sociology

SOC 015 Sociological Research Methods

A minimum of four upper-division SOC courses

## ■ MINOR IN SPANISH

To be able to communicate in a foreign language is a fundamental asset in any profession, from careers in education, translating and interpreting, to those in international studies, health, business or law. A minor in Spanish addresses the needs of students who seek the ability to communicate in more than one language in order to be competitive in their chosen profession. The study of Spanish language and culture is of special importance in the United States, the country with the second largest Spanish-speaking population in the world. The Spanish minor offers students the linguistic confidence needed for studying in another country and the benefits of being exposed to other cultures.

### Minimum Requirements

SPAN 103 Spanish Composition and Conversation

Four additional courses from the following list (at least three must be upper division):

- LIT 050 Introduction to Hispanic Literature I
- LIT 051 Introduction to Hispanic Literature II
- LIT 061 Hispanic/Latino Children's Literature and Film
- LIT 063 Hispanic Film and Popular Culture

- LIT 069 US Latino Literature
- LIT 150 Topics in Hispanic Literature
- LIT 151 Golden Age Spanish Literature
- LIT 152 The Transatlantic Baroque
- LIT 153 Spanish Literature Since the 20th Century
- LIT 155 Latin American Colonial Literature
- LIT 156 Latin America Literature Since the Independence
- LIT 157 Caribbean Literatures and Cultures
- LIT 158 Transatlantic Modernismo
- LIT 159 Diasporas and Exiles in the Hispanic World
- LIT 160 Hispanic Women Writers
- LIT 162 Bilingualism and Borders in Hispanic Literature
- LIT 164 Hispanic Drama and Performing Arts
- LIT 168 Chicano Literature
- LIT 169 US Latino Literature
- SPAN 105 Hispanic Cultures I
- SPAN 106 Hispanic Cultures II
- SPAN 110 Spanish Linguistics
- SPAN 141 Spanish for Health Professionals
- SPAN 142 Spanish for Business and Management
- SPAN 180 Topics on Hispanic Languages and Cultures

More course options may be added to this list over time. Please check with the SSHA Advising Office for updates.

Substitutions and waivers are subject to approval by the Foreign Language Coordinator.

\* Students may complete only one course in English to be counted toward the minor.

## ■ MINOR IN WRITING

It is the responsibility of the University to ensure that their graduates communicate effectively and write proficiently. A minor in writing explicitly engages students in the writing process and fosters their development as writers in academic and pre-professional contexts.

Writing courses train students in academic discourse and provide them with extensive opportunities for professional development within and across the disciplines. Emphasizing writing as a process, writing minor courses offer challenging curricula that develop students' abilities to research, synthesize, and innovate. Within these courses, students demonstrate individual and collaborative responsibility, applying their studies from other courses. The analytical approaches they practice in writing courses are applicable to any course that they take at the University.

The writing minor enhances students' understanding of the theoretical, interdisciplinary and professional aspects of writing, and helps them develop the vocabulary, syntax, style and voice appropriate to the practice of composition in diverse fields. By using the writing process to strengthen their ideas, students develop strategies for participating in research, policy-making, professional advancement, and creative expression. The writing minor fosters respect for language, for the contributions of peers, and for the value of effective communication.

The minor in writing is open to—and appropriate for—students majoring in any field, and prepares those proceeding on to graduate work for the challenges of advanced academic writing. By representing the student's intensive work in writing, the minor also signals to prospective employers the student's distinguished preparation for the demands of the professional workplace.

Students can follow one of two tracks in the minor, focusing either on Professional Writing or Creative Writing.

### Minimum Requirements\*

One lower-division course from the following list:

- WRI 025 Introduction to Creative Writing
- WRI 030 Introduction to Professional Writing

Four additional upper-division courses from the following list:

- WRI 100 Advanced Writing
- WRI 105 Language and Style
- WRI 110 Tutor Training
- WRI 115 Science Writing
- WRI 116 Science Writing in Natural Sciences
- WRI 117 Writing for Social Sciences and Humanities
- WRI 118 Management Communication
- WRI 119 Writing for Engineering
- WRI 125 Topics in Creative Writing
- WRI 130 Topics in Professional Writing
- WRI 131 Journal Production
- SPAN 103 Spanish Composition and Conversation

With an instructor's permission, students may repeat WRI 125 and WRI 130 as their specific topics change.

\* With the approval of the Director of Writing, one writing-intensive course may be substituted for any of the required minor program courses. The Director may also allow applying one lower division writing course completed elsewhere towards fulfillment of this minor program.

MY EXPERIENCE AT UC MERCED WAS MORE VALUABLE THAN I COULD EVER IMAGINE. I EXPERIENCED THE LONG NIGHTS OF STUDYING AND ENDLESS CRAMMING, BUT I ALSO HAD THE OPPORTUNITY TO BE A PHENOMENAL STUDENT LEADER. UC MERCED PROVIDED UNLIMITED POSSIBILITIES VIA STUDENT-RUN ORGANIZATIONS, SUCH AS OUR CHEER TEAM.

—Joycelyn Stephens, Psychology

# Graduate Studies



## WELCOME FROM THE DEAN

Dear Students:

Graduate education is an experience in learning the process of discovery. Be it in the laboratory, the field, a museum or library, students will learn how to identify, investigate and analyze major problems of importance to society. As a natural laboratory for research of international significance, California's San Joaquin Valley is defined by the diversity of its people and the proximity of the Sierra Nevada mountains. These elements offer a critical venue for a broad palette of studies that span the gamut from the humanities and social sciences to the natural and engineering sciences.

The University of California, Merced is building a world-class faculty. These individuals provide abundant opportunities for graduate students to interact with a broad range of internationally acclaimed scientists and policy makers while also providing access to some of the world's most powerful research instrumentation.

I hope you will explore UC Merced for your graduate education. As the tenth and newest campus of the University of California, we offer our graduate students the matchless experience of being here at the beginning. You will have a profound impact on the campus spirit, culture and traditions that will become the hallmarks of the San Joaquin Valley's first UC campus.

Graduate education is about adventure and exploration; so too is the development of a new campus. The entrepreneurial spirit that drives the best graduate students is identical to that needed on a new campus. The faculty and the Graduate Division look forward to providing our students an educational experience that will be the stepping stone to a truly exceptional career.

Samuel J. Traina  
Dean, Graduate Division

## SOLVING SOCIETY'S CHALLENGES

Society's most intractable problems are broad based and multifaceted. UC Merced is committed to offering graduate students an opportunity to work on many of society's most pressing and important problems. The research interests of our faculty reach across the spectrum of modern research and scholarship. Research interests among UC Merced's faculty include:

- History of the Cold War and nuclear armament
- Ethnic diversity and political participation
- Spatial language, metaphor and gesture
- Economics of women's employment and decisions regarding fertility and child care
- Experimental and quasi-experimental design, metaanalytic methods, program evaluation and effects of psychotherapy
- U.S. economic history and political economy
- Digital cultural atlases for history and heritage preservation
- Space, mapping and power in pre-industrial Eurasia
- Spanish language literature of the Americas and Spain
- Transport of organic and inorganic contaminants in natural systems

- Structural and functional characteristics of biomaterials
- Design of environmental sensors for contaminant transport
- Computational biology, genomics and proteomics
- Biology of stem cells
- Philosophical issues in neuroscience and cognitive science
- Nanotechnology and solar energy

Given UC Merced's plans for substantial growth during the coming years, this list will expand rapidly. The current list of UC Merced faculty can be found online at [www.ucmerced.edu/faculty/facultylist.asp](http://www.ucmerced.edu/faculty/facultylist.asp).

While the scope of graduate education at UC Merced is national and international, the campus location also offers unique research avenues. From the cultural diversity of the San Joaquin Valley to the ecological diversity of the Sierra and the coastal mountains, the interior of California offers an abundance of unique living, learning and research opportunities. The interdependence of the Valley and the surrounding mountains provides a natural laboratory for creating environmental sustainability in the presence of an expanding and diverse population base.

Our programs are designed to prepare students for careers in academia, industry, government or private research organizations.

## UC Merced offers graduate research and education in the following areas:

- Applied Mathematics
- Biological Engineering and Small-Scale Technologies
- Electrical Engineering and Computer Science
- Environmental Systems
- Mechanical Engineering and Applied Mechanics
- Physics and Chemistry
- Quantitative and Systems Biology
- Social and Cognitive Sciences
- World Cultures

Graduate students excel in a uniquely supportive setting where world-renowned professors and promising students strive together to research human nature, society and the natural world. The graduate group structure for overseeing each of these emphases is composed of faculty from multiple Schools. Each program is highly interdisciplinary in approach and intended to facilitate interactions between faculty and students from a broad scope of traditional academic disciplines. This is intended to offer graduate students the flexibility to address major societal problems using the tools of a wide variety of disciplines.

### PREPARING FOR AN ADVANCED DEGREE

Admission to a graduate program at UC Merced requires a bachelor's degree, or its equivalent, that is comparable to a degree from the University of California both in the level of scholarly achievement and in the distribution of academic subject matter. Although applications for graduate study will be evaluated primarily on scholarly achievement, UC Merced will utilize the totality of a prospective student's qualifications, including research, work experience, recommendations and other creative accomplishments, to render a decision. To be eligible for admission to the UC Merced Graduate Division, you must have a minimum B average in your undergraduate coursework. In addition to your undergraduate transcripts and an application, applicants must submit Graduate Record Examination (GRE) scores, letters of recommendation and, for certain programs, examples of your own written work that can be evaluated by the graduate admissions committee.

### APPLYING FOR ADMISSION

An applicant can be considered for only one emphasis area during a term. Applications to UC Merced can be accessed electronically at [gradstudies.ucmerced.edu](http://gradstudies.ucmerced.edu). Applications are accepted for the fall semester only. Prospective students are encouraged to begin the admissions process as early as possible in the prior academic year. International applicants should consult the UC Merced Graduate Division web site listed above for details regarding application and admission. Residents of the United States must have all application materials submitted to UC Merced by January 15. In order for an application to be fully considered, a non-refundable application fee of \$70 for domestic applicants and \$90 for international applicants must be paid. You may pay online with a credit card (minimal surcharge added): [epaygradapp.ucmerced.edu/](http://epaygradapp.ucmerced.edu/). Alternatively, checks should be made payable to UC Regents, accompanied by the Graduate Application Fee Form for Admission, and mailed to the Graduate Division Office. Fee exemptions for UC-approved programs are available. The Graduate Division site, [gradstudies.ucmerced.edu](http://gradstudies.ucmerced.edu) provides further information about admission requirements, financial assistance, deadlines and important contacts.

### International Students

Students with credentials from universities outside the United States should begin the application process well in advance of the deadline date. Official copies or certified copies of all transcripts in English and in the original language are required.

Applicants whose native language or language of instruction is not English must show evidence of having recently taken the Test of English as a Foreign Language (TOEFL) or the International English Language Testing Service (IELTS) examination. A score of at least 7 on the IELTS is required. For TOEFL-IBT (Internet-based test), UC Merced requires an overall score of 68 with minimum scores on each section are as follows:

- 18 / writing
- 17 / speaking
- 16 / listening
- 17 / reading

A minimum score of at least 26 on the speaking section is required to be appointed as a teaching assistant; therefore, the overall minimum requirement is 77. Some programs may require higher scores. Please check individual program Web sites for specifics.

Information on the TOEFL is available online at [www.toefl.org](http://www.toefl.org) and IELTS information at [www.ielts.org](http://www.ielts.org). These requirements are waived for applicants who have received an advanced degree from a U.S. institution or from a country where English is the language of instruction.

International applicants must certify that they have sufficient funds to cover fees, tuition and living expenses for the first year of their study at UC Merced. A Foreign Applicant Questionnaire for the purpose of verifying the amount and source of funds available for graduate study will be forwarded upon acceptance into graduate study. Financial verification must be provided before visa forms can be issued.

### ADMISSIONS AND REGISTRATION

A formal notice from the dean of the Graduate Division is the official proof of admission to graduate study at UC Merced. Successful applicants will be notified as soon as possible after the program faculty has made its recommendations to the dean of the Graduate Division. Accepted students will be asked to verify their intention to register by filling out and returning a Statement of Intent to Register by April 15. Return of this form reserves your slot in the program. Should you choose not to accept the offer of admission, we ask that you also notify us by completing the Declination of Admission section so that we can offer the placement to another applicant.

Students must be enrolled in 8 units each semester to retain graduate student standing. Students with teaching assistant or research appointments are required to enroll in 12 units each semester. Registration provides the necessary access to courses, facilities and faculty. Students holding nonimmigrant visas must register for each semester covered by their visa.

## Programs Of Study



THE THING I ENJOY MOST AT UC MERCED IS WORKING WITH STUDENTS. EVERYONE HERE HAS THE PIONEERING SPIRIT WHICH MAKES TEACHING CLASSES FUN AND EXCITING.

—Professor Arnold Kim, Mathematics

UC Merced's first Ph.D. recipient Ricardo Cisneros with Graduate Dean Samuel Traina.

UC Merced offers the Master of Science (M.S.), Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.) degrees. New students are assigned a faculty advisor and committee that assist them in developing a curriculum to meet the requirements. Although considerable flexibility to meet individual needs exists, requirements usually include a core of required material that a student must master.

The M.S. and M.A. degrees are either Plan I or Plan II programs. Plan I requires a minimum of 20 semester units of upper division and graduate courses plus completion of a thesis. Plan II requires at least 24 semester units of upper division and graduate courses, followed by a comprehensive examination administered by the faculty.

Students pursuing M.S. or M.A. Plan I degrees will begin their thesis research at the end of the first year. Although they may continue to take additional graduate seminars or independent study, the majority of the second year involves thesis research and writing. The thesis committee must approve the scope of the thesis and provide guidance during the process of developing the thesis. Approval of the thesis must be unanimous for the award of the master's degree.

The Ph.D. degree is designed to prepare students for creative activity and original research. A doctoral degree is awarded in recognition of a student's knowledge of a broad field of learning and for distinguished accomplishment in that field through an original contribution of significant knowledge. The dissertation must demonstrate a high level of critical ability, imagination and synthesis. In contrast to the master's degrees, there are no University unit requirements for the doctorate, although individual programs may set specific course requirements. However, students must complete at least four semesters of academic residence at UC Merced and successfully complete the course requirements before they are allowed to take the Qualifying Examination.

All students pursuing the Ph.D. degree must pass a Qualifying Examination before admission to candidacy. Students are expected to pass the Qualifying Examination before the beginning of their third year of graduate study unless they successfully petition the Graduate and Research Council to take it at a specified later date.

The intent of this examination is to ascertain the breadth of a student's comprehension of fundamental facts and principles that apply in the major field of study. It will also determine the student's ability to think critically about the theoretical and practical aspects of the field. Students are advanced to candidacy when they fulfill the following requirements:

- Successfully completed the Qualifying Exam;
- Maintained a minimum grade point average of 3.0;
- Received incomplete grades in no more than two courses; and
- Fulfilled any language requirement associated with their program. Once a student is advanced to candidacy, it is imperative that he/she begin his/her dissertation studies promptly.

Graduate programs are built around an interdisciplinary, graduate group model that melds faculty expertise and scholarly approaches, transcending normal disciplinary boundaries.

### ■ APPLIED MATHEMATICS (AM)

<http://appliedmath.ucmerced.edu/>

Contact: Michael Sprague, Assistant Professor of Natural Sciences  
msprague@ucmerced.edu

Applied Mathematics involves the use of analytical and computational mathematics to solve real-world problems. Its core is based on modeling, analysis and scientific computing. The Applied Mathematics graduate emphasis offers opportunities for students interested in multidisciplinary mathematics projects at the interface with life sciences, physical sciences, engineering and social sciences. Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees are offered. The coursework provides training in the fundamental tools of applied mathematics, including ordinary and partial differential equations, asymptotic and perturbation methods, numerical analysis and scientific computing. An explicit goal of applied mathematical sciences is to contribute significantly to another discipline. Hence, the objective of applied mathematics is to foster multidisciplinary research and education.

During a student's first year, he or she will take Applied Mathematics Core courses, take the preliminary exams in the spring semester, and become familiar with the various active research areas in the group. In the second year, a student will complete the Core courses, take Special Topics courses, and begin working on a M.S. or Ph.D. research project. M.S. students typically complete their degrees in two years. Ph.D. students take their qualifying exam in the second or third year of studies, and are expected to complete their degrees in four to six years total.

M.S. and Ph.D. graduates in Applied Mathematics will find a wide variety of careers and ongoing study opportunities. Employers value the analytical and computational skills acquired through the training provided in Applied Mathematics. Potential employers include government and industrial research labs in a broad array of fields including engineering, energy, telecommunications, transportation and pharmaceutical sciences, as well as consulting firms, financial institutions, schools, etc. The unique combination of solid mathematical background, computational expertise and advanced knowledge of an application area places our graduates ahead of the curve on a job market that increasingly values interdisciplinary research. Graduates seeking a career in academia as post-doctoral researchers or college professors will be in a distinctly favorable position through their teaching and research training, and through the breadth of their mathematical, computational, and scientific qualifications.

All Applied Mathematics graduate students are required to pass preliminary exams offered in the first year of studies, and to complete the five core courses covering partial-differential equations, asymptotic and perturbation methods, numerical methods and scientific computing. Details regarding specific degree requirements may be found at <http://appliedmath.ucmerced.edu/grad-requirements.html>.

#### PARTICIPATING FACULTY AND RESEARCH AREAS

Harish Bhat, Assistant Professor of Natural Sciences: wave phenomena in electromagnetic media and compressible fluids studied using applied/computational analysis and geometric mechanics

François Blanchette, Assistant Professor of Natural Sciences: computational and theoretical multiphase fluid dynamics with applications to sedimenting systems and surface tension dominated flows

Boaz Ilan, Assistant Professor of Natural Sciences: nonlinear analysis applied to control of intense laser beams and high-precision measurements of frequency and time

Arnold D. Kim, Associate Professor of Natural Sciences, wave propagation in random media applied to biomedical optical imaging and wireless communications

Kevin Mitchell, Assistant Professor of Natural Sciences: dynamical systems applied to atomic, molecular and optical physics

Michael Sprague, Assistant Professor of Natural Sciences: computational mathematics of structural mechanics and fluid mechanics with applications in geophysical fluid dynamics.

Mayya Tokman, Assistant Professor of Natural Sciences: computational science, numerical analysis, mathematical modeling applied to plasma physics

#### AFFILIATE FACULTY

Alberto Cerpa, Assistant Professor of Engineering: computer networking and distributed systems areas

Raymond Chiao, Professor of Engineering and Natural Sciences: interface of quantum mechanics and general relativity, partial differential equations and differential geometry

Ajay Gopinathan, Assistant Professor of Natural Sciences: Analytical treatment and computational modeling of biomembrane dynamics, cell motility, cytoskeletal dynamics, polymer translocation, anomalous diffusion in polymer systems, chemotaxis

Thomas C. Harmon, Professor of Engineering: contaminant transport in aquatic systems, soil and groundwater remediation, development and use of environmental sensors

Marcello Kallman, Assistant Professor of Engineering: geometric modeling, computer graphics, computer animation, autonomous agents, robotics and artificial intelligence

Shawn Newsam, Assistant Professor of Engineering: image processing, computer vision, pattern recognition, machine learning, content-based information retrieval, digital libraries, data mining, and knowledge discovery in spatio-temporal, multimedia and scientific datasets

Katie L. Winder, Assistant Professor of Social Sciences, Humanities and Arts: labor economics, applied econometrics, economics of gender, poverty

Jeffrey Yoshimi, Assistant Professor of Social Sciences, Humanities and Arts: philosophy of mind, philosophy of cognitive science, phenomenology (especially Husserl) and neural networks

#### ■ BIOLOGICAL ENGINEERING AND SMALL-SCALE TECHNOLOGIES (BEST)

<https://best.ucmerced.edu/>

Chair: Kara E. McCloskey  
[kmccloskey@ucmerced.edu](mailto:kmccloskey@ucmerced.edu)

The engineering sciences are undergoing a vast and fundamental metamorphosis from isolated disciplines to more integrative and multidisciplinary topics. BEST offers Masters of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in the synergistic areas of Biological Engineering and Materials Engineering with specializations in diverse themes. Research projects are available on topics ranging from fundamental characterization of materials to tissue engineering, and coursework will provide a background in the tools and integration of modern materials.

Our faculty and staff take pride in combining exceptional teaching with state-of-the-art research to advance the education and research of this rapidly maturing discipline. Our researchers are actively participating both within and beyond the university community to apply biotechnology principles to the solutions of essential medical, technological, and societal challenges.

The doctoral degree is granted to students who demonstrate a thorough knowledge of a broad field of learning and have given evidence of distinguished accomplishment in that field. The degree also signifies that the recipient has critical ability and powers of imaginative synthesis as demonstrated by a doctoral dissertation containing an original contribution to knowledge in his or her chosen field of study. The doctoral student will complete a variety of coursework tailored to his specific area of study. Research and publication efforts will also be a primary focus of the individual doctoral training program. Funding is usually provided for doctoral students in the form of fellowships, training grants, teaching assistantships, or research assistantships.

**BEST Research Themes Include:****TISSUE ENGINEERING**

The area of tissue engineering is, by nature, cross disciplinary in that it employs cell culture methods combined with identification and development of appropriate materials, scaffolding architecture, technologies for cell delivery and nutrient transport strategies while also synergizing with nanobioengineering and bio-inspired materials.

Wei-Chun Chin, Assistant Professor of Engineering

Valerie Leppert, Associate Professor of Engineering

Jennifer Lu, Assistant Professor of Engineering

Kara McCloskey, Assistant Professor of Engineering

**BIOLOGICAL MATERIALS**

Nature's materials, structures, and devices provide stimulating examples of how engineers might optimize materials synthesis, assembly and processing strategies. Our efforts at biomimicry encompass a number of lessons from the natural world.

Wei-Chun Chin, Assistant Professor of Engineering

Carlos Coimbra, Associate Professor of Engineering

Lilian Davila, Assistant Professor of Engineering

Ajay Gopinathan, Assistant Professor of Natural Sciences

Michelle Khine, Assistant Professor of Engineering

Kara McCloskey, Assistant Professor of Engineering

Christopher Viney, Professor of Engineering

**BIOLOGICAL MODELING AND CONTROL**

Biological modeling and control is an interdisciplinary research area combining the fields of engineering, cell biology, and chemistry. Examples include the design of components for biomedical devices and tissue engineering and chemical optimization of molecules with biological properties.

Carlos Coimbra, Associate Professor of Engineering

Ajay Gopinathan, Assistant Professor of Natural Sciences

Kara McCloskey, Assistant Professor of Engineering

Matthew Meyer, Assistant Professor of Natural Sciences

David Ojcius, Professor of Natural Sciences

Meng-Lin Tsao, Assistant Professor of Natural Sciences

**PHYSIOLOGICAL ENGINEERING**

Physiological Engineering is an area of bioengineering that focuses on the development and implementation of instruments and techniques to evaluate the function of biological systems at the tissue, cellular and molecular level. This area includes bioelectronics, modern non linear optical techniques, molecular biology, spectroscopy, electrophysiology, single molecule detection and genetic engineering techniques to evaluate central paradigms and hypotheses in bioengineering.

Wei-Chun Chin, Assistant Professor of Engineering

Ariel L Escobar, Professor of Engineering

Jennifer Lu, Assistant Professor of Engineering

David Ojcius, Professor of Natural Sciences

Jay Sharping, Assistant Professor of Natural Sciences

**BIOSENSOR DESIGN AND FABRICATION**

Sensors and "bots" that can replace defective physiological counterparts in humans and animals; implants and prosthetics constructed from nanocomposites that closely resemble natural tissue; and biosensors, which can be designed to nanodimensions, mounted on a single chip and used in remote diagnoses.

Wei-Chun Chin, Assistant Professor of Engineering

Ariel L Escobar, Professor of Engineering

Steve Kang, Professor of Engineering

Michelle Khine, Assistant Professor of Engineering

Valerie Leppert, Associate Professor of Engineering

Jennifer Lu, Assistant Professor of Engineering

Yanbao Ma, Assistant Professor of Engineering

Jay Sharping, Assistant Professor of Natural Sciences

Jian-Qiao Sun, Professor of Engineering

Tao Ye, Assistant Professor of Natural Sciences

**MICRO/NANOSCALE MATERIALS**

Rational synthesis and self-assembly of complex inorganic nanoscale building blocks using macromolecules, such as block copolymer templates, are being investigated in this highly interdisciplinary research area. Structure and properties are characterized by advanced techniques. Using a multidisciplinary approach, experimental investigation and theoretical simulations, a comprehensive design guideline for creating new materials with novel properties is being established.

Lilian Davila, Assistant Professor of Engineering

Sayantani Ghosh, Assistant Professor of Natural Sciences

Michelle Khine, Assistant Professor of Engineering

Valerie Leppert, Associate Professor of Engineering

Jennifer Lu, Assistant Professor of Engineering

David Ojcius, Professor of Natural Sciences

Christopher Viney, Professor of Engineering

Tao Ye, Assistant Professor of Natural Sciences

**HYBRID MATERIALS**

New hybrid materials, such as smart materials that can easily recognize and respond to external stimuli, are being designed and synthesized. Innovative devices are being fabricated to harness their unique properties for a myriad of applications ranging from harvesting energy, to monitoring the environment, to detecting diseases.

Lilian Davila, Assistant Professor of Engineering

Ariel Escobar, Professor of Engineering

Valerie Leppert, Associate Professor of Engineering

Jennifer Lu, Assistant Professor of Engineering

## ■ ELECTRICAL ENGINEERING AND COMPUTER SCIENCE (EECS)

<http://eeecs.ucmerced.edu/>

Graduate studies in Electrical Engineering and Computer Science offers individualized, strongly research-oriented courses of study leading to the M.S. and Ph.D. degrees. The EECS graduate emphasis area is organized to allow students to pursue cutting edge research in modern fields of electrical engineering and computer science, emphasizing research and preparing students for leadership positions in industrial labs, government, or academia.

The EECS graduate emphasis area is highly cross-disciplinary with connections to faculty from all three Schools at UC Merced. In particular, strong collaborations with the graduate programs in environmental engineering and cognitive sciences are possible.

Research projects with applications across the full spectrum of science and engineering are encouraged. Opportunities for collaborative projects with scientists at the Lawrence Livermore National Laboratory and with the Center for Information Technology Research in the Interest of Society (CITRIS) are available, particularly with respect to the use of specialized computational equipment.

Prospective applicants must hold the equivalent of a B.S. degree as determined by the university. The principal requirements for the Ph.D. are (1) coursework, (2) the qualifying exam, and (3) the dissertation. To apply for the graduate studies in EECS, applicants must follow the application procedure of the UC Merced Graduate Division.

### PARTICIPATING FACULTY AND RESEARCH AREAS

Stefano Carpin, Assistant Professor of Engineering: robotics, artificial intelligence; Robotics Lab (<https://robotics.ucmerced.edu/robotics>)

Miguel Carreira-Perpinan, Assistant Professor of Engineering: machine learning with applications to computer vision and speech; computational neuroscience

Alberto Cerpa, Assistant Professor of Engineering: embedded networked systems of sensors, computer networks, distributed systems, operating systems

Marcelo Kallmann, Assistant Professor of Engineering: computer graphics, animation, robotics; Computer Graphics Lab (<http://graphics.ucmerced.edu/>)

Steve Kang, Chancellor and Professor of Engineering: semiconductor devices and circuits, high-speed optoelectronic circuits and optical network systems, and nanoelectronics

Shawn Newsam, Assistant Professor of Engineering: image processing, computer vision, pattern recognition, content-based image retrieval, geoinformatics, data mining

David Noelle, Assistant Professor of Engineering and Social Sciences, Humanities and Arts: computational cognitive neuroscience, artificial neural networks, machine learning, artificial intelligence

Songhwai Oh, Assistant Professor of Engineering: intelligent systems, wireless sensor networks, robotics; Intelligent Systems Laboratory (<http://isl.ucmerced.edu/>)

Ming-Hsuan Yang, Assistant Professor of Engineering: Computer Vision, Pattern Recognition and Machine Learning

## ■ ENVIRONMENTAL SYSTEMS (ES)

The Environmental Systems graduate group engages in individualized, research-based courses of study leading to the M.S. and Ph.D. This program strives to equip students with the knowledge and skills to improve the scientific understanding of Earth as an integrated system of atmosphere, hydrosphere, lithosphere and biosphere. Courses are designed to provide the scientific principles underlying the function and sustainability of natural and engineered ecosystems, and the policies affecting them. Participating faculty are affiliated with the Schools of Engineering, Natural Sciences, and Social Sciences, Humanities and Arts.

UC Merced's unique geographical location, its relationship with neighboring institutions and its seamless integration of science and engineering render the ES program distinct from similar programs in California and elsewhere. In particular, a substantial part of UC Merced's initial development as a research institution has been the structuring of meaningful relationships with the National Park Service and the Lawrence Livermore National Laboratory, with a particular emphasis on joining scientific inquiry with engineering analysis.

The ES faculty research strengths include Earth systems science, ecology and evolutionary biology, spatial analysis, environmental engineering, air quality, geochemistry, solar energy, climatology, hydrology, policy, and economics.

### PARTICIPATING FACULTY:

Andres Aguilar, Assistant Professor of Natural Sciences

Roger Bales, Professor of Engineering

Martha Conklin, Professor of Engineering

Yihsu Chen, Assistant Professor of Engineering and Social Sciences, Humanities and Arts

Wei-Chun Chin, Assistant Professor of Engineering

Carlos Coimbra, Associate Professor of Engineering

Michael Dawson, Assistant Professor of Natural Sciences

Benoit Dayrat, Assistant Professor of Natural Sciences

Gerardo Diaz, Assistant Professor of Engineering

Phillip Duffy (LLNL), Adjunct Professor of Natural Sciences

Qinghua Guo, Assistant Professor of Engineering

Thomas Harmon, Professor of Engineering and Chair of the Environmental Systems Graduate Program

Lara Kueppers, Assistant Professor of Natural Sciences

Valerie Leppert, Associate Professor of Engineering

Monica Medina, Assistant Professor of Natural Sciences

Peggy O'Day, Professor of Natural Sciences

Niguel Quinn, Adjunct Research Engineer, School of Engineering

Samuel Traina, Professor of Natural Sciences and Engineering; Vice Chancellor for Research and Dean, Graduate Division

Anthony Westerling, Assistant Professor of Engineering and Social Sciences, Humanities and Arts

Roland Winston, Professor of Natural Sciences and Engineering

Jeff Wright, Professor and Dean of Engineering



## ■ MECHANICAL ENGINEERING AND APPLIED MECHANICS (MEAM)

<http://meam.ucmerced.edu/>

Program Chair: Carlos F. M. Coimbra, [ccoimbra@ucmerced.edu](mailto:ccoimbra@ucmerced.edu)

Admissions Chair: Jian Q. Sun, [jsun3@ucmerced.edu](mailto:jsun3@ucmerced.edu)

The Mechanical Engineering and Applied Mechanics (MEAM) graduate emphasis engages in individualized, research-based programs of study leading to the M.S. and Ph.D. degrees.

The MEAM faculty members strive to provide students with a comprehensive research experience based on the latest developments of the analytical, numerical and experimental tools available in the field. Mechanical Engineering and Applied Mechanics includes a broad spectrum of research activities that are based on well-defined scientific principles. Judicious application of the fundamentals principles of Mechanics allows specialized Mechanical Engineers and Applied Mechanicists to impact virtually all fields of science and technology. The goal of the MEAM emphasis at UC Merced is to provide its graduate students with a very solid foundation in Mechanical Sciences and a strong and comprehensive exposure to modern research techniques.

Courses are designed to provide the mathematical and scientific principles underlying the foundations of Applied Mechanics, with emphasis on applications and novel research developments in diverse topics such as Advanced Dynamics, Modern Control Systems, Continuum Mechanics, Viscous Flows, Rheology, Radiative Transfer, etc. The MEAM graduate program provides a seamless transition for undergraduate students interested in pursuing graduate studies in the area.

The current MEAM faculty research strengths include:

- Continuum Mechanics
- Thermodynamics (Optimal Design, Low-Entropy Generating Systems)
- Heat Transfer (Radiative Transfer, Evolutionary Design of Thermal Systems)
- Fluid Mechanics (CFD, Sedimentation, Unsteady Viscous Flows, Microfluidics)
- Solid Mechanics and Mechanical Design (Motion Planning, Geometric Modeling)
- Robotics, Mechanisms and Artificial Intelligence
- Hydroelasticity and Aeroelasticity
- Rheology, Polymers
- Vibration and Control
- Solar Energy and Particle Physics
- Molecular Dynamics

### PARTICIPATING FACULTY:

Francois Blanchette, Assistant Professor of Natural Sciences

Stefano Carpin, Assistant Professor of Engineering

Carlos Coimbra, Associate Professor of Engineering, Chair

Lilian Davila, Assistant Professor of Engineering

Gerardo Diaz, Assistant Professor of Engineering

Ajay Gobinathan, Assistant Professor of Natural Sciences

Marcelo Kallman, Assistant Professor of Engineering

Michelle Khine, Assistant Professor of Engineering

Jianbao Ma, Assistant Professor of Engineering

Michael F. Modest, Professor of Engineering

Michael Sprague, Assistant Professor of Natural Sciences

Jian Qiao Sun, Professor of Engineering

Roland Winston, Professor of Engineering and Natural Sciences

## ■ PHYSICS AND CHEMISTRY

<http://physics-chemistry.ucmerced.edu/>

Contact: Professor Anne Myers Kelley, [amkelley@ucmerced.edu](mailto:amkelley@ucmerced.edu)

(Chemistry); Professor Sayantani Ghosh, [sgghosh@ucmerced.edu](mailto:sgghosh@ucmerced.edu)

(Physics)

Research in the Physics and Chemistry graduate emphasis area spans the traditional disciplines of chemistry and physics and related interdisciplinary fields. Graduate education within the group is currently divided into three tracks—Physics, Physical Chemistry, and Organic Chemistry—which have different preliminary exams and course work. Thus, students are educated and must demonstrate proficiency in a particular discipline, but have the opportunity to pursue research that is highly interdisciplinary if they so desire. This approach provides our students with both the rigorous training and the broad perspectives needed to address present-day scientific and technological challenges, most of which are not confined to single disciplines. Most students are admitted to the Physics and Chemistry program to work toward a Ph.D. degree, but applications from students whose goal is a terminal M.S. degree will also be considered.

The deadline for receipt of applications is January 15. Late applications are considered as space permits. Normally applications are accepted for Fall semester only. The minimum requirement admission to the Physics and Chemistry program is a bachelor's degree in physics, chemistry, or a related field of science or engineering with a grade point average of at least 3.0. The GRE general test is required and the subject test in physics, chemistry, or mathematics is recommended. Admission decisions are based on undergraduate grades, performance on the GRE, accomplishments in undergraduate research, and letters of recommendation. Students from non-English speaking countries must take the TOEFL exam and are normally interviewed by telephone in order to evaluate English proficiency.

During the first year in residence, students typically take courses and serve as TAs for undergraduate science courses. The heart of the Physics and Chemistry Ph.D. program is the completion of a piece of original scientific research leading to the preparation and defense of a Ph.D. thesis. Students are encouraged to discuss research interests and possible Ph.D. projects with all of the faculty in the group as early as possible, and select a faculty research advisor (major professor) early during the second semester of study. Research normally occupies a majority of the student's time after the first year of residence.

The Physics and Chemistry group has established the following requirements for the Ph.D. degree:

- Complete at least four semesters of full-time academic residence (12 units minimum) at UC Merced.
- Complete the required courses for one of the three emphasis tracks (physics, physical chemistry, or organic chemistry), with a letter grade of at least "B" in each course ("S" in seminar courses graded S/U).

- Serve as a teaching assistant for at least one semester.
- Pass a preliminary examination testing undergraduate level knowledge of physics, physical chemistry, or organic chemistry.
- Pass an oral Ph.D. qualifying examination, normally taken during the second year in residence
- Present an open technical seminar at least once each calendar year in residence (organic chemistry and physical chemistry emphasis tracks only)
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field.

## PARTICIPATING FACULTY AND RESEARCH AREAS

Raymond Chiao, Professor of Engineering and Natural Sciences: Nonlinear and quantum optics, experiment and theory; gravitational radiation

Sayantani Ghosh, Assistant Professor of Natural Sciences: Experimental condensed matter physics including correlated magnetic systems, quantum information processing, nano-scale self-assembly, and hybrid photovoltaics

Ajay Gopinathan, Assistant Professor of Natural Sciences: Theoretical biophysics and soft condensed matter physics

Anne Kelley, Professor of Natural Science: Linear and nonlinear laser Raman scattering, experiment and theory; organic nonlinear optical materials; nanoplasmonics and surface enhanced spectroscopies

David Kelley, Professor of Natural Sciences: Ultrafast dynamics and spectroscopy of semiconductor nanoparticles and solar energy conversion.

Valerie Leppert, Associate Professor of Engineering: Electron microscopy of technological and environmental nanomaterials

Linda Hirst, Assistant Professor of Natural Sciences: Experimental soft condensed matter physics, with interests in both biophysics and liquid crystal materials

Jennifer Lu, Assistant Professor of Engineering: Synthesis of novel functional nanomaterials employing self-assembled macromolecules as templates; applications in biosensing and renewable energy

Erik Menke, Assistant Professor of Natural Sciences: Materials chemistry directed toward solar energy capture and storage as chemical fuels

Matthew Meyer, Assistant Professor of Natural Sciences: Organic reaction mechanism with a focus on developing new methods for studying pharmaceutically-relevant asymmetric reactions

Kevin Mitchell, Assistant Professor of Natural Sciences: Nonlinear dynamics and classical/quantum chaos, with applications to atomic and molecular physics.

Jay E. Sharping, Assistant Professor of Natural Sciences: Ultrafast laser technology and applications in physics, chemistry, and biology

Lin Tian, Assistant Professor of Natural Sciences: Theoretical quantum optics, quantum coherence effects in condensed matter systems, and quantum information

Meng-Lin Tsao, Assistant Professor of Natural Sciences: Bioorganic chemistry, chemical biology, protein chemistry and vaccine technology

Christopher Viney, Professor of Engineering: Biomolecular materials; physical science and engineering of polymers and liquid crystals

Roland Winston, Professor of Engineering and Natural Sciences: Solar power and renewable energy; elementary particle physics; nonimaging optics

Tao Ye, Assistant Professor of Natural Sciences: Scanning probe microscopy study of interfaces; nanoscale machines on surfaces; single molecule analysis of biopolymers.

## ■ QUANTITATIVE AND SYSTEMS BIOLOGY (QSB)

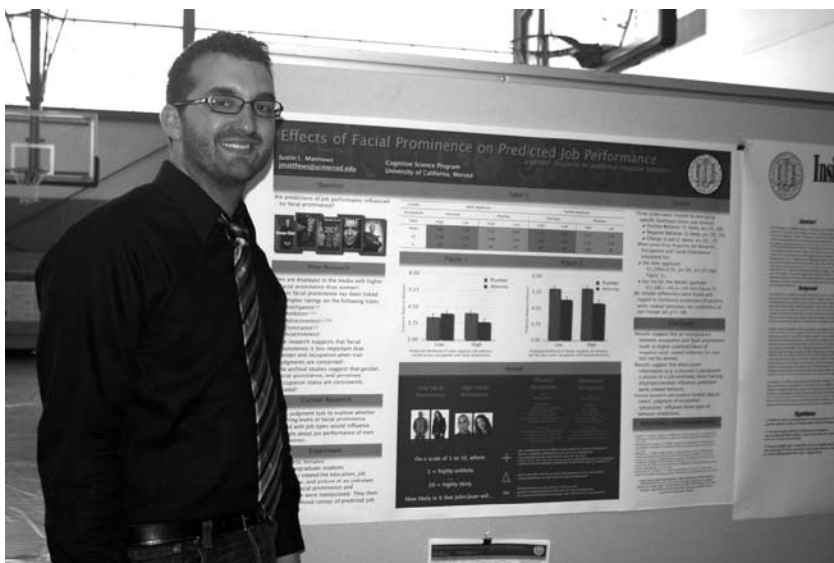
<http://qsb.ucmerced.edu>

Contact: Associate Professor Andy LiWang  
aliwang@ucmerced.edu

Advances in techniques and theory that bridge molecular and ecosystems scales, have greatly enabled the potential for integration across the life sciences. Biologists' ability to gather and process large amounts of quantitative data in field and laboratory settings, is advancing hand-in-hand with theory and modeling that better explain the diversity of life on Earth. The Quantitative and Systems Biology graduate emphasis at UC Merced provides individualized, research-based courses of study leading to M.S. and Ph.D. degrees. Research projects are available on diverse topics including: 1) biomolecular interactions, 2) genomics and proteomics, 3) cellular interactions and signal transduction, 4) organ systems and whole animals (both vertebrate and invertebrate), 5) comparative ecology, evolution, and organismal biology, and 6) computational biology. Because of the interdisciplinary nature of the program and faculty, research projects often span multiple topics to address more complex questions and linkages across levels of biological scale (e.g. molecules, cells, organisms, communities) typical of systems biology and quantitative biology (e.g. measuring individuals to describe populations). Course work in this graduate emphasis provides a background in the tools of modern biology, including computational biology, genomics and advanced instrumentation. The Quantitative and Systems Biology emphasis offers particular opportunities for students interested in multidisciplinary projects at the interface of biology, computer science and bioengineering. Career opportunities for graduates include exciting research positions in government and industry, as well as academic positions at colleges and universities.

The minimum requirement for graduate admission to UCM is a bachelor's degree with an undergraduate grade point average no lower than 3.0 on a 4.0 scale. This minimum will be waived only under circumstances where the applicant has demonstrated strong academic skills subsequent to their undergraduate studies. Performance on the GRE, accomplishments in undergraduate research, and letters of recommendation are also important determinants of an applicant's potential for success in graduate education and will be evaluated by the admissions committee. Foreign students from non-English speaking countries are required to attain a minimum score of 580 on the TOEFL exam (paper version) or 230 (computer-based version), as well as a score of at least 45 on the TSE. Each academically qualified student will also have a telephone or in-person interview with one or more QSB faculty members. Finally, the match of the candidate's skills and interests to QSB research programs will be considered. For this reason applicants are encouraged to contact QSB faculty before applying.

Graduate students in the Ph.D. program typically spend the first year taking courses, fulfilling their teaching requirement, and working on their graduate research project. The subsequent years will be primarily devoted to the student's graduate research project. Typically, a graduate student spends five years to complete their research project. Students are supported by Teaching Assistantships during the first year, and by Graduate Student Research Positions in subsequent years.



Graduate student Justin Matthews winner of the 2009 Student Research Poster competitions, Graduate Student Division.

The Quantitative and Systems Biology graduate group has established the following requirements for the Ph.D. degree. Students must:

- Complete at least four semesters of full-time academic residence (12 units minimum) at UC Merced
- Earn a passing grade in at least four graduate courses of at least three units (exclusive of research)
- Complete all graduate courses with a letter grade of at least "B"
- Serve as a Graduate Student Instructor (GSI) for at least one semester
- Pass a qualifying oral exam
- Present an open technical seminar at least twice while in residence
- Publish at least one scientific paper in the peer-reviewed literature
- Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field

#### PARTICIPATING FACULTY AND RESEARCH AREAS

Andres Aguilar, Assistant Professor of Natural Sciences: Population genetics and molecular evolution

Keith Alley, Professor of Natural Sciences: Developmental neuroscience

David Ardell, Assistant Professor of Natural Sciences: Computational biology of gene expression systems

Miriam Barlow, Assistant Professor of Natural Sciences: Evolution of bacteria

Wei-Chei Chun, Assistant Professor of Engineering: Applying engineering principles to biological systems

Jinah Choi, Assistant Professor of Natural Sciences: Molecular biology of hepatitis C virus

Michael Cleary, Assistant Professor of Natural Sciences: Determinants of stem cell fate

Michael Colvin, Professor of Natural Sciences: Biomolecular simulations

Michael Dawson, Assistant Professor of Natural Sciences: Ecology and evolution, marine biodiversity and biogeography

Benoit Dayrat, Assistant Professor of Natural Sciences: Evolution of mollusks

Stephen C. Hart, Professor of Natural Sciences: Biogeochemical processes and productivity in managed and wildland terrestrial ecosystems

Henry J. Forman, Professor of Natural Sciences: Biochemistry of reactive oxygen species

Carolyn Frank, Assistant Professor of Natural Sciences: Microbial genome evolution

Marcos Garcia-Ojeda, Assistant Professor of Natural Sciences: Stem cell development

Ajay Gopinathan, Assistant Professor of Natural Sciences: Modeling of cell motility and biopolymers

Michelle Khine, Assistant Professor of Engineering: Engineering therapeutically useful cells

Andy LiWang, Associate Professor of Natural Sciences: Nuclear magnetic resonance spectroscopy

Patricia LiWang, Professor of Natural Sciences: Chemokine structure and function

Jennifer Manilay, Assistant Professor of Natural Sciences: Mechanisms of lymphocyte development

Kara McCloskey, Assistant Professor of Engineering: Tissue engineering

Monica Medina, Assistant Professor of Natural Sciences: Evolution of marine invertebrate animals

David Ojcius, Professor of Natural Sciences: Intracellular pathogens of epithelial cells

Rudy Ortiz, Assistant Professor of Natural Sciences: Physiology & endocrinology of cardiovascular and renal function and disease, and nutrition

Maria Pallavicini, Professor and Dean of Natural Sciences: Stem cell behavior

Jason Raymond, Assistant Professor of Natural Sciences: Systems biology and the diversity of life

Meng-Lin Tsao, Assistant Professor of Natural Sciences: Organic synthesis, protein engineering, bioconjugation

Christopher Viney, Professor of Engineering: Biomolecular materials

#### ■ SOCIAL AND COGNITIVE SCIENCES (SCS)

<http://scsgrad.ucmerced.edu>

Contact: Mitch Ylarregui, Graduate Program Coordinator  
mylarregui@ucmerced.edu

The graduate emphasis in Social and Cognitive Sciences offers students individualized training and the opportunity to help build a unique, interdisciplinary research community. Graduate study is currently organized in five tracks: anthropology, cognitive science, economics, political science, and psychology. In addition, there are individual faculty members with interests in policy and sociology. There are future plans for additional areas, but applications are only considered in areas of current faculty research. Graduate study at UC Merced will involve working closely with one or more professors, so prospective applicants should carefully consult the faculty list for current research topics.

## ANTHROPOLOGY

This track explores contemporary and historical cultures and societies by studying the practices and processes that entwine the individual in social structures, social relations, and power dynamics. Areas of focus include health and nutritional status, migration, demography, identity, culture and citizenship, and globalization, with attention to the Americas.

*Faculty: DeLugan, Hull, Rebhun.*

## COGNITIVE SCIENCE

This track provides interdisciplinary training in computational modeling, high-level cognition, including reasoning, categorization and decision-making, psycholinguistics, cognitive linguistics, visual perception, cognitive engineering, artificial intelligence, computer vision, philosophy of mind, and cognitive neuroscience.

*Faculty: Dunham, Heit, Kallmann, Kello, Maglio, Matlock, Newsam, Noelle, Spivey, Yoshimi.*

## ECONOMICS

This track provides training in such applied microeconomic fields as labor economics, public economics, law and economics, industrial organization and political economy.

*Faculty: Kantor, Neumann, Whalley, Winder.*

## POLITICAL SCIENCE

This track provides training in quantitative approaches to American Political Behavior and Institutions.

*Faculty: Hansford, Monroe, Nicholson, Trounstone.*

## PSYCHOLOGICAL SCIENCES

This track provides training in developmental psychology, health psychology and quantitative psychology. Areas of particular strength include experimental design, meta-analysis, health in children, adolescents and young adults, development of social stereotypes and prejudices, and language and cognitive development.

*Faculty: Chouinard, Dunham, Shadish, Song, Vevea, Wallander.*

## PARTICIPATING FACULTY AND RESEARCH AREAS:

Irenee Beattie, Assistant Professor of Social Sciences, Humanities and Arts: Sociology of Education, Racial/Ethnic and Gender Inequality, Law and Social Policy, Adolescent Transitions to Adulthood

Yihsu Chen: Assistant Professor of Engineering and Social Sciences, Humanities and Arts: Energy and environmental modeling, statistics, operations research, decision analysis, policy and health effect analysis

Michelle Chouinard: Assistant Professor of Social Sciences, Humanities and Arts: Language acquisition, conceptual development, folk biology

Robin Maria DeLugan, Assistant Professor of Social Sciences, Humanities and Arts: Collective identity, social memory, the nation-state, migration and transnational practices, hemispheric perspectives on the Americas, Indigenous peoples' issues

Yarrow Dunham: Assistant Professor of Social Sciences, Humanities and Arts: Social cognitive development, stereotyping and prejudice, linguistic influences on conceptual development

Tom Hansford, Associate Professor of Social Sciences, Humanities and Arts: Political institutions, judicial politics, campaigns and elections, statistical modeling

Kathleen Hull, Assistant Professor of Social Sciences, Humanities and Arts: Anthropological archaeology, colonialism, demographic anthropology, identity and ethnogenesis, Indigenous people

Evan Heit, Professor of Social Sciences, Humanities and Arts: Psychology and cognitive science, focusing on reasoning, memory, categorization, computational modeling

Marcelo Kallmann: Assistant Professor of Engineering: Virtual reality, computer animation, humanoid robotics, motion planning

Shawn Kantor, Professor of Social Sciences, Humanities and Arts: Political economy, law and economics, public economics, U.S. economic history

Christopher Kello, Associate Professor of Social Sciences, Humanities and Arts: Psycholinguistics, speech production, and word reading. Computational modeling using neural networks and dynamical systems.

Paul Maglio: Associate Adjunct Professor of Social Sciences, Humanities and Arts: Distributed cognition, Human-Computer Interaction, Service Science

Teenie Matlock, Associate Professor of Social Sciences, Humanities and Arts: Psycholinguistics, cognitive linguistics, semantics, spatial cognition, metaphor, human-computer interaction

Nathan Monroe, Assistant Professor of Social Sciences, Humanities and Arts: American politics, political institutions, legislative politics, legislative elections, research design, positive political theory

Todd Neumann, Assistant Professor of Social Sciences, Humanities and Arts: Applied microeconomics, industrial organization, program evaluation, and economic history with a focus on the history of the American retail industry

Shawn Newsam, Assistant Professor of Engineering: Computer vision, pattern recognition, machine learning, data mining

Stephen Nicholson, Associate Professor of Social Sciences, Humanities and Arts: Political behavior, public opinion, voting and elections, political psychology, and direct democracy

David Noelle, Assistant Professor of Engineering and Social Sciences, Humanities and Arts: Computational cognitive neuroscience, concept formation, working memory, cognitive psychology, machine learning, artificial intelligence

Linda-Anne Rebhun, Associate Professor of Social Sciences, Humanities and Arts: Medical anthropology: maternal and child health; Psychological Anthropology: emotions, romance; Gender; Religion: magic, witchcraft, folk Catholicism; Folklore; Latin America, African Diaspora, Africa

William Shadish, Professor of Social Sciences, Humanities and Arts: Experimental and quasi-experimental design, meta-analysis, program evaluation, psychology of science

Anna V. Song: Assistant Professor, School of Social Sciences, Humanities, and Arts: Health psychology, adolescent and young adult risk behavior decision making, health-related attitudes and perceptions.

Michael Spivey, Professor of Social Sciences, Humanities and Arts: Psycholinguistics, visiolinguistic processing, visual memory and attention, studied via eye movements and artificial neural networks

Jessica Trounstone, Assistant Professor of Social Sciences, Humanities and Arts: Local politics, elections, political institutions, political parties, mixed-methods

Nella Van Dyke, Associate Professor of Social Sciences, Humanities and Arts: Political Sociology/Social Movements; Hate Crime; Gender and Sexuality

Jack Vevea, Associate Professor of Social Sciences, Humanities and Arts: Quantitative Psychology, Meta-Analysis, Mathematical Models of Cognition

Jan Wallander, Professor of Social Sciences, Humanities and Arts: Health and developmental psychology, behavioral influences on health, quality of life, with a focus on children and adolescents

Simon Weffer-Elizondo, Assistant Professor of Social Sciences, Humanities and Arts: Social stratification, social movements, racial/ethnic relations, political sociology, immigration

Anthony Westerling, Assistant Professor of Engineering and Social Sciences, Humanities and Arts: Applied climatology; climate-wildfire interactions; statistical modeling for seasonal forecasts, paleofire reconstructions, and climate change impact assessments; resource management and policy

Alex Whalley, Assistant Professor of Social Sciences, Humanities and Arts: Economics of labor markets, impact of education and job training

Katie Winder, Assistant Professor of Social Sciences, Humanities and Arts: Labor economics, applied econometrics, economics of gender, poverty

Jeffrey Yoshimi, Assistant Professor of Social Sciences, Humanities and Arts: Philosophy of mind, philosophy of cognitive science, phenomenology (especially Husserl), and neural networks

## ■ WORLD CULTURES (WC)

<http://wcgrad.ucmerced.edu>

Contact: Mitch Ylarregui, Graduate Program Coordinator  
mylarregui@ucmerced.edu

The graduate emphasis in World Cultures offers individualized, research-based courses of study that explore cultures in both their local manifestations—by focusing on the rich cultural and historical heritage of California, the San Joaquin Valley, and the Sierra Nevada—and in a global context. The program pays particular attention to world cultures in their historical, political, material, and literary manifestations, and to the effects of immigration and migration on society and cultural change. Students explore and apply the methods by which historians, literary scholars, anthropologists, artists, philosophers, scholars of cultural studies, and other humanists and social scientists examine societies and cultures. The emphasis offers concentrations in History, Literatures and Cultures of the Spanish-speaking World, Literatures and Cultures of the English-speaking World, and World Heritage.

Concentrations include multidisciplinary and interdisciplinary courses, and the concentrations are conceived as mutually complementary. Since proximity to the Sierra and the other splendid natural features of California has significantly influenced the cultural and historical development of the state, students will also benefit from the intersections of interests between the World Cultures Institute (WCI) and the Sierra Nevada Research Institute (SNRI), particularly with respect to cultural understanding of wilderness, landscape, and the environment.

### PARTICIPATING FACULTY:

Virginia Adan-Lifante, Lecturer, Social Sciences, Humanities and Arts: Second Language Acquisition, Spanish and Latin American language, literature and culture, women's literature

Susan D. Amussen, Professor of Social Sciences, Humanities and Arts: Early Modern English History, Early Modern Europe, British history, Atlantic History, European Women's History, Women's Studies, history and literature

Gregg Camfield, Professor of Social Sciences, Humanities and Arts: Early American Literature (to 1899); Mark Twain; humor (social, ethical, and psychological dimensions); neuro-physiology of aesthetics; literary and philosophical sentimentalism

Robin Maria Delugan, Assistant Professor of Social Sciences, Humanities and Arts: Collective identity, social memory, the nation-state, migration and transnational practices, hemispheric perspectives on the Americas, Indigenous peoples' issues

Kevin Fellez, Assistant Professor of Social Sciences, Humanities and Arts: US national popular music culture; jazz studies; rock; ki ho'alu; accordion culture; aesthetics

Maurizio Forte, Professor of Social Sciences, Humanities and Arts: reconstruction of archaeological and ancient landscapes in a virtual format

Jan E. Goggans, Assistant Professor of Social Sciences, Humanities and Arts: Regional literatures, Environmental literature and movements, Protest literature, California and the West, Literature and Culture of the 1930s, Intersections of Visual and Textual Representations

Gregg Herken, Professor of Social Sciences, Humanities and Arts: Professor of History, SSHA. Recent American history, modern U.S. diplomatic history, history of the Cold War, nuclear history

Kathleen L. Hull, Assistant Professor of Social Sciences, Humanities and Arts: Anthropological archaeology, colonialism, demographic anthropology, identity and ethnogenesis, Indigenous people

Ignacio Lopez-Calvo, Professor of Social Sciences, Humanities and Arts: Human rights, ethnicity and Latin American literature and culture, Asian diasporas in Latin America, authoritarianism

Sean Malloy, Assistant Professor of Social Sciences, Humanities and Arts: U.S. diplomatic history, nuclear history, war and morality, twentieth century U.S. social movements

Manuel M. Martin-Rodriguez of Professor, Social Sciences, Humanities and Arts: Chicano/a and U.S. Latino/a literature and media studies, reading and reception studies, U.S. Hispanic literary past, comparative migration studies

Ruth Mostern, Assistant Professor of Social Sciences, Humanities and Arts: Chinese and world history, historical geography, environmental history, digital humanities, state power

Sholeh A. Quinn, Associate Professor of Social Sciences, Humanities and Arts: History of Iran, Safavid Iran, Persian historiography, Mughal India, 19th century Iranian religions

Linda-Anne Rebhun, Associate Professor of Social Sciences, Humanities and Arts: Medical anthropology: maternal and child health; Psychological Anthropology: emotions, romance; Gender; Religion: magic, witchcraft, folk Catholicism; Folklore; Latin America, African Diaspora, Africa

Cristian Ricci, Assistant Professor of Social Sciences, Humanities and Arts: Nineteenth and Twentieth Century Spanish literature; Nineteenth and Twentieth Century Spanish-American literature; Portuguese literature; Golden Age and Colonial literature

Simon Weffer-Elizondo, Assistant Professor of Social Sciences, Humanities and Arts: Social stratification, social movements, racial/ethnic relations, political sociology, immigration

Jeffrey Yoshimi, Assistant Professor of Social Sciences, Humanities and Arts: Philosophy of mind, philosophy of cognitive science, phenomenology (especially Husserl), and neural networks

### GRADUATE STUDENT RESEARCH POSITIONS AND TEACHING ASSISTANTSHIPS

For information on graduate student research positions or teaching assistantships, please see the Graduate Student Financial Support section of this catalog.

## GOVERNANCE OF GRADUATE EDUCATION

Graduate study is administered by the Dean of the Graduate Division and by the Graduate and Research Council, a committee of the Academic Senate. The Coordinating Committee on Graduate Affairs is a system-wide body that assures coordination between the campuses and develops general policies that govern graduate education throughout the University of California.

## FINANCIAL SUPPORT

Several forms of financial support are available to facilitate the pursuit of a graduate education at UC Merced. Most forms of support are granted for merit, while others are granted for financial need or for a combination of merit and need. The Graduate Division works closely with the Office of Financial Aid and Scholarships and the academic units to coordinate all forms of financial support.

The Graduate Division and Office of Financial Aid and Scholarships administer need-based financial aid programs for graduate students. We are here to help students understand the financial aid opportunities as well as the criteria utilized in determining eligibility for the various financial aid programs available at UC Merced.

## TYPES OF AID

Financial support is available at UC Merced in the form of graduate student research positions, teaching assistantships, fellowships and loans. All students, regardless of income, are encouraged to apply.

### Graduate Student Research (GSR) Positions

Research positions afford excellent opportunities to gain invaluable experience in areas of importance to your graduate education while receiving financial support. Information and application materials for GSR positions are available from the academic units.

### Teaching Assistantships (TA)

Graduate students working toward advanced degrees are given duties in undergraduate courses that may include conducting discussion or laboratory sections, grading student work and providing students with individual help in the subject. Teaching assistants are chosen for excellent scholarship and promise as teachers. They serve apprenticeships under active tutelage and supervision of regular faculty members. Teaching assistants engage in learning how to teach and work closely with faculty mentors. A limited number of teaching assistantships are available each year. On the recommendation of the academic deans, the academic units make appointments to teaching assistantships.

### Fellowships

Fellowships are awarded primarily on the basis of scholarship and the promise of outstanding academic and professional achievement. Consideration is given to the extent and quality of previous undergraduate and graduate work, evidence of ability in research or other creative accomplishment, evidence of intellectual capacity and promise of productive scholarship.

Financial need or the availability of other sources of support in your graduate program is not relevant to the evaluation of academic merit, but may be an additional criterion for some fellowships. Students must establish eligibility for need-based fellowships by filing a Free Application for Federal Student Aid (FAFSA). For faster and more accurate filing, students can complete the FAFSA online at [www.fafsa.ed.gov](http://www.fafsa.ed.gov).

## Loans

Financial aid awards that require repayment, loans, offer the opportunity to defer the cost of your educational expenses by borrowing now and repaying later. Some loan programs are based on financial need, but there are loan programs available to all students regardless of income. Loan programs available through UC Merced are federally funded, providing long-term, low-interest loans.

**Federal Subsidized Stafford Loans:** These loans are awarded to students with financial need. This loan is “subsidized” in that the federal government pays the interest while the student is in school and during the grace period (first six months after leaving school or dropping to less than half-time enrollment status).

**Federal Unsubsidized Stafford Loans:** Not based on financial need, these loans are available to all eligible students, regardless of income. This loan is “unsubsidized” in that the student is responsible for paying all interest due. There is no federal interest subsidy for the loan. Interest accrues immediately upon disbursement. Borrowers may elect to pay accrued interest on a monthly or quarterly basis or have it added back to the principal balance in a process called capitalization.

## HOW TO APPLY FOR FINANCIAL AID

Graduate applicants who are US citizens, permanent residents or immigrants are required to file a “Free Application for Federal Student Aid” (FAFSA). Although the FAFSA can be filed at any time, it is strongly suggested that you file by the priority processing date of March 2. However, if the March 2 deadline has passed, you may still submit this form. We process some forms of financial aid throughout the year. For faster and more accurate processing, you may fill out this form online at [www.fafsa.ed.gov](http://www.fafsa.ed.gov). This form is used to determine financial need only. Financial need is a component of the eligibility criteria for many forms of financial support. If you need assistance with your application, please contact the Office of Financial Aid and Scholarships.

To be considered for graduate student research or teaching assistant (TA) positions: Graduate students who are interested in obtaining a graduate student research position or a teaching assistant position must submit an application online. From the UC Merced home page, select job/opportunities and follow the links to academic student positions. TA positions are listed there.

For Additional Information: Please refer to the Financing Your Education section on the web site at [gradstudies.ucmerced.edu](http://gradstudies.ucmerced.edu) for additional information and assistance.

## H. RAJENDER REDDY HEALTH CENTER

Student health and wellness services are provided at the H. Rajender Reddy Health Center on the 2nd floor of the Joseph Edward Gallo Recreation and Wellness Center. The H. Rajender Reddy Health Center provides quality health care and wellness education focused on the needs of graduate students.

All registered graduate students are eligible to use the services at the H. Rajender Reddy Health Center. These include injury and illness visits with medical providers, appointments with a health educator or nutritionist, laboratory testing, medications, immunizations and injections, optometry services and health and wellness education. Most of our core services are covered by registration and health fees and are provided at no additional cost, with the exception of labs,

radiology, pharmaceuticals and some immunizations. Hours are posted on the health web site at [health.ucmerced.edu](http://health.ucmerced.edu).

Our mission is to assist you to achieve and maintain maximum wellness to allow you to pursue your academic and personal goals. The campus health center provides basic treatment and prevention services that enhance and maintain your physical, emotional and social well-being. These services are provided by board-certified physicians, certified nurse practitioners and health educators. Our staff and peer counselors also provide information on issues such as alcohol and drug abuse, safety, sexual health, stress management, nutrition and body image and smoking cessation. Through our programs and services, we encourage you to become active participants in your health and wellness.

### Health Insurance Plan

All students attending a UC campus are required to have major medical health insurance as a nonacademic condition of enrollment. Graduate students are automatically enrolled in UC Merced's Graduate Student Health Insurance Plan (GSHIP) and billed through their student account. This comprehensive and affordable health insurance plan supplements the campus services available at the H. Rajender Reddy Health Center and provides extended medical care services, including emergency services, when you need them. Graduate students with a TA/GSR appointment greater than twenty-five percent (25%) may have their medical insurance cost paid by their UC Merced Department.

If you are covered by other health insurance, the GSHIP requirement may be waived if you can demonstrate, by the specified deadline, that your coverage is comparable to that available under the University's plan. If GSHIP is waived, you are still eligible to utilize the campus health center. For further information on insurance, including the Waiver Application, refer to the health services web page at [health.ucmerced.edu](http://health.ucmerced.edu) or contact [insurance@ucmerced.edu](mailto:insurance@ucmerced.edu).

YOU CAN'T CONTROL THE ACTIONS AND BEHAVIORS OF OTHERS BUT YOU CAN CONTROL YOUR OWN. MAKE THE MOST OF EVERYTHING YOU DO AND APPLY YOURSELF WHEREVER AND WHENEVER YOU CAN. DO NOT COMPARE YOURSELF TO THE PIONEERING CLASS. INSTEAD, BUILD YOURSELF ON TOP OF WHAT IS OR ISN'T ESTABLISHED AND CONTINUE THE PIONEERING BOBCAT SPIRIT.

—JaeJae Julian, Psychology and Management

# Research At UC Merced

Research is the pioneering work of the intellect, an adventure at the frontiers of knowledge in which faculty engage both their undergraduate and graduate students. It reflects mankind's indomitable spirit of optimism that we can and must do better. Every human pursuit benefits from the ongoing process of evaluation and discovery. As the first research university to be built in the 21st century, UC Merced is positioned for new approaches to research in support of the university's educational mission. As the tenth campus of the University of California, UC Merced joins in the University's unparalleled history of accomplishment. That history also sets the high standards that UC Merced must live up to.

As an undergraduate student at UC Merced, you will find faculty research enriching your education and your ability to analyze and critique information objectively. Exposure to research approaches will help you to begin to define solutions to the weighty problems with which humankind will wrestle during your lifetime. Your courses will be continually enriched and invigorated by faculty discoveries, which reflect an ever-evolving curriculum. You will also have formal opportunities to participate in ongoing faculty projects, joining graduate students and postdoctoral fellows in labs, field work and other research settings. These opportunities will extend your classroom experiences and highlight the process of discovery that is critical to each discipline.

As a graduate student you will plumb the depths of some of the world's most challenging problems through your research and scholarly work. Graduate students work with faculty as apprentice scholars, building the skills needed to create and communicate discoveries in their field. The distinguishing feature of UC Merced's graduate programs is their interdisciplinary nature, which provides a breadth of knowledge that helps put studies into a wider context. You will join a community of scholars and set your course for a career. Part of your research experience will include working closely with your faculty mentor and advisory committee as you build professional expertise and prepare for the future.

To foster discovery that brings faculty insights from many disciplines together, UC Merced is structuring many of its research and graduate educational activities around research institutes composed of faculty from multiple schools. The first four such organizations are described below.

UC Merced is in the process of developing a Sustainable Energy Institute and a World Cultures and Heritage Institute.

## ■ The Sierra Nevada Research Institute (SNRI)

The mission of the Sierra Nevada Research Institute is to discover and disseminate new knowledge that contributes to sustaining natural resources and promoting social well being in the San Joaquin Valley and Sierra Nevada regions of California, and related regions worldwide, through integrated research in the natural, social and engineering sciences.

### The mission of the Sierra Nevada Research Institute is accomplished through:

- Collaborative, multidisciplinary, fundamental research conducted by faculty, students, staff and affiliated scientists in natural sciences, engineering and social sciences.
- Strong interactions with related research units within the UC system and close collaborative relations with scientists and managers at national laboratories, and local, state and federal agencies, including the National Park Service.
- Connecting objective, science-based data and information with public and private stakeholders.

The Sierra Nevada Research Institute is organized around an Environmental Systems model. A particular emphasis is on the physical and biological connections that exist between the Central Valley and Sierra ecosystems. Through these balanced research efforts, the Sierra Nevada Research Institute serves as a source





of objective scientific information for public policy makers as California faces the growing challenge of sustaining the integrity and quality of its resources into the future.

Through the Sierra Nevada Research Institute our students and faculty have access to a variety of biological field stations in Yosemite, Sequoia and Kings Canyon National Parks. In May 2004, Yosemite National Park and the Sierra Nevada Research Institute dedicated the first of these stations, located in Wawona. The Wawona station gives logistical support for academic field research and outreach activities in Yosemite National Park.

In addition, the Virginia Smith Trust Reserve adjacent to the UC Merced campus provides additional sites for research.

UC Merced faculty currently affiliated with the Sierra Nevada Research Institute are working on climate change and ecosystem health, contaminant transformations in soils and aquatic systems, development of environmental sensors, hydrologic processes in the Sierra Nevada, nutrient transport in agricultural and natural systems, water and air quality in the Valley basin and Sierra Nevada Range, and computational ecology and biodiversity.

## ■ Biomedical and Systems Biology Research Institute (BSBR)

Systems Biology brings a new multi-disciplinary approach to life sciences that uses advanced technology to elucidate the function of complex biological phenomena, then creates practical applications of this knowledge. Examples include developing better treatments for human disease and better strategies to understand health environment interactions.

The Biomedical and Systems Biology Research Institute forms the academic foundation for health science programs. The goal of the Biomedical and Systems Biology Research Institute is to establish programs of excellence at UC Merced by highlighting UC Merced's interest and commitment to the new biology and facilitating intercampus interactions in a dynamic new field. The Institute also provides a collaborative forum for community partners interested in biomedical and health sciences.

The Institute addresses a critical need in the San Joaquin Valley: human health and well-being. San Joaquin Valley communities are medically underserved and have a higher incidence of health problems than do other regions of California. A central lesson in the history of health care is that improving the well-being of a community requires a systemic approach, including facilities, healthcare providers, outreach, and educational and research institutions.

The Biomedical and Systems Biology Research Institute is home to biologists, mathematicians, engineers, biophysicists, computer scientists, chemists and physicians who work at the interface of life sciences, engineering and computer science. Faculty, students and researchers from these disciplines will develop new technologies to identify and measure the fundamental molecular components of biological processes, elucidate the relations between these components and ultimately develop models to simulate the behavior of the system as a whole.

UC MERCED HAS PREPARED ME AS A LEADER AND SCHOLAR MORE THAN ANY OTHER UNIVERSITY COULD.

— Christian Ayeni, Dallas, TX, Bioengineering Major

## ■ Center For Nonimaging Optics

UC Merced's Center for Nonimaging Optics conducts research in areas of new and sustainable energy technologies. UC Merced faculty researchers are engaged in developing close linkages throughout the solar technologies community, and with nonimaging optics professionals to expand into other areas of renewable and sustainable energy futures.

Nonimaging optics has been successfully applied to the design of solar concentrators and shows great promise of revolutionizing solar energy technology used for commercial, industrial and domestic heating, cooling and lighting. A key dimension to this energy program will be the strong research and education integration between energy, and environmental and water resources engineering. The Center's goal is to produce societal-scale improvements in efficiencies in the management and stewardship of precious energy and water resources, through the design, development, implementation and testing of new and practical space heating, cooling and day lighting technologies. A major emphasis throughout this work will be to promote and develop strong international collaborations and entrepreneurial partnerships.

# Course Descriptions

## ANTHROPOLOGY

### **ANTH 001: Introduction to Sociocultural Anthropology [4]**

Introduction to human culture and cultural diversity, including the methods by which anthropology—via the study of social institutions, shared practices, and collective meanings—seeks to understand how people adapt to, make sense of, and transform their worlds.

*Discussion included.*

### **ANTH 003: Introduction to Anthropological Archaeology [4]**

Survey of theory, field and analysis methods, and objectives of anthropological archaeology. Examines how intellectual perspectives guide the ways in which archaeologists undertake their work and the types of materials they collect and analyze to study issues such as technology, exchange, subsistence, settlement, social organization, and ideology.

*Discussion included.*

### **ANTH 005: Introduction to Biological Anthropology [4]**

Introduction to evolution and how natural selection has shaped modern human variation. Examination of non-human primate behavior and how analogous it might be to that of early humans. Discussion of culture, the fossil evidence, genetics, and inheritance.

*Laboratory included.*

### **ANTH 090X: Freshman Seminar [1]**

Examination of a topic in anthropology.

*May be repeated for credit.*

### **ANTH 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### **ANTH 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **ANTH 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **ANTH 100: History of Anthropological Thought and Practice [4]**

Historical overview of key individuals and central ideas influencing the practice of anthropology and the production of anthropological knowledge. Topics may include the disciplining of anthropology into related subfields; social evolutionism, historical particularism, British structural-functionalism; French structuralism; cultural ecology; sociobiology; symbolic and interpretive anthropology; feminist and other critiques of anthropology.

*Prerequisite: ANTH 001 and (ANTH 003 or ANTH 005) or consent of instructor. Discussion included.*

## UNDERGRADUATE COURSES

### **Lower Division Courses**

Courses numbered 1–99 are designed primarily for freshmen and sophomores but are open to all students for lower division credit. (Graduate students requesting to enroll in lower-division undergraduate courses will not receive unit credit nor will the course fulfill degree requirements.)

### **Upper Division Courses**

Courses numbered 100–199 are open to all students who have met the necessary prerequisites as indicated in the catalog course description. Preparation should generally include completion of one lower division course in the given subject or completion of two years of college work.

## GRADUATE COURSES

Courses numbered 200–299 are open to graduate students. (Undergraduate students must obtain the signature of the instructor, School Dean, and the Dean of Graduate Studies. Graduate level units will count towards the required 120 units for graduation; however students are urged to meet with their academic advisor in order to determine if graduate course units may be used to fulfill a graduation requirement.)

## CROSS-LISTED/CONJOINED COURSES

Cross-listed courses are the same course offered under different course subjects at the same level (either undergraduate or graduate) that share the same meeting time, requirements, units, etc. Conjoined courses are the same course but one is undergraduate and one is graduate.

### **ANTH 110: Migration, Diaspora and Transnational Belonging [4]**

Exploration of modern, global movements of people with a focus on the conditions, processes, and practices of contemporary national and transnational belonging. Topics include globalization, migration, immigration, Diaspora, the nation-state, national identities and cultural citizenship.

*Prerequisite: ANTH 001 or junior standing.*

### **ANTH 112: Political Anthropology [4]**

Political anthropology involves the study of formal political institutions as well as the manifestations of power in everyday life. Topics

## COREQUISITE COURSE

A corequisite course is a course that must be taken at the same time as another course.

## PREREQUISITES

Prerequisites for courses should be followed carefully; the responsibility for meeting these requirements rests on the student. If you can demonstrate that your preparation is equivalent to that specified by the prerequisites, the instructor may waive these requirements for you. The instructor also may request that a student who has not completed the prerequisites be dropped from the course. Note: For all courses a “C-” or better grade is required for a course to be used as a prerequisite for another course. If a course was taken for a “P/NP” grade then a “P” grade is required. If the prerequisite for a course is not satisfied, students must obtain the approval of the instructor (or school designee) of the course they wish to take.

## COURSE SUBSTITUTIONS

Students may petition the appropriate dean to substitute a suitable course in place of a required course (for a general education course: petition the Dean of College One; for a major course: petition the dean of the School in which the major resides). Petition forms are available on the following web sites: Office of the Registrar, the Student Advising & Learning Center, College One and Schools.

## GRADING OPTIONS

Unless otherwise stated in the course description, each course is letter graded with a P/NP or S/U option (unless required for your major or graduate program).

may include anthropological perspectives on: the state and other forms of political authority; social inequality; conflict; indigenous responses to colonialism and the nation-state; social movements; citizenship; governmentality; and globalization.

*Prerequisite: Junior standing or ANTH 001.*

### **ANTH 114: Social Memory [4]**

Introduction to the practices, spaces, artifacts and media through which social memory is formed, maintained and reproduced. Topics may include: how societies remember; how the past and its representation is bound up with national and other collective identities; commemoration;

heritage; and the link between history, memory, and social justice.

*Prerequisite:* Junior standing or ANTH 001.

#### **ANTH 116: Indigenous Activism in the Americas [4]**

Focusing on the contemporary struggles of Indigenous peoples for rights; self-determination; social, political, and environmental justice and/or increased nation-state participation. Examines how the mobilization of indigenous peoples is strengthened through regional, hemispheric and global solidarities; and how international law, media, and technology support indigenous actions for change.

*Prerequisite:* Junior standing or ANTH 001.

#### **ANTH 120: Introduction to Medical Anthropology [4]**

This course provides knowledge about medical anthropology, how different cultures understand human physiology and health, definitions of sickness, types of medical systems and practitioners, how cultural practices affect health, issues in gender environmental health, and how medical anthropology influences health policy.

*Prerequisite:* ANTH 001 or ANTH 005. Letter grade only.

#### **ANTH 121: Ethnomedicine [4]**

This course provides knowledge of medical systems cross culturally including the three ancient literary systems (Chinese, Ayurvedic, Greco-Arabic), shamanism, folk medicine, and biomedicine. Readings focus on the beliefs and organization of each system, types of practitioners, types of sicknesses treated, and how anthropologists research and understand these phenomena.

*Prerequisite:* ANTH 001 or ANTH 120.

#### **ANTH 124: Ethnopsychology [4]**

This course covers anthropological perspectives on mental states, experience of emotions, and concepts of mental normality in a variety of cultural settings. Lectures and readings will focus especially on the relationship between individual and society, the role of emotions, and the definition of psychological phenomena cross culturally.

*Prerequisite:* ANTH 001 or ANTH 120.

#### **ANTH 126: Anthropological Approaches to Gender [4]**

This course will examine gender and sexuality cross-culturally: cultural aspects of gender, sexuality, reproduction, and gender identity. Readings will explore definitions of male and female roles, sexual mores, issues in human reproduction, variations in definitions of sexual identity, and cultural, economic and religious aspects of gender, marriage, and family.

*Prerequisite:* ANTH 001 or ANTH 120.

#### **ANTH 130: Material Culture [4]**

Examines the role that material objects play in human social relations, identity, and economy, including archaeological application of such knowledge to past societies. We explore the range of production and use of material objects, including theories of material culture, technology, style, meaning, memory, and agency.

*Prerequisite:* ANTH 003 or junior standing or consent of instructor.

#### **ANTH 134: Dynamics of Small-scale Societies [4]**

Examines ethnographic and archaeological literature on small-scale hunter-gatherer-fisher and horticultural societies, and explores how these data contribute to study of subsistence and settlement strategies, technology, exchange, demography, and social relations in the past and present.

*Prerequisite:* ANTH 003, junior standing or consent of instructor.

#### **ANTH 140: Cultural Heritage Policy and Practice [4]**

Critical examination of the legal, practical, and ethical aspects of cultural heritage management in the United States and abroad. Topics include cultural resource management in public and private contexts, participation of stakeholders, the application of anthropological knowledge, and public outreach.

*Prerequisite:* ANTH 003, WH 001, or junior standing or consent of instructor.

#### **ANTH 142: Archaeology of Colonialism [4]**

Examines theoretical perspectives, issues, and interpretations in archaeological study of the interaction between indigenous peoples, European colonists, and enslaved Africans. Topics include disease, power, resistance, colonial institutions, multi-ethnic communities, and gender relations in diverse native engagements with colonists and others from a variety of homelands.

*Prerequisite:* ANTH 003 or junior standing or consent of instructor.

#### **ANTH 146: Archaeology of Native California [4]**

Research issues and regional interpretations in the archaeological study of California native cultures from earliest settlement to contact with Europeans.

*Prerequisite:* ANTH 003 or junior standing or consent of instructor.

#### **ANTH 150: Race and Human Variation [4]**

Investigation of how human biological variation is studied and how the definition of such variation differs between the scientific community and the public. Topics include historical perspectives on race and eugenics, how scientific racism has shaped national policy, and how genetic diversity and the Human Genome Project have informed such issues.

*Prerequisite:* ANTH 005 or junior standing.

#### **ANTH 151: Human Adaptability [4]**

Examination of how humans live in marginal environments, such as extremely hot, extremely cold, or high altitude areas. Evolutionary, genetic ecological, demographic, and cultural explanations for human biological adaptability are explored. Students consider case studies from the high Andes, Siberia, equatorial South America, and the International Space Station.

*Prerequisite:* ANTH 005 or junior standing or consent of instructor.

#### **ANTH 152: Dying, Death, and Dead Persons [4]**

Examination of the multiple cultural meanings of death and the dead person, including hospice, reactions to death, memorial gestures, rights to and constructions of the dead body in the U.S. legal system, cadavers in education and research,

dead persons in mass disasters and human rights cases, archaeological examples, and repatriation issues.

*Prerequisite:* ANTH 005 or junior standing or consent of instructor.

#### **ANTH 155: Paleodemography [4]**

Exploration of human population growth and decline, fertility and mortality, and population age and sex structure in the past without benefit of written records. Topics include the interplay of demography and hominid evolution, migration, environmental stress, the transition to agriculture, and the rise and fall of complex societies.

*Prerequisite:* Junior standing and ANTH 003 and ANTH 005 or consent of instructor.

#### **ANTH 160: Human Origins [4]**

This course explores the biological heritage of humans by providing students with a rigorous grounding in modern evolutionary theory and undertaking detailed study of the phylogeny, morphology, and paleoecology of the Hominini. In addition, this course uses the fossil record to reveal the truly unique features of Homo sapiens.

*Prerequisite:* ANTH 005. Discussion included.

#### **ANTH 162: Growth, Development, and Human Evolution [4]**

This course applies modern life history theory to understand how evolution of growth patterns contributed to divergence in adult morphology among human ancestors, as revealed by the fossil record of hominin species. We also examine the uniquely human phenomenon of childhood, and the geographic diversity observed among modern human beings.

*Prerequisite:* ANTH 005.

#### **ANTH 169: Trends in Biological Anthropology [4]**

Explores current trends in biological anthropology. Course material will vary. Possible topics may include: isotopic analysis of human nutrition; genetic studies of human variation and adaptability; life history and population studies of health and disease; studies of the interaction of the environment, human behavior, and human biology; and ethics.

*Prerequisite:* ANTH 005. May be repeated for credit once.

#### **ANTH 170: Ethnographic Methods [4]**

Examination of the critical use of historical documents, journals, and visual images; archives; oral history to understanding past cultures and culture change. Analysis of case studies and original archival research demonstrate how these sources complement data collected through ethnographic, archaeological, or biological methods.

*Prerequisite:* ANTH 001 or junior standing or consent of instructor.

#### **ANTH 172: Ethnohistory [4]**

This course examines the critical use of historical documents, journals, and visual images; archives; and oral history to understanding past cultures and culture change. Analysis of case studies and original archival research demonstrate how these sources complement data collected through ethnographic, archaeological, or biological methods.

*Prerequisite:* ANTH 001, ANTH 003 or junior standing or consent of instructor.

**ANTH 174: Lithic Analysis [4]**

Systematic consideration and practical application of analytical laboratory and data recording techniques used to study stone tools and manufacturing debris. Topics include procurement; production and reuse; style and function; the organization of technology with respect to settlement and gender; and craft specialization.

*Prerequisite:* ANTH 003 or consent of instructor. ANTH majors/minors given priority. Laboratory included.

**ANTH 176: Archaeological Field Methods [4]**

Introduction to the goals and methods of archaeological surface survey, excavation, and various forms of field documentation. The integration of research issues and methods is addressed through both classroom and field activities.

*Prerequisite:* ANTH 003 or junior standing in the major. Fieldwork included.

**ANTH 178: Human Osteology [4]**

Students develop a basic familiarity with human skeletal remains, including the identification of the bones of the skull, dentition, and axial and appendicular skeletons. Identification of side (i.e., left, right) and element of both intact and fragmentary remains are considered.

*Prerequisite:* ANTH 005 or consent of instructor. ANTH majors/minors given priority. Laboratory included.

**ANTH 179: Bioarchaeology [4]**

In-depth consideration of methods used to identify sex, age at death, stature, and ancestry from human skeletal remains. Anthropometrics, disease, trauma, and basic demographic techniques are also considered, preparing students for anthropological study of both individual remains and skeletal populations.

*Prerequisite:* ANTH 005 and ANTH 178 or consent of instructor. Laboratory included.

**ANTH 190: Topics in Anthropology [4]**

Exploration of a special topic or problem within or between fields in anthropology. Topics vary and course may be repeated for credit if topics differ.

*Prerequisite:* Junior standing, ANTH 001, ANTH 003, or ANTH 005 or consent of instructor. May be repeated for credit twice with different topics.

**ANTH 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**ANTH 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ANTH 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## ARTS

**ARTS 001A: Learning to See: Beginner Drawing [4]**

Develops cognitive skill of drawing by teaching the ability to see accurately. Material covered is not limited to skills required for becoming an artist. Anyone interested in sharpening one's perceptions and creative abilities finds this course useful.

**ARTS 002A: Learning to Vocalize: Beginning Vocal Instruction [4]**

Vocal instruction for students with a beginning level of music proficiency.

**ARTS 002B: Introduction to Chorale [4]**

Students form a choral group focusing in the study and performance of choral literature chosen from all major eras and genres. Emphasis on part-singing, intonation, ensemble blend, diction, and vocal development. Includes written assignments requiring research and analysis of the music, composers, style, and music fundamentals.

*Prerequisite:* ARTS 002A or consent of instructor.

**ARTS 002C: Introduction to Vocal Jazz Repertoire [4]**

The study and performance of Jazz vocal repertoire with continued instruction in correct singing techniques, posture and breathing, diction, and anatomy of the singing instrument. In addition to vocal instruction, includes written assignments requiring research and analysis of the music, composers, style, and music fundamentals.

*Prerequisite:* ARTS 002A or consent of instructor.

**ARTS 002D: Introduction to Musical Theater Vocal [4]**

The study and performance of Musical Theater/Broadway repertoire. Instruction in correct singing techniques, posture and breathing, diction, correct use of the chest and "theater" voice. Special attention to character development and stage movement. Includes written assignments requiring research and analysis of music, composers, style, and music fundamentals.

*Prerequisite:* ARTS 002A or consent of instructor.

**ARTS 003: Learning to See: Painting [4]**

Development of the skill of painting in watercolor to develop the complex process of color vision to enhance one's perceptive powers. The use of this skill is not limited to those planning to be artists. This is a studio class that will include drawing and painting from nature.

**ARTS 003B: Learning to See: Intermediate Painting [4]**

Course teaches intermediate level techniques in acrylic, watercolor or oil painting, concentrating on enhancing the technique necessary to develop mastery of individual expression.

*Prerequisite:* ARTS 003.

**ARTS 004A: Learning to See in Three Dimensions [4]**

Development of cognitive skill of seeing in three dimensions. Material covered is not limited to skills required for becoming an artist. Anyone interested in sharpening his or her perceptions and creative capabilities finds this course useful.

**ARTS 004B: Introduction to Sculpture [4]**

Introduces students to the traditional additive and subtractive sculptural methods along with contemporary sculptural processes. Students are

taught to explore conventional media, such as clay, soft stone, wood, wax, plaster and paper pulp as well as unconventional materials. Emphasis is placed on successful union of technique and personal expression.

**ARTS 005A: Learning to Listen: Beginner Music [4]**

Cognitive skill of listening to music to enhance perceptive powers. The use of this skill is not limited to those planning to be artists.

**ARTS 007: ArtScore: Introduction to Global Arts Studies Program [4]**

Survey of arts around the globe, with an integrated and comparative approach to studying the history and ideas of arts from antiquity to the twentieth century. This is the foundation course for all students pursuing an arts major.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Letter grade only. Discussion included.

**ARTS 008A: Learning to Perform: Beginner Acting [4]**

Develops cognitive skill of physical and vocal performance by teaching the ability to act on stage. Material covered is not limited to skills required for becoming an artist. Anyone interested in sharpening one's abilities to perform finds this course useful.

**ARTS 009: Introduction to Contemporary Practices in Photography [4]**

Beginning level course stressing technical and critical photographic skills. The class aims to develop the student's capacity to produce well-wrought, effectively structured photographs utilizing in camera exposure, depth-of-field, and composition with either a digital or film camera.

**ARTS 010: Substances of Arts [4]**

Introduces students to substantive characteristics of the arts, with emphasis on cultural and social significance. Each student learns to develop his/her own understanding of what is art, what makes individual works of art significant and how art enriches human existence. Course work includes research, writing and art event attendance.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent.

**ARTS 011: Substances of Music [4]**

Introduces students to substantive characteristics of the art of music, with emphasis on cultural and social significance. Each student learns to develop his/her own understanding of what the art of music entails, what makes individual works of music art significant and how music enriches human experience.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent.

**ARTS 012: Substances of Architecture [4]**

Introduces students to substantive characteristics of architecture, with emphasis on cultural and social significance. Each student learns to develop his/her own understanding of what is architecture and why individual works of architecture become significant. Emphasizes the interrelatedness of architecture and socioeconomic history.

**ARTS 013: Substances of Visual Arts [4]**

Introduces students to substantive characteristics of visual arts, with an emphasis on developing students' own critical skills in studying our

contemporary and historical visual culture. Topics include artworks from the Renaissance to Neoclassicism to Pop, as well as issues in television, video, fashion, magazine, pop culture, computer art.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent.

#### **ARTS 070: Techniques of Contemporary Artists [4]**

Students have opportunity to study with a contemporary artist. Open to any student interested in learning how acquisition of technique supports creative processes. Emphasis is put on process instead of result. Techniques taught vary depending on the instructor artist's medium of expression.

*Permission of instructor required. May be repeated for credit.*

#### **ARTS 071: Techniques of Interdisciplinary Research in Arts [4]**

Explores differences between research conducted by artists and by academics, and examines how artists process information, as well as how various forms of artistic expression influence content and meaning. The role of cliché and stereotypical representation in the creation of works of art is also explored.

May be repeated for credit.

#### **ARTS 090X: Freshman Seminar [1]**

Examination of a topic in the arts.

#### **ARTS 095: Lower Division Undergraduate Research [1 - 6]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **ARTS 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **ARTS 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **ARTS 100: History of World Art [4]**

Introduces students to significant examples of world art through analysis of selected works from a number or different geographical regions of the world. Emphasis is placed upon the influence of religious, economic, political and aesthetic factors. Course work includes research and writing.

*Prerequisite:* ARTS 010 or consent of instructor.

#### **ARTS 101: History of Clothing, Costume and Fashion: Euro-centric Pre-History to 1800 [4]**

Survey of history of Euro-centric clothing, costumes and fashion from pre-history to 1800. Emphasizes the intrinsic connection between clothing and all aspects of human existence from politics, economics, sociology, cultural history, to climate, psychology and art. Each student is encouraged to pick research topics connected to his or her major.

#### **ARTS 102: History of Clothing, Costume and Fashion: Euro-centric 1800 to 1980 [4]**

Survey of history of Euro-centric clothing, costumes and fashion from 1800 to 1980. Emphasizes the intrinsic connection between

clothing and all aspects of human existence from politics, economics, sociology, cultural history, to climate, psychology and art. Each student is encouraged to pick research topics connected to his or her major.

#### **ARTS 103: History of Ethnic Costume [4]**

Survey of ethnic costume across the globe. Covers indigenous clothing, emphasizing the intrinsic connection between clothing and cultural history. Each student is encouraged to pick research topics connected to his or her major.

*Prerequisite:* Junior standing or consent of instructor.

#### **ARTS 104: History of Costume Design [4]**

Survey of history of costume design with emphasis on costumes for the stage. Examines the practice of costume design across world cultures as well as the relationship between costumes and prevailing cultural values. Course work concentrates on research but may include a creative component.

*Prerequisite:* Junior standing or consent of instructor.

#### **ARTS 115: Twentieth Century Drama: Theatre and Social Responsibility [4]**

Examination of ways in which the works of selected 20th century playwrights contribute to awareness of social responsibility. Explores correlation between dramaturgy and political activism. Includes staged readings of plays, research and writing.

#### **ARTS 120: Critical Popular Music Studies [4]**

Investigate popular music and the various meanings it has held for musicians, critics and audiences. What, exactly, is popular music? This course will explore this and related questions in order to complicate our notions of what constitutes popular music.

*Prerequisite:* Junior standing and ARTS 011 or consent of instructor.

#### **ARTS 121: Music of the Twentieth Century [3]**

A critical investigation of various music trends in the 20th century with an emphasis on the musicians who have bridged or blurred the distinctions between art music and popular music.

*Prerequisite:* ARTS 007.

#### **ARTS 125: African American Music of the 20th Century [4]**

Focuses on a central question: how do we locate African American music, i.e., how can we define African American music? In attempting to answer this question, we think through concepts such as authenticity, representation, recognition, cultural ownership, appropriation, origin(s).

*Prerequisite:* Junior standing or consent of instructor.

#### **ARTS 130: History of World Architecture [4]**

Introduces students to significant examples of world architecture, concentrating on characteristics of structure, materials, and use. Course work includes research and writing.

*Prerequisite:* ARTS 012 or consent of instructor.

#### **ARTS 141: History and Practice of Photography [4]**

In this course students examine critical texts on the history and theory of photography, study the work of photographers from diverse backgrounds, and investigate cultural and sociopolitical issues in photographic practice and production. Students will also learn some basic techniques of taking photographs through various in-class exercises and assignments.

*Prerequisite:* Sophomore standing and any lower-division GASP or ARTS course. Letter grade only.

#### **ARTS 150: Assemblage Sculpture [4]**

Course in assemblage sculpture, a unique three dimensional art form that consists of creating works of art that are assembled rather than modeled, carved or cast. The elements are pre-formed, natural or manufactured materials or objects. Course work includes research into the history and uses of assemblage, and writing.

*Prerequisite:* ARTS 004A and ARTS 004B or portfolio or consent of instructor.

#### **ARTS 159: Advanced Projects in Acrylic Painting [4]**

Course in application of acrylic medium techniques for the purpose of creating original works. Course advances each student's understanding and application of color, composition, proportion, and principles of artistic creativity.

*Prerequisite:* ARTS 001 or (ARTS 003A and ARTS 003B) or portfolio or consent of instructor. May be repeated for credit twice.

#### **ARTS 170: Techniques of Contemporary Artists [4]**

Students have opportunity to study with a contemporary artist. Open to any student interested in learning how acquisition of technique supports creative processes. Emphasis is put on process instead of result. Technique taught varies depending on instructor artist's medium of expression.

May be repeated for credit.

#### **ARTS 171: Techniques of Interdisciplinary Research in Arts [4]**

Explores differences between research conducted by artists and by academics. Examines how artists process information, as well as how various forms of artistic expression influence content and meaning. The role of cliché and stereotypical representation in the creation of works of art is also explored.

*May be repeated for credit.*

#### **ARTS 180: Architecture Design Studio: Modern Houses [4]**

Course introduces students to issues of complex form making in architecture through the study of important works of Modern domestic architecture. Tools of exploration will include research and writing, drawing, three dimensional model-making and computer modeling.

*Prerequisite:* ARTS 001 or (ARTS 004A and ARTS 004B) or portfolio or consent of instructor.

#### **ARTS 181: Architecture Design Studio: Urban Architecture and Sustainability [4]**

Course introduces students to issues of sustainability in urban architecture. Tools include analyzing and diagramming modern and pre-modern urban form, in-depth study of specific regional and urban issues around the city of

Merced, and design projects created to address these subjects. Course work includes research, writing, drawing, and model-making.

*Prerequisite: ARTS 001 or (ARTS 004A and ARTS 004B) or portfolio or consent of instructor.*

### **ARTS 195: Upper Division Undergraduate Research [1 - 6]**

Group or individual research projects.

*Permission of instructor required. May be repeated for credit.*

### **ARTS 196: Individual Internship [2 - 4]**

Internship in the arts management, production or preservation under the supervision of arts faculty. Requires minimum of 6 hours a week in the field internship and 1 hour a week meeting with faculty supervisor. Students enrolled for more than 2 units are required to write an original research paper based on the internship. Internship may also be completed during the summer between junior and senior year at an arts production, management and preservation organization.

*Prerequisite: Junior standing or consent of instructor. Letter grade only. May be repeated for credit twice.*

### **ARTS 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **ARTS 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## **BIOLOGICAL ENGINEERING AND SMALL-SCALE TECHNOLOGIES**

### **BEST 200: Special Topics in Bioengineering [3]**

Special Topics in Bioengineering cover background principles of cutting-edge research directions in the field of Biological Engineering. Includes 3 hours of lecture and discussion per week and significant out-of-class reading and study. The course format also emphasizes student-led presentation, analysis and discussion of reading assignments from the current and recent scientific literature.

*Prerequisite: MATH 021 and BIO 100. Letter grade only.*

### **BEST 201: Special Topics in Materials [3]**

Special Topics in Materials covers background principles of cutting-edge research directions in the field of material science. Includes 3 hours of lecture and discussion per week and significant out-of-class reading and study. The course format also emphasizes student-led presentation, analysis and discussion of reading assignments from the current and recent scientific literature.

*Prerequisite: MATH 021, PHYS 008 and BIO 100 or equivalent. Letter grade only.*

### **BEST 210: Structure and Properties of Materials [4]**

Structure and bonding of materials and their relationship to the mechanical, thermal, electrical, optical, and magnetic properties of materials within the context of structure-properties-processing performance relationships. Non- and

quasi-crystalline materials and the role of defects. Processing and device applications.

*Letter grade only. Laboratory and discussion included.*

### **BEST 214: Tissue Engineering Design [3]**

Fundamental topics include: issues related to the cell source (including stem cells, plasticity, transdifferentiation, therapeutic cloning vs. reproductive cloning, bone marrow transplants, and cell differentiation and purification), cell culture and tissue organization, gene therapy delivery methods, cell adhesion and migration, issues in construct design, tissue preservation, and immunoisolation and/or modulation. We also cover current case studies and issues for FDA approval of tissue engineered products.

*Letter grade only.*

### **BEST 217: Lab on a Chip: Developing 3rd World Diagnostics for Global Health [3]**

This is the first-ever four campus course between UC San Francisco, UC Berkeley, UC Santa Cruz, and UC Merced which aims to 1) raise awareness and knowledge about global health issues 2) teach students critical engineering skills such as nano/micro-fabrication 3) enable students to design, build, and test their own diagnostics and 4) develop entrepreneurial skills. Students learn about tuberculosis from leading experts at UCSF and then address the dearth of sensitive diagnostics by designing and testing their own nano/micro-systems. Taught at UC Merced with teleconferencing to the other campuses and two field trips.

*Letter grade only. Laboratory included.*

### **BEST 226: Nanodevice Fabrication [3]**

This course will teach basic properties of nanomaterials and their applications (the lecture part). A nanoscale transducer will be chosen as a sensing element and sensors will be fabricated and tested (the lab part). The interactive and experiential education will be blended into theoretical concept teaching.

*Letter grade only. Laboratory included.*

### **BEST 291: Research Seminar [1]**

Seminar series covering various topics in quantitative and systems biology, bioengineering, biomaterials and nanotechnology hosted by combined BEST and QSB Graduate Group.

*May be repeated for credit.*

### **BEST 292: Group Meeting [1]**

Meetings to describe current research progress and future research plans lead by BEST faculty.

*May be repeated for credit.*

### **BEST 293: Journal Club [1]**

Student-led presentation, analysis and discussion of reading assignments from the scientific literature.

*May be repeated for credit.*

### **BEST 294: Responsible Conduct in Research [1]**

Seminar covering responsibilities and expectations for researchers as well as advice for success in graduate school and science careers, required for NIH-funded graduate students.

*Satisfactory/Unsatisfactory grading only.*

### **BEST 295: Graduate Research [1 - 12]**

Supervised research with BEST faculty.

*Permission of instructor required. May be repeated for credit.*

### **BEST 299: Directed Independent Study [1 - 6]**

Supervised course study with BEST faculty.

*Permission of instructor required. Letter grade only. May be repeated for credit.*

## **BIOLOGICAL SCIENCES**

### **BIO 001: Contemporary Biology [4]**

Introduction to the major concepts in biology including origin of life, evolution, DNA, genes and genomes, principles and patterns of inheritance, genotype to phenotype, gene, environment and disease relationships, biotechnology, ecosystem structure and function, nutrient cycles and pollution, biodiversity, earth systems.

*Letter grade only. Discussion included.*

### **BIO 001L: Contemporary Biology Lab [1]**

BIO 001L is the laboratory component of BIO 1 Contemporary Biology. BIO 001 must be taken concurrently.

*Letter grade only.*

### **BIO 002: Introduction to Molecular Biology [4]**

Introduction to the molecules and molecular processes underlying life. Overview of structures and chemical properties of biological macromolecules.

*Prerequisite: BIO 001. Letter grade only. Discussion included.*

### **BIO 002L: Introduction to Molecular Biology Lab [1]**

Laboratory exercises demonstrating and reinforcing topics covered in BIO 002. BIO 002 must be taken concurrently.

*Letter grade only.*

### **BIO 003: To Know Ourselves: Molecular Basis of Health and Disease [4]**

Introduction to the molecular basis of a number of human diseases and molecular-based therapies for disease treatment.

*Laboratory and Discussion included.*

### **BIO 005: Concepts and Issues in Biology Today [4]**

Fundamental biological concepts in the areas of genetics, evolution and ecology are explored in the context of current issues enabling students to understand the relevance of biology to their lives both as individuals and as voting citizens.

*Course cannot be taken after obtaining credit for BIO 001. Not recommended for BIO majors. Laboratory and Discussion included.*

### **BIO 010: Genetics, Stem Cells and Development [4]**

Issues associated with genes, stem cells and embryonic development increasingly impact our lives. Integrates an overview of biologic topics such as genetic testing, stem cells and the use of animal models with their bioethical considerations. It places science in the context of personal decisions and ethics.

*Discussion included.*

**BIO 034: Introduction to Marine Science [4]**

An introduction to biological, chemical, and physical oceanography, marine geomorphology, and their synthesis in the study of marine life; also including relationships with atmospheric, freshwater, and terrestrial systems. Areas of emphasis include ecosystems (from the deep sea to saltwater ponds), the integrated coastal zone, resource management, and global change.

*Letter grade only. Laboratory and discussion included.*

**BIO 043: Biodiversity and Conservation [4]**

Introduction to the study of biodiversity and conservation. Patterns, origin, and importance of biodiversity are discussed. An introduction to the major biological groups and the conservation efforts used to preserve contemporary biodiversity.

*Laboratory included.*

**BIO 046: Paleobiology: Age of Dinosaurs [4]**

Dinosaurs are used to explore the development of science and fundamental concepts of geology, evolution, and biodiversity. Students are also introduced to basic anatomy and the underlying unity of animal form. Current controversies such as mass extinctions are explored, and students weigh evidence in coming to their own interpretations.

*Laboratory and Discussion included.*

**BIO 050: Human Development [4]**

Male and female reproductive systems, hormonal control of egg-sperm interactions, fertilization, venereal disease, embryonic development, fetal physiology.

*Laboratory and Discussion included.*

**BIO 051: Cancer and Aging [4]**

Introduction to the biology of cancer and aging, including discussions of the biological and molecular basis of aging and cancer, novel and conventional cancer treatments, cancer prevention, and prospects for new approaches to increase longevity and health.

*Laboratory and Discussion included.*

**BIO 060: Nutrition [4]**

Introduction to nutrition science that integrates basic concepts of nutrients, human physiology, microbiology, biochemistry, and the psychology of wellness.

*Laboratory and Discussion included.*

**BIO 090X: Freshman Seminar [1]**

Examination of a topic in the biological sciences. *May be repeated for credit.*

**BIO 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**BIO 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**BIO 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**BIO 100: Molecular Machinery of Life [4]**

Introduction to the chemical processes underlying life, covering the structure and properties of biological macromolecules, metabolism, regulation, and energy transduction.

*Prerequisite: BIO 001. Letter grade only. Laboratory and discussion included.*

**BIO 101: Biochemistry I [4]**

Advanced study of proteins, enzymes, enzyme kinetics, and carbohydrates metabolism in living organisms.

*Prerequisite: CHEM 100. Letter grade only. Discussion included.*

**BIO 102: Advanced Biochemistry and Molecular Biology [4]**

Mechanisms of amino acid, nucleic acid, and lipid metabolism plus advanced mechanisms of gene expression, signal transduction, and regulation of gene expression.

*Prerequisite: BIO 101. Letter grade only. Laboratory and discussion included.*

**BIO 104: Biophysics [4]**

An introduction to the physical processes underlying biological phenomena. Topics to be covered include transport and diffusion, biochemical reaction kinetics and thermodynamics, molecular motors, cell motion, and cellular electrophysiology.

*Prerequisite: (CHEM 010 or ENGR 130) and (BIO 100 or BIO 101) or consent of instructor. Discussion included.*

**BIO 104L: Biophysics Laboratory [1]**

Laboratory experiments demonstrating and reinforcing topics covered in BIO 104. BIO 104 must be taken concurrently.

*Prerequisite: (BIO 100 or BIO 101) and (CHEM 010 or ENGR 130) or consent of instructor. Letter grade only.*

**BIO 105: Enzymology [4]**

Advanced study of enzyme mechanisms and regulation.

*Prerequisite: BIO 100 and CHEM 010. Discussion included.*

**BIO 105L: Enzymology Laboratory [1]**

Laboratory experiments demonstrating and reinforcing topics covered in BIO 105. BIO 105 must be taken concurrently.

*Prerequisite: BIO 100 and CHEM 010.*

**BIO 106: Introduction to Molecular and Cell Biology [4]**

Advanced study of the mechanisms of nucleic acid replication, transcription and translation as well as gene regulation and expression.

*Prerequisite: BIO 001. Letter grade only. Laboratory and discussion included.*

**BIO 107: Physical Biochemistry [4]**

Physical Biochemistry is the study of Biochemistry via properties that can be quantitatively assessed to provide specific molecular information. Such properties include macromolecular folding, multimerization, structure, and ligand binding. This course will instruct students on these properties of macromolecules and on the experimental techniques that can quantitatively probe these properties.

*Prerequisite: BIO 101 and MATH 021. Letter grade only. Discussion included.*

**BIO 110: The Cell [4]**

Introduction to the structure and function of bacterial, plant and animal cells, with an emphasis on universal cellular systems, including regulation of subcellular organization, control of cellular processes by internal and external signaling, energy capture, storage and usage, and cell cycle.

*Prerequisite: BIO 100 or BIO 101. BIO 101 may be taken concurrently. Laboratory and discussion included.*

**BIO 111: Cells, Tissues, and Organs [4]**

Introduction to principles of cell structure and the organization of cells into tissues, organs, and organ systems. Both the cellular and extracellular components of the primary tissues and their compilation into the major organic systems are covered. Emphasis on understanding the link between cellular architectures and organ function.

*Prerequisite: BIO 110. Discussion included.*

**BIO 120: General Microbiology [4]**

Molecular basis for diversity in bacteria and archae. Students explore the significance of molecular diversity in microbial biology and gain an understanding of the genetic, physiologic, and structure-function relationships that underlie the remarkable ability of these organisms to adapt to the environment.

*Prerequisite: BIO 110. Discussion included.*

**BIO 120L: General Microbiology Laboratory [2]**

Laboratory experiments demonstrating and reinforcing topics covered in BIO 120. BIO 120 must be taken concurrently.

*Prerequisite: BIO 110. Laboratory included.*

**BIO 122: Microbial Pathogenesis [4]**

Genetic and biochemical features of infectious agents including identification and characterization of pathogens and the epidemiology of infectious diseases.

*Prerequisite: BIO 120. Discussion included.*

**BIO 123: Human Parasitology [4]**

Introduction to protozoan, worm, and insect parasitism in animals and humans and resultant diseases. Emphasis on epidemiology, diagnosis, and immunology of parasitic infections.

*Prerequisite: BIO 120. Discussion included.*

**BIO 124: Microbial Evolution [4]**

Evolution of microbes. Concepts covered include horizontal exchange, genome evolution, dispersal of microbes, population size, cryptic genes, mutagenesis and mutagenic pathways, phylogenetics, experimental evolution, metabolic evolution and antimicrobial resistance evolution.

*Prerequisite: BIO 120 and BIO 141. BIO 141 may be taken concurrently. Letter grade only. Discussion included.*

**BIO 125: Emerging Public Health Threats [4]**

Multidisciplinary study of the historical, sociological, medical, and biological issues underlying new public health threats and the scientific and policy-based approaches to responding to these new threats.

*Prerequisite: BIO 120. Discussion included.*

**BIO 127: General Virology [4]**

Introduction to biology of bacterial and animal viruses, focusing on structure, infective cycle, interactions with host, transmission and methods

of detection and control. Discusses scientific literature and current topics in virology.

*Prerequisite:* BIO 110, which may be taken concurrently. BIO 140 strongly recommended. Letter grade only. Discussion included.

#### **BIO 130: Plant Biology [4]**

An introduction to the biology of plant life, including plant cell physiology, plant growth and development, and plant evolution and adaptation.

*Prerequisite:* BIO 110. Discussion included.

#### **BIO 134: Marine Sciences Theory and Practice [4]**

Integrative studies of ocean and coastal ecosystems, including current issues. Also referencing relationships with atmospheric, freshwater, and terrestrial systems. Areas of emphasis include practical field study in the coastal zone in any area of marine science.

*Prerequisite:* Junior standing and BIO 034 and (BIO 141 or BIO 148). Letter grade only. Fieldwork and discussion included.

#### **BIO 140: Genetics [4]**

Includes concepts of inheritance, structure and function of genes and genomes, recombination, genetic mapping, gene regulation, mutations, and recombinant DNA technology including labs and discussions.

*Prerequisite:* BIO 001. Letter grade only. Laboratory and discussion included.

#### **BIO 141: Evolution [4]**

Natural Selection and Darwinian evolution, includes concepts of population and quantitative genetics, speciation, neutral theory and molecular evolution, phylogenetics, comparative genomics, and macroevolution including labs and discussion.

*Prerequisite:* BIO 100 or BIO 101. Letter grade only. Laboratory included.

#### **BIO 142: Genome Biology [5]**

Introduction to the concepts behind genome biology and a detailed overview of the many tools used in comparative genomics. Specific topics include genome assembly, gene modeling and comparative genomics, transcriptomics, and proteomics of prokaryotic and eukaryotic organisms. Students carry out real scientific projects in collaboration with course faculty and produce new genomic data of publishable quality. Includes mandatory weekly three hour lab.

*Prerequisite:* BIO 110. Letter grade only. Laboratory and discussion included.

#### **BIO 143: Biodiversity and the Tree of Life [4]**

Introduction to the biological diversity in the three domains of the Tree of Life (Archaeobacteria, Eubacteria, and Eukaryotes): overview of species diversity as well as diversity in the deep characteristics (e.g., reproduction, metabolism, structure) of plants, animals, fungi, and microbes. Illustrated by complementary field trips and labs (part of BIO 143F).

*Prerequisite:* BIO 001. Letter grade only. Discussion included.

#### **BIO 143F: Biodiversity and the Tree of Life [1]**

Field trips and labs reinforcing topics covered in BIO 143. Five field trips illustrate the biodiversity of different regions of California (seashore, Central Valley, foothills, and Sierra Nevada). Wet

labs serve to examine the organisms collected during field trips, and participate in a long-term DNA Barcoding project of the field sites visited. BIO 143 must be taken concurrently.

*Prerequisite:* BIO 001. Letter grade only. Fieldwork and laboratory included.

#### **BIO 144: Phylogenetics [4]**

Theory behind phylogenetic reconstruction and an introduction to the diverse methods for phylogenetic inference. How to deal with morphological and molecular characters is discussed as well as the comparative method.

*Prerequisite:* BIO 140 and (MATH 032 or MATH 018). Discussion included.

#### **BIO 144L: Phylogenetics Laboratory [1]**

Laboratory experiments demonstrating and reinforcing topics covered in BIO 144. BIO 144 must be taken concurrently.

Letter grade only.

#### **BIO 145: Introduction to Population and Community Ecology [4]**

Comprehensive introduction to the ecology of populations, communities and ecosystems. Examines the dynamics of single-species populations, and then moves to species interactions including competition, predation, parasitism, and mutualism. Structure and dynamics of entire communities and food webs also are examined. Discusses conservation biology applications throughout.

*Prerequisite:* BIO 001 and MATH 021. Discussion included.

#### **BIO 146: Paleobiology [4]**

An introduction to the major geological factors that have affected the evolution and the diversity of organisms. We also present how the fossil record can help us understand evolution of Life through time, with an emphasis on macro-evolutionary events (e.g., mass extinctions, transitions between habitats, radiations).

*Prerequisite:* BIO 140. Discussion included.

#### **BIO 147: Astrobiology [4]**

Astrobiology refers to the study of the origin and evolution of life in the cosmos. It is an integrative, multidisciplinary field that includes areas of biology, astronomy, geology, chemistry and physics. Students in the class face some of the most fundamental topics addressed by science today such as who we are, where we came from, and where we might go. We cover three main themes: How did life begin and evolve? Does life exist elsewhere in the universe? What is life's future on Earth and beyond?

*Prerequisite:* CORE 001 and (BIO 001, BIO 005, PHYS 006, PHYS 008, CHEM 002, or ESS 001) or consent of instructor. Letter grade only. Discussion included.

#### **BIO 148: Fundamentals of Ecology [4]**

Introduction to the principles of ecology at population, community, ecosystem, landscape, and global scales.

*Prerequisite:* BIO 001, BIO 005, ESS 001, ESS 005 or consent of instructor. Letter grade only. Fieldwork and discussion included.

#### **BIO 149: Conservation Biology [4]**

Detailed examination of the evolutionary, ecological, management, and policy issues related to the conservation of ecosystems, species, and genetic diversity. Theory and practical aspects of

biological conservation are also presented, with special reference to case studies from California.

*Prerequisite:* BIO 001 and (MATH 018 or MATH 032). BIO 148 recommended. Letter grade only. Discussion included.

#### **BIO 149F: Conservation Biology Laboratory [1]**

Field and laboratory exercises reinforcing material presented in BIO 149/ESS 149.

*Prerequisite:* BIO 149, which may be taken concurrently, Letter grade only. Fieldwork and laboratory included.

#### **BIO 150: Embryos, Genes, and Development [4]**

Principles of developmental biology as revealed through analysis of invertebrate and vertebrate systems. Animal models are used to examine the molecular and cellular mechanisms that influence cell fate. Cell signaling is studied in the context of embryonic pattern formation and the development of body plans and organ systems.

*Prerequisite:* BIO 110. Discussion included.

#### **BIO 151: Molecular Immunology [4]**

Emphasis on development and function of hematopoietic and immune systems and their roles in responding to environmental change, maintenance of health, and disease pathogenesis.

*Prerequisite:* BIO 110. Discussion included.

#### **BIO 151L: Molecular Immunology Laboratory [1]**

Laboratory experiments demonstrating and reinforcing topics covered in BIO 151. BIO 151 must be taken concurrently.

*Prerequisite:* BIO 110. Letter grade only.

#### **BIO 152: Cancer Genetics and Tumor Biology [4]**

Topics include viral and hormonal carcinogenesis, molecular aberrations in cancer, tumor development, epigenetics and cancer, tumor immunology, oncogenes.

*Prerequisite:* BIO 101 or BIO 110. Discussion included.

#### **BIO 153: Evolution and Development [4]**

Comparison and contrast of the development and developmental cues of a variety of animals and emphasizes how conserved developmental pathways have been manipulated through evolutionary processes to produce different physical features. The effects of regulatory region mutations, gene duplication, and genetic co-opting are investigated.

*Prerequisite:* BIO 110. Letter grade only. Discussion included.

#### **BIO 154: Developmental Immunology [4]**

An in-depth exploration of the development of the immune system. Topics include the biology of primary lymphoid organs (particularly the thymus and bone marrow) and early development of lymphoid and myeloid cells. Emphasis is on the temporal, microenvironmental, genetic and molecular control of immune cell development.

*Prerequisite:* Junior standing and BIO 151. Letter grade only. Discussion included.

#### **BIO 160: Comparative Physiology [4]**

Covers the function of the major organ systems by studying species-specific adaptations across the vertebrate subphylum, emphasizing physiological adaptations to environmental challenges.



Locomotion, reproduction, cardiovascular, renal, and pulmonary function serve as the models for assessing the cellular basis for physiologic adaptation across the spectrum of vertebrates.

*Prerequisite:* BIO 100 or BIO 101. Discussion included.

#### **BIO 160L: Comparative Physiology Laboratory [1]**

Laboratory experiments demonstrating and reinforcing topics covered in BIO 160. BIO 160 must be taken concurrently.

*Prerequisite:* BIO 110. Pass/No Pass grading only.

#### **BIO 161: Human Physiology [4]**

Understanding the mechanisms underlying function of major human organs. Emphasis includes neural transmission and action potential, cardiovascular, renal and gastrointestinal physiology, metabolism, and endocrinology. Laboratory experiments demonstrating and reinforcing topics covered in lecture with an emphasis on scientific method.

*Prerequisite:* Senior standing and BIO 101 and (PHYS 009 or PHYS 019). Letter grade only. Laboratory included.

#### **BIO 162: Evolutionary Constraints of Physiology [4]**

An introduction to the materials upon which evolution acts. We study the structure of animals, the materials from which living organisms are made and the limitations that those materials impose upon evolution.

*Prerequisite:* BIO 160. Discussion included.

#### **BIO 163: Endocrinology [4]**

Basic principles of endocrinology; structure and functions of endocrine glands primarily in mammals with reference to other vertebrates for comparison; hormonal control of kidney function, metabolism, neural transmission, and reproduction; mechanisms of hormone actions.

*Prerequisite:* BIO 110, BIO 160 and CHEM 008 or consent of instructor. Letter grade only. May be repeated for credit once. Discussion included.

#### **BIO 163L: Endocrinology Laboratory [1]**

Laboratory experiments demonstrating and reinforcing topics covered in BIO 163 with an emphasis on analytical techniques in endocrinology. BIO 163 must be taken concurrently.

*Letter grade only. May be repeated for credit once.*

#### **BIO 164: Human Anatomy [5]**

Introduction to the basic concepts of human anatomy at the cell, tissue, and organ levels, through a system-based approach (e.g., skeletal, muscular, nervous, cardiovascular, respiratory, digestive, urinary, reproductive). Laboratories include dissection of mammal organs (cat, sheep, cow), observation of human models and histological slides of human tissues, and interactive computer based exercises.

*Prerequisite:* Junior standing and BIO 110. Letter grade only. Laboratory and discussion included.

#### **BIO 170: Neurobiology [4]**

Examination of the general operations of the central and peripheral nervous system. Covers cellular neuroscience, including the molecular basis of excitability, synaptic transmission, and neuronal signal transduction, as well as the organization and operations of the major neural

systems associated with sensation, locomotion, and higher brain function.

*Prerequisite:* BIO 110. Discussion included.

#### **BIO 170L: Neurobiology Laboratory [1]**

Laboratory experiments demonstrating and reinforcing topics covered in BIO 170. BIO 170 must be taken concurrently.

*Prerequisite:* BIO 110. Letter grade only.

#### **BIO 175: Biostatistics [4]**

Advances in statistical techniques to investigate experimental data generated in molecular, cellular, and evolutionary biology, and health sciences research.

*Prerequisite:* (MATH 018 or MATH 032) and (PHYS 008, MATH 022 or MATH 030). Discussion included.

#### **BIO 180: Mathematical Modeling for Biology [4]**

Statistical analysis and mathematical modeling skills for life scientists. The first half of this course is about building statistical models of complex data sets and the second half is about using population models to describe demographic change, ecosystems and epidemics. Extensive computer laboratories using the "R" statistical language.

*Prerequisite:* (BIO 100 or BIO 101) and (MATH 022 or MATH 030) and (MATH 018 or MATH 032). Discussion included.

#### **BIO 181: Introduction to Biomolecular Simulation [4]**

Lectures and laboratory exercises teach the principles and practice of molecular modeling with a focus on simulations of biological macromolecules. Topics covered include classical molecular dynamics, molecular mechanics, docking, and visualization. The computational laboratories involve simulations of systems including water, micelles, DNA, and proteins.

*Prerequisite:* BIO 180 or (BIO 100 and CHEM 008 and MATH 015 and MATH 021 and (PHYS 008 or PHYS 018)) or consent of instructor. Laboratory and discussion included.

#### **BIO 182: Bioinformatics [5]**

Detailed introduction to the tools, algorithms, statistics and databases used in bioinformatics, emphasizing an open-source, command-line toolbox approach. Topics may include: alignments, search, gene/motif classification, phylogenetics, genomics, gene expression, ontologies, structure and networks. Course includes a mandatory computer laboratory. Prior programming experience recommended, but not assumed.

*Prerequisite:* (BIO 100 or BIO 101) and (MATH 018 or MATH 032) and (BIO 140, which may be taken concurrently). Letter grade only. Laboratory and discussion included.

#### **BIO 183: Population Genetics [4]**

A study of the various factors that affect gene flow and frequency within a population. Theories of selection, neutrality, drift, hitchhiking, recombination, mutation, isolation, in-breeding, and selfish genetic elements are taught along with statistical tests and experimental methods for detecting these forces.

*Prerequisite:* BIO 140 and MATH 021. Discussion included.

#### **BIO 185: Biomedical Ethics [3]**

Ethical issues associated with contemporary biology and the complex relationships among medicine, science, and society. Topics include genetic engineering, cloning, and stem cell research.

*Prerequisite:* BIO 001 or BIO 003.

#### **BIO 190: Research Seminar [1]**

Student-led presentations of current topics in biological sciences, including independent research presentations.

*Prerequisite:* Junior standing. Permission of instructor required.

#### **BIO 192: Communicating Science [1 - 2]**

Development of skills to effectively communicate scientific topics to broad audiences.

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **BIO 195: Upper Division Undergraduate Research [1 - 5]**

Group or individual research projects in the biological sciences under the direction of a BIO faculty member.

*Permission of instructor required. May be repeated for credit.*

#### **BIO 198: Upper Division Directed Group Study [1 - 5]**

Group directed study in the biological sciences under the guidance of a BIO faculty member.

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **BIO 199: Upper Division Individual Study [1 - 6]**

Independent study in the biological sciences under the direction of a BIO faculty member.

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## BIOENGINEERING

#### **BIOE 030: Introduction to Bioengineering [4]**

Presents students with an overview of the creative synergies between engineering and life sciences that define the scope of Bioengineering. Examples of successful Bioengineering endeavors (devices, materials, processes, models) are provided. Discussion of current frontiers and future direction of Bioengineering, with an emphasis on information technology and nanotechnology.

*Prerequisite:* MATH 021, PHYS 008, BIO 001 and CHEM 002. CHEM 002 may be taken concurrently. Letter grade only. Laboratory included.

#### **BIOE 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **BIOE 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **BIOE 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**BIOE 100: Physiology for Engineers [4]**

Using the conceptual, analytical, modeling and design tools of engineering to achieve quantitative insights into physiological systems. Transport mechanisms, energy transduction, feedback and feed forward control, optimization, and materials selection principles in the context of cells, tissues, and organs. How muscles, nerves and biological fluids interact to allow you to read this course description.

*Prerequisite: BIO 002, CHEM 008, MATH 021 and PHYS 008. Letter grade only. Laboratory included.*

**BIOE 101: Modeling of Nanoscale Process in Biology [3]**

Advanced mathematical modeling, simulation and data analysis applied to biological problems at the molecular level; probabilistic models. Scope and limitations of these techniques. Molecular conformations and folding, protein structure, molecular interactions, binding sites, formation of aggregates and complexes, phase changes, membrane transport, physiological control systems in cells.

*Prerequisite: MATH 021, PHYS 008, MATH 023 and BIO 001. MATH 024 recommended. Letter grade only. Laboratory included.*

**BIOE 102: Biosensors [4]**

Design of natural and artificial devices for characterizing the physical and chemical environment inside and outside living cells. Detection of metabolites, toxins, pathogens and cancers. Molecular and nanoparticle probes. Immunosensors. Nucleic acid sensors and DNA chips. Enzyme-based biosensors. Organism and whole cell-based biosensors. Natural and synthetic receptors for biosensors. Remote diagnosis.

*Prerequisite: BIO 001, MATH 021 and PHYS 008. Course cannot be taken after obtaining credit for BIOE 103. Letter grade only. Laboratory included.*

**BIOE 103: Biosensors and Bioinstrumentation [4]**

Intended for the last-year engineering student to facilitate the student's development into bioengineering investigation. Designed to introduce fundamental principles of circuit theory, analog and digital electronics and biological instrumentation techniques commonly used in biomedical research.

*Prerequisite: MATH 02, PHYS 008 and BIO 001. Letter grade only.*

**BIOE 104: Biotransport [3]**

Biological Transport Phenomena is the quantitative description of momentum transport (viscous flow) and mass transport (convection and diffusion) in living systems. We explore the similarities between the fundamental principles of momentum, heat, and mass transfer, develop analogies between the fundamentals that apply at microscopic and macroscopic scales, and use the fundamentals in conjunction with conservation laws to develop mathematical descriptions of physiological and engineering systems.

*Prerequisite: Junior standing and MATH 021, PHYS 008, BIO 002 and CHEM 002. Letter grade only.*

**BIOE 110: Self-Assembling Molecular Systems [3]**

Preparation, characterization, and applications of supramolecular structures. Factors that promote controlled molecular assembly at interfaces and

in 3-D. Hydrophobic bonding and the role of water. Liquid crystalline phases. In vivo and in vitro examples of self-assembly. Biomimetic materials: the quest for adaptive responses to changes in environment, and self-healing. "Green" processing routes via biotechnology. Limitations of biomimetic materials.

*Prerequisite: MATH 021, PHYS 008 and BIO 002. Letter grade only.*

**BIOE 111: Biomembranes [3]**

The molecular and physical chemistry of membranes formed from natural and synthetic amphiphiles. Relationships between surfactant molecular structures, chemical and physical environment, and membrane assembly. Solubility of proteins in biomembranes. Pore formation and structure. Transport through biomembranes. Biomembranes as catalysts and reaction vessels. Characterization of membrane structure and properties.

*Prerequisite: MATH 021, PHYS 008 and BIO 100. Letter grade only.*

**BIOE 112: Biomolecule-Substrate Interactions [3]**

Cell receptor biology in the context of cell interactions with materials. Biomolecule adsorption to solid materials. Relevance to catalysis, adhesion, and responses to implanted biomaterials. Interactions between nanoparticles and biological tissue. Coagulation and thrombosis, infection, acute inflammation, chronic inflammation and the foreign body response, immune and tumorigenic mechanisms. Surface and interface characterization methods.

*Prerequisite: MATH 021, PHYS 008, BIO 002 and ENGR 045. Letter grade only.*

**BIOE 113: Bioinstrumentation [4]**

Signals and interactions that are useful in characterizing biomolecules and small-scale biological structures. Principles of 2-D and 3-D image formation. Resolution limits of imaging and non-imaging characterization techniques. Integration of mechanical, sensor and control technologies into devices that can perform diagnoses and repairs at cellular and subcellular length scales.

*Prerequisite: MATH 021, PHYS 008, BIO 001. Course cannot be taken after obtaining credit for BIOE 103. Letter grade only. Laboratory included.*

**BIOE 114: Tissue Engineering Design [3]**

Fundamental topics include: issues related to the cell source (including stem cells, plasticity, transdifferentiation, therapeutic cloning vs. reproductive cloning, bone marrow transplants, and cell differentiation and purification), cell culture and tissue organization, gene therapy delivery methods, cell adhesion and migration, issues in construct design, tissue preservation, and immunosolation and/or modulation. We also cover current case studies and issues for FDA approval of tissue engineered products.

*Prerequisite: MATH 021, PHYS 008 and BIO 002. Letter grade only.*

**BIOE 117: Lab on a Chip: Developing 3rd World Diagnostics for Global Health [3]**

Innovative campus course between UC San Francisco, UC Berkeley, UC Santa Cruz, and UC Merced which aims to 1) raise awareness and knowledge about global health issues 2) teach students critical engineering skills such as nano/micro-fabrication 3) enable students to design, build, and test their own diagnostics

and 4) develop entrepreneurial skills. Students learn about tuberculosis from leading experts at UCSF and then address the death of sensitive diagnostics by designing and testing their own nano/micro-systems. Taught at UC Merced with teleconferencing to the other campuses. Two field trips also are required.

*Prerequisite: Junior standing and MATH 021, PHYS 008, BIO 001 and CHEM 002. Letter grade only. Laboratory included.*

**BIOE 120: Physiology for Engineers: Lab Only [1]**

Human physiological functions in organ systems. Labs emphasize functional aspects of organs systems through experimentation. This lab should help you gain practical lab skills, scientific reasoning, understanding of physiology subject matter, and teamwork skills. Physiology laboratory is intended for transfer students that have completed the lecture portion of Physiology at another institution.

*Prerequisite: BIO 002, MATH 021 and PHYS 008. Letter grade only.*

**BIOE 126: Nanodevice Fabrication: Bridging Research and Education [3]**

This course will teach basic properties of nanomaterials and their applications (the lecture part). A nanoscale transducer will be chosen as a sensing element and sensors will be fabricated and tested (the lab part). The interactive and experiential education will be blended into theoretical concept teaching.

*Prerequisite: Junior standing and CHEM 002 and (PHYS 009 or PHYS 019) and (ENGR 165, BIOE 102 or BIOE 103). Letter grade only. Laboratory included.*

**BIOE 150: Bioengineering Design [3]**

Students work in teams on bioengineering problems requiring design solutions. Students define the problem, propose a viable solution, acquire approval for the design, and build and test the designed device.

*Prerequisite: BIO 002, CHEM 008, ENGR 045, ENGR 120, ENGR 130, MATH 021 and PHYS 008, Letter grade only. Laboratory and discussion included.*

**BIOE 195: Upper Division Undergraduate Research [1 - 5]**

Research credit is designed to give credit to students that elect to conduct research in a laboratory on campus. Credits are proportional to the hours spent in the laboratory (1-5 credits).

*Permission of instructor required. Letter grade only. May be repeated for credit.*

**BIOE 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**BIOE 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## CHEMISTRY

**CHEM 001: Preparatory Chemistry [3]**

Preparation for general chemistry. Units of measurement, dimensional analysis, significant figures; elementary concepts of volume, mass, force, pressure, energy, density, temperature, heat,

work; fundamentals of atomic and molecular structure; the mole concept; acids and bases; stoichiometry; properties of the states of matter; gas laws; solutions, concentrations.

NOTE: Chemistry 1 satisfies no requirements other than contribution to the 120 units required for graduation. Designed for students who need additional help prior to enrollment in General Chemistry.

*Course cannot be taken after obtaining credit for CHEM 002. Discussion included.*

#### **CHEM 002: General Chemistry I [4]**

Atoms, molecules, and stoichiometry; periodic properties; chemical equations; concepts of chemical bonding; Lewis structures; bond energies; atomic and molecular orbitals; solutions and measures of concentration; acid-base and solubility equilibria; thermochemistry; main group descriptive chemistry. Laboratories emphasize "green chemistry" concepts, using environmentally benign reagents and minimizing waste.

*Prerequisite: CHEM 001 or passing score on the Chemistry Placement Exam or score of 3 or better on AP Chemistry Exam. Laboratory included.*

#### **CHEM 008: Principles of Organic Chemistry [4]**

Molecular shapes and charge distributions; resonance; electron delocalization; organic structures, nomenclature and isomerism, stereochemistry; optical activity; organic reactions; IR spectroscopy; intermolecular forces. Rational approaches to organic mechanism are emphasized.

*Prerequisite: CHEM 002 (with a grade of A- or better) or CHEM 010. Laboratory included.*

#### **CHEM 010: General Chemistry II [4]**

Gas properties; entropy; free energy; chemical kinetics: rate laws, temperature dependence, catalysis, enzymes; diffusion and transport; nuclear chemistry; quantum mechanics; molecule-radiation interactions; electronic and vibrational spectroscopy; coordination compounds; solids and liquids; salts, metals, and semiconductors; mass spectrometry; diffraction. Laboratories emphasize "green chemistry" concepts, using environmentally benign reagents and minimizing waste.

*Prerequisite: CHEM 002. Laboratory included.*

#### **CHEM 090X: Freshman Seminar in Chemistry [1]**

Examination of a topic in chemistry.

Pass/No Pass grading only.

#### **CHEM 095: Lower Division Undergraduate Research [1 - 5]**

Laboratory, field, theoretical, and/or computational research under the supervision of a faculty member on a topic of mutual interest. A written report is required.

*Permission of instructor required. May be repeated for credit.*

#### **CHEM 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **CHEM 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **CHEM 100: Organic Synthesis and Mechanism [3]**

Reactions, syntheses, purification and characterization of all of the major classes of organic compounds. Includes standard organic reaction mechanisms and bioorganic mechanism. A retrosynthetic approach to synthetic design is emphasized.

*Prerequisite: CHEM 008 and CHEM 010.*

#### **CHEM 100L: Organic Chemistry Laboratory [1]**

Laboratory experiments in synthetic methods and chemical and spectroscopic characterization of organic compounds. Emphasis is on microscale techniques.

*Prerequisite: CHEM 100, which may be taken concurrently.*

#### **CHEM 101L: Advanced Synthetic Laboratory [2]**

Laboratory experiments in synthetic methods and chemical and spectroscopic characterization of organic and inorganic compounds. Emphasis is on microscale techniques.

*Prerequisite: CHEM 100, which may be taken concurrently.*

#### **CHEM 111: Biochemistry I [4]**

Advanced study of proteins, enzymes, enzyme kinetics, and carbohydrates metabolism in living organisms.

*Prerequisite: CHEM 100. Letter grade only. Discussion included.*

#### **CHEM 112: Quantum Chemistry and Spectroscopy [3]**

Theory and practical application of molecular quantum mechanics. Schrodinger equation and matrix representations of quantum mechanics; simple exactly solvable model problems; calculation of observable properties; vibrational and electronic wave functions; approximation methods; quantum mechanics of spectroscopy.

*Prerequisite: CHEM 010, MATH 024 and PHYS 009. Letter grade only.*

#### **CHEM 113: Chemical Thermodynamics and Kinetics [3]**

Statistical mechanics, thermodynamics, and chemical kinetics, taught from a perspective that develops the behavior of bulk matter from molecular properties.

*Prerequisite: CHEM 112. Letter grade only.*

#### **CHEM 114L: Physical Chemistry and Instrumental Analysis Laboratory [2]**

Laboratory experiments in spectroscopy, electrochemistry, separations, and kinetics, including biochemical and biophysical applications.

*Prerequisite: CHEM 112, which may be taken concurrently.*

#### **CHEM 115: Instrumental Analysis and Bioanalytical Chemistry [3]**

Spectroscopic, electrochemical, and separation methods of chemical analysis including bioanalytical techniques.

*Prerequisite: CHEM 112, which may be taken concurrently.*

#### **CHEM 120: Inorganic Chemistry [3]**

Descriptive inorganic chemistry, reactivity, inorganic spectroscopy, group theory, and crystallography.

*Prerequisite: CHEM 008 and CHEM 010. Letter grade only.*

#### **CHEM 122: Advanced Biochemistry and Molecular Biology [4]**

Mechanisms of amino acid, nucleic acid, and lipid metabolism plus advanced mechanisms of gene expression, signal transduction, and regulation of gene expression.

*Prerequisite: BIO 101 and BIO 140. Letter grade only. Laboratory and discussion included.*

#### **CHEM 130: Organic Spectroscopy and Computation [3]**

Modern methods and tools employed for the determination of organic molecular structure including NMR [1D and 2D FT], IR, and UV spectroscopy. Applications of quantum mechanical concepts and methods to understand and predict organic structures and reactivities. Computational modeling methods, including force field and quantum mechanical computer calculations.

*Prerequisite: CHEM 100 and CHEM 112. Laboratory included.*

#### **CHEM 131: Molecular Spectroscopy [3]**

Time-dependent quantum mechanics; interaction of radiation with matter; electronic spectra of atoms and molecules; vibrational, rotational, and Raman spectra; magnetic resonance spectroscopy; X-ray, neutron, and electron diffraction.

*Prerequisite: CHEM 112. Letter grade only.*

#### **CHEM 133: Biophysical Chemistry [3]**

Biochemical kinetics, solution thermodynamics of biochemical systems, multiple equilibria, hydrodynamics, energy levels, spectroscopy, and bonding. Three-dimensional structure of proteins, forces that stabilize protein structures, protein folding, prediction of protein structure from sequence. Three-dimensional structure of DNA and RNA, sequence-specific recognition of DNA and RNA, RNA-catalyzed processes.

*Prerequisite: (CHEM 111 or BIO 101) and CHEM 113. Letter grade only.*

#### **CHEM 140: Nanoscale Materials Chemistry [3]**

An introduction to the properties of matter on size scales intermediate between atoms or molecules and bulk matter, with emphasis on metallic and semiconductor nanoparticles. Synthesis, characterization, physical and chemical properties, and applications of these materials.

*Prerequisite: CHEM 100, CHEM 113 and CHEM 120, all of which may be taken concurrently. Letter grade only.*

#### **CHEM 147: Materials Chemistry Laboratory [3]**

Laboratory examination of materials synthesis and physical properties of complex materials. Combines synthetic skills with fundamental physical understanding and characterization in approximately equal proportions to relate materials synthesis to materials function.

*Prerequisite: CHEM 101L and CHEM 113. CHEM 113 may be taken concurrently. Laboratory included.*

#### **CHEM 190: Advanced Topics in Chemistry [3]**

In-depth treatment of a timely advanced topic in chemistry as selected by the faculty. More than one section covering different topics may be offered.

Permission of instructor required. Letter grade only. May be repeated for credit.

**CHEM 195: Upper Division Undergraduate Research [1 - 5]**

Laboratory, field, theoretical, and/or computational research under the supervision of a faculty member on a topic of mutual interest. A written report is required.

Permission of instructor required. May be repeated for credit.

**CHEM 198: Upper Division Directed Group Study [1 - 5]**

Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.

**CHEM 199: Upper Division Individual Study [1 - 5]**

Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.

**CHEM 200: Advanced Organic Synthesis [3]**

Logical approaches to designing syntheses of target organic compounds. Introduction to retrosynthetic analyses and background on the reactions needed to achieve common syntheses; protecting groups and stereoselective methodologies. Classic syntheses are discussed in the context of modern methods. Introduction to literature search tools, a practical estimate of the reliability of published protocols, and references on chemical purification.

Prerequisite: One year of organic chemistry. Letter grade only.

**CHEM 201: Organic and Organometallic Reaction Mechanisms [3]**

Thermodynamics, statistical mechanics, and molecular orbital theory are used to explain reactivity, product distributions, the stability of intermediates, and transition state structure. Elements of computational chemistry, kinetic methods of interrogation, linear free energy relationships, kinetic isotope effects, and other methods for empirically constructing plausible reaction mechanisms.

Prerequisite: One year of organic chemistry and one year of physical chemistry. Letter grade only.

**CHEM 202: Bioorganic Chemistry [3]**

The molecular basis of biological processes. Methods by which enzymes catalyze organic reactions; experimental methods by which the mechanisms of enzyme-catalyzed reactions are elucidated; chemistry of disease states and drug action.

Prerequisite: One year of organic chemistry and one semester of biochemistry. Letter grade only.

**CHEM 212: Molecular and Solid State Quantum Chemistry [3]**

Theory and practical application of molecular quantum mechanics. Schrodinger equation and matrix representations of quantum mechanics; simple exactly solvable model problems; calculation of observable properties; vibrational and electronic wave functions; approximation methods; quantum mechanics of spectroscopy. Graduate requirements include computer laboratory and a computational project.

Letter grade only.

**CHEM 213: Chemical Thermodynamics and Kinetics [4]**

Statistical mechanics, thermodynamics, and chemical kinetics, taught from a perspective that develops the behavior of bulk matter from molecular properties; modern experimental and theoretical methods in kinetics.

Prerequisite: CHEM 212. Letter grade only.

**CHEM 231: Molecular Spectroscopy [3]**

Time-dependent quantum mechanics; interaction of radiation with matter; electronic spectra of atoms and molecules; vibrational, rotational, and Raman spectra; magnetic resonance spectroscopy; X-ray, neutron, and electron diffraction. Modern experimental and theoretical methods in spectroscopy. Graduate requirements include a term paper critically evaluating a recent technique in spectroscopy.

Prerequisite: CHEM 212.

**CHEM 251: Microstructures Processing and Properties of Materials [3]**

Relationships between material properties and their molecular and higher-level organization; control of these properties by the environment to which the material is subjected during processing.

**CHEM 290: Current Topics in Physics and Chemistry [3]**

Exploration of current research directions, problems, and techniques in molecular and materials chemistry, physics, and engineering. Course format emphasizes student-led presentation, analysis, and discussion of reading assignments from the current and recent scientific literature. Topics are determined by the instructor and change each semester.

May be repeated for credit. Seminar included.

**CHEM 291: Physics and Chemistry Seminar [1]**

Graduate seminar in physics and chemistry.

Satisfactory/Unsatisfactory grading only. May be repeated for credit.

**CHEM 295: Graduate Research [1 - 15]**

Supervised research.

Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.

**CHEM 298: Directed Group Study [1 - 6]**

Group project under faculty supervision.

Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.

**CHEM 299: Directed Independent Study [1 - 6]**

Independent project under faculty supervision.

Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.

**CHN 001: Elementary Chinese I [4]**

An introduction to modern standard Chinese (Mandarin) pronunciation and grammar as well as pinyin and simplified characters. Emphasis is on the basic language skills: speaking, listening, reading and writing.

**CHN 002: Elementary Chinese II [4]**

An introduction to modern standard Chinese (Mandarin) pronunciation and grammar as well as pinyin and simplified characters. Emphasis is on the basic language skills: speaking, listening, reading and writing.

Prerequisite: CHN 001.

**CHN 003: Intermediate Chinese I [4]**

Review of modern standard Chinese (Mandarin) pronunciation and grammar as well as pinyin and simplified characters. Emphasizes speaking and writing skills. Readings are utilized to build cultural understanding.

Prerequisite: CHN 002.

**CHN 004: Intermediate Chinese II [4]**

Review of modern standard Chinese (Mandarin) pronunciation and grammar as well as pinyin and simplified characters. Emphasizes speaking and writing skills. Readings are utilized to build cultural understanding.

Prerequisite: CHN 003.

## COGNITIVE SCIENCE

**COGS 001: Introduction to Cognitive Science [4]**

An introduction to the interdisciplinary field of cognitive science. Basic issues related to cognition, including perception, memory, language, learning, problem solving, spatial cognition, attention, mental imagery, consciousness, brain damage, development, and artificial intelligence, are considered from the perspectives of psychology, philosophy, computer science, and neuroscience.

Discussion included.

**COGS 005: Introduction to Language and Linguistics [4]**

An introduction to the scientific study of language. Topics include phonology, phonetics, syntax, semantics, pragmatics, sociolinguistics, psycholinguistics, historical linguistics, language acquisition, and natural discourse.

Discussion included.

**COGS 090X: Freshman Seminar [1]**

Examination of a topic in the cognitive sciences.

May be repeated for credit.

**COGS 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

Permission of instructor required. May be repeated for credit.

**COGS 098: Lower Division Directed Group Study [1 - 5]**

Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.

**COGS 099: Lower Division Individual Study [1 - 5]**

Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.

## CHINESE

No credit is allowed for completing a less advanced course after successful completion (C- or better) of a more advanced course in the foreign languages. This applies only to lower division foreign language courses, not upper division courses.

**COGS 101: Mind, Brain and Behavior [4]**

Further explores the issues covered in COGS 1, but with greater emphasis on computation, brain structure, neurological deficits, and the connection between mind and brain.

*Prerequisite:* COGS 001 or PSY 001.

**COGS 102: Introduction to Cognitive Modeling [4]**

An introduction to the use of computer programs in modeling and cognitive phenomena. Some proficiency in a high level programming language [C, Java, Lisp, etc.] is assumed. Topics include symbolic artificial intelligence, neural networks, genetic algorithms, and computer graphics.

*Prerequisite:* (COGS 001 or PSY 001) and (CSE 001, CSE 002 or CSE 020) or consent of instructor.

**COGS 103: Introduction to Neural Networks in Cognitive Science [4]**

Introduction to the use of neural networks in the study of cognitive phenomena. Topics include perception, attention, language, memory, and biologically realistic model neurons.

*Prerequisite:* COGS 001 or PSY 001 or consent of instructor.

**COGS 105: Research Methods for Cognitive Scientists [4]**

Methods used for conducting interdisciplinary research in cognitive science. Topics range from identifying interesting problems, applying methods and theory to everyday cognitive tasks, designing projects, collecting data, analyzing and interpreting data, modeling data, and writing up results. Lab work and group projects are included.

*Prerequisite:* (COGS 001 or PSY 001) and PSY 010. Laboratory included.

**COGS 110: Philosophy of Cognitive Science [4]**

Consideration of philosophical and foundational issues in cognitive science, including the Turing Test, the Chinese Room argument, the nature of cognitive architecture, animal cognition, connectionism vs. symbolic artificial intelligence, and the possibility of thinking machines.

*Prerequisite:* PHIL 001 and (COGS 001 or PSY 001).

**COGS 121: Cognitive Psychology [4]**

Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving and computer simulation.

*Prerequisite:* COGS 001 or PSY 001. Discussion included.

**COGS 123: Computational Cognitive Neuroscience [4]**

Design and analysis of computational simulations of human behavior and brain function. Techniques for modeling active membranes, individual neurons, the dynamics produced by recurrent excitation and lateral inhibition, synaptic plasticity, and the computational role of neurotransmitters. Formal models of perception, attention, learning, memory, language, categorization, and cognitive control.

*Prerequisite:* (COGS 001 or PSY 001) and one additional upper division COGS course or consent of instructor. Laboratory included.

**COGS 125: Introduction to Artificial Intelligence [4]**

Provides an overview of the main concepts and algorithms underlying the understanding and construction of intelligent systems: agents, problem solving, search, representation, reasoning, planning, communication, perception, robotics, neural networks. Includes practical experimentation of algorithms in computer labs.

*Prerequisite:* (CSE 020 and CSE 021) or (CSE 001 and CSE 002) or (CSE 020 and CSE 021) or (CSE 030 and CSE 031) or consent of instructor. COGS 001 recommended. Laboratory included.

**COGS 128: Cognitive Engineering [4]**

This survey provides an introduction to cognitive engineering, with an emphasis on cognitive science. Topics include human computer interaction, human robot interaction, speech recognition systems, animated characters, virtual reality systems, ubiquitous computing, computer supported cooperative work, and the implications of cognitive science research on the design and use of electronic devices and user interfaces in the 21st Century.

*Prerequisite:* COGS 001 or PSY 001 or consent of instructor. Laboratory included.

**COGS 130: Cognitive Neuroscience [4]**

Brain systems involved in mental processes including perception, attention, language, reasoning, spatial cognition, memory, and decision-making. Neurobiological evidence for functional subsystems within these processes and the evolution of specialized systems are considered through examining findings from animal studies, human behavior and development research, and brain imaging studies.

*Prerequisite:* COGS 001, BIO 001 or PSY 001.

**COGS 140: Perception [4]**

An introduction to key theoretical constructs and experimental procedures in visual and auditory perception. Topics include psychophysics; perception of color, space, shape and motion; pattern recognition; perceptual attention; and brain areas engaged in perception.

*Prerequisite:* COGS 001 or PSY 001.

**COGS 141: Visual Perception [4]**

A survey of central topics in the psychological study of vision: neurophysiological structure and function of the visual system; psychophysical methods for studying visual perception; color, motion, and form perception; three dimensional space perception; visual attention and oculomotor behavior; evolutionary advantages of vision; psychological and philosophical theories of visual consciousness.

*Prerequisite:* PSY 001 or COGS 001.

**COGS 144: Animal Cognition [4]**

Focuses on how different species of animals process, organize, and retain information. Topics such as learning and memory, sensation and perception, navigation and migration, and communication, are discussed from ethological, experimental, behavioral, and neuroscientific perspectives. Contemporary issues in the comparative study of the evolution of human cognition are also addressed.

*Prerequisite:* Junior standing and PSY 001 or COGS 001 or consent of instructor.

**COGS 150: Language, Cognition, and Interaction [4]**

Examines the interactive nature of language. Discussion focuses on the extent to which perception, memory, and other non-linguistic processes interact with language and the way people use language to interact in everyday situations. Topics include conversational language, gesture, speech disfluencies, figurative language, spatial language, child-parent interaction, speech recognition, and human-computer processing. Integrates research from psychology, linguistics, sociolinguistics, and human-computer interaction. Research project required.

*Prerequisite:* (COGS 001 or PSY 001) and COGS 005 or consent of instructor.

**COGS 152: Services Science and Management [4]**

Services, e.g., restaurants, hotels, lawyers, information technology operations, business consulting—account for more than 70% of the US economy. Through case studies of businesses and scientific studies of people in real service settings, we focus on how to align people and technology effectively to generate value.

*Prerequisite:* ECON 001. Letter grade only.

**COGS 153: Judgment and Decision Making [4]**

An introduction to the study of human judgment and decision making. Topics include decision making under uncertainty, financial choices, health decision making, group decisions, rational theories of choice behavior, and improving decision making. The material is related to cognitive science, psychology, economics, and other social sciences.

*Prerequisite:* COGS 001 or PSY 001.

**COGS 154: Cognitive Science Applications for Management [4]**

Covers thought, behavior, and interaction in modern businesses, where knowledge workers interact with one another and with technology. Topics include business decision making, risk behavior, attitudes toward risk, planning, communication, information management, information systems, human-computer interaction, neuroeconomics, and organizational behavior.

*Prerequisite:* COGS 001 or PSY 001 or consent of instructor.

**COGS 155: Language Acquisition [4]**

A comprehensive survey of the theories, methods and findings on first and second language acquisition.

*Prerequisite:* (COGS 001 or PSY 001) and COGS 005 or consent of instructor.

**COGS 171: Memory and Cognition [4]**

Advanced study of recent research on human memory such as systems of memory, memory disorders, the neural basis of memory, memory and consciousness, memory and emotion, representation of knowledge, computer models of memory.

*Prerequisite:* COGS 121 or PSY 121 or consent of instructor. Letter grade only.

**COGS 172: Thinking and Reasoning [4]**

Advanced study of recent research on thinking and reasoning such as inductive and deductive reasoning, concepts and categorization, problem

solving, creative thinking, expertise, cognition in groups, relations to philosophy of science.

*Prerequisite:* COGS 121 or PSY 121 or consent of instructor. Letter grade only.

#### **COGS 175: Spatial Cognition [4]**

Topics include navigation, perception of space and motion, spatial attention, spatial language, neurological deficits related to spatial cognition, spatial mental models, motion path planning in humans and computers, and visual representation in the arts and new media.

*Prerequisite:* COGS 001 or PSY 001.

#### **COGS 180: Topics in Cognitive Science [4]**

A variety of topics in cognitive science are offered.

*Prerequisite:* COGS 001, PSY 001 or consent of instructor. May be repeated for credit twice with different topics.

#### **COGS 190: Advanced Seminar in Cognitive Science [4]**

Intensive treatment of a special topic or problem within cognitive science.

*Prerequisite:* Junior standing. Permission of instructor required. May be repeated for credit once.

#### **COGS 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **COGS 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **COGS 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **COGS 201: Cognitive Science Foundations I [4]**

Solidification and expansion of students' existing knowledge of the fundamental theoretical frameworks and methodological tools of cognitive science. Connections among Philosophy of Mind, Cognitive Neuroscience, Theoretical Linguistics, Artificial Intelligence, and Cognitive Psychology, are emphasized. Required of all first-year Cognitive Science graduate students.

#### **COGS 202: Cognitive Science Foundations II [4]**

Continuation of COGS 201, with more emphasis placed on recent developments and applications in Cognitive Science, and tools needed to conduct cognitive science research in a variety of domains. Also includes practical career information, such as tutorials in grant-writing, effective presentation, writing techniques, and professional development. Required of all first-year Cognitive Science graduate students.

#### **COGS 203: Introduction to Neural Networks in Cognitive Science [4]**

Introduction to the use of neural networks in the study of cognitive phenomena. Topics include perception, attention, language, memory and biologically realistic model neurons. This graduate level version of the course includes a sizeable final project that simulates data from cognitive research.

#### **COGS 223: Computational Cognitive Neuroscience [4]**

Design and analysis of computational simulations of human behavior and brain function.

Techniques for modeling active membranes, individual neurons, the dynamics produced by recurrent excitation and lateral inhibition, synaptic plasticity, and the computational role of neurotransmitters. Formal models of perception, attention, learning, memory, language, categorization, and cognitive control.

*Permission of instructor required. Laboratory included.*

#### **COGS 250: Cognitive Science Graduate Seminar [4]**

Broad issues in cognitive science, with an emphasis on computation, and the connections among mind, technology, and society. Each semester features guest speakers and topics such as artificial intelligence, design, human-computer interaction, perception, language, high-level cognition, reasoning, neuroscience, and the role of technology in society.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit. Discussion and seminar included.*

#### **COGS 285: Topics in Philosophy of Cognitive Science [4]**

Detailed study of special topics in the philosophy of cognitive science, including (but not limited to): Animal Cognition, Cognitive Architecture, Consciousness, Mental Representation, Modularity, Nativism vs. Empiricism, and Self.

May be repeated for credit.

#### **COGS 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **COGS 298: Directed Group Study [1 - 6]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

#### **COGS 299: Directed Independent Study [1 - 6]**

Independent project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## CORE

#### **CORE 001: The World at Home: Planning for the Future in a Complex World I [4]**

A foundation for UC Merced's general education program with a strong emphasis on writing, quantitative literacy, critical thinking, and understanding events in their historical and cultural contexts. The inaugural theme is a study of how individuals and societies can make the best choices in preparing for an uncertain future. The unifying theme in these modules is contemporary California which acts as a common reference point highlighting the regional implications of global events or the global consequences of seemingly local choices. A wide range of interdisciplinary perspectives from the arts, humanities, social sciences, life and physical sciences, and engineering are brought to bear on the course topics.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Letter grade only. Discussion included.

#### **CORE 090X: Freshman Seminar [1]**

Examination of a topic.

*Pass/No Pass grading only. May be repeated for credit.*

#### **CORE 100: The World at Home: Planning for the Future in a Complex World II [4]**

Second half of the Core course sequence, building on the foundation of UC Merced's general education program and has a strong emphasis on writing, quantitative literacy, critical thinking, and understanding events in their historical and cultural contexts. The inaugural theme is a study of how individuals and societies can make the best choices in preparing for an uncertain future. The unifying theme in these modules is contemporary California which acts as a common reference point highlighting the regional implications of global events or the global consequences of seemingly local choices. A wide range of interdisciplinary perspectives from the arts, humanities, social sciences, life and physical sciences, and engineering are brought to bear on the course topics. Upper-division-level quantitative literacy skills and writing ability is expected.

*Prerequisite:* Junior standing and CORE 001. Letter grade only. Discussion included.

## COMPUTER SCIENCE AND ENGINEERING

#### **CSE 001: Programming I [3]**

Fundamentals of computer programming, including basic algorithms, programming styles, program validation, and debugging. Covers the major compound data types including arrays, queues, tuples, stacks, binary trees, and linked lists.

*Laboratory included.*

#### **CSE 002: Programming II [3]**

Intermediate computer programming, including concepts of recursion, functional and object-oriented programming. Includes concepts of classes and objects, abstraction, inheritance, operator overloading, and data localization.

*Prerequisite:* CSE 001. Laboratory included.

#### **CSE 005: Introduction to Computer Applications [4]**

This project-based experience presents the use of computers to control information flow: data collection, management, analysis, and presentation. Basic programming skills, selection of appropriate computer-based tools and languages, and data security are covered. Emphasis is placed on computer knowledge necessary for non-CSE majors to successfully use and manage data and information.

*Offered fall and spring. Letter grade only. Laboratory included.*

#### **CSE 020: Introduction to Computing I [2]**

Designed to give students comprehensive introduction to computing using quantitative examples. Fundamentals of computer programming, including basic algorithms, programming styles, program validation, debugging, and Methods Objects. Major

compound data types including arrays, queues, tuples, stacks, binary.

*Offered fall and spring. Laboratory included.*

### **CSE 021: Introduction to Computing II [2]**

Designed to give students comprehensive introduction to computing using quantitative examples. Fundamentals of computer programming, including basic algorithms, programming styles, program validation, debugging, and Methods Objects. Major compound data types including arrays, queues, tuples, stacks, binary.

*Prerequisite: CSE 020. Offered fall and spring. Laboratory included.*

### **CSE 030: Introduction to Computer Science and Engineering I [4]**

Provides students with an overview of the diverse field of computer science and engineering. Provides an in-depth analysis of several key inventions in the field that have been instrumental in advancing CSE and driving worldwide technical growth.

*Prerequisite: CSE 021. Offered fall and spring. Laboratory included.*

### **CSE 031: Introduction to Computer Science and Engineering II [4]**

Provides students with an overview of the diverse field of computer science and engineering. Also provides an in-depth analysis of several key inventions in the field that have been instrumental in advancing CSE and driving worldwide technical growth.

*Prerequisite: CSE 030. Offered fall and spring. Laboratory included.*

### **CSE 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### **CSE 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **CSE 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **CSE 100: Algorithm Design and Analysis [4]**

Introduction to the design and analysis of computer algorithms. Topics will include concepts of algorithm complexity, and various algorithmic design patterns like divide and conquer, dynamic programming and greedy algorithms. Course will also cover major algorithms and data structures for searching and sorting, graphs and some optimization techniques.

*Prerequisite: CSE 031. Letter grade only. Laboratory and tutorial included.*

### **CSE 106: Exploratory Computing [4]**

Our ability to manipulate data depends on and is limited by our familiarity with computing technologies. We study tools for exploratory computing, emphasizing programming and scripting languages over point-and-click interfaces. We cover the Unix basics and common utilities, regular expressions, Perl and R languages. Development of a problem solving

ability to learn languages independently and cull online documentation.

*Letter grade only. Laboratory included.*

### **CSE 111: Database Systems [4]**

Principles of database design and operation. Major types of databases, including flat-file, hierarchical, relational, and object-oriented. Other topics include database querying languages, database security, and special issues related to the www-based database systems.

*Prerequisite: CSE 100. Offered fall only. Laboratory included.*

### **CSE 120: Software Engineering [4]**

Modern engineering techniques for developing reliable, efficient, re-usable, and maintainable computer software. Primary software design models, including functional, structured, and object-oriented programming. Other topics include software validation, revision control, project management, and documentation.

*Prerequisite: CSE 111, CSE 150, CSE 160 or CSE 170. Offered spring only. Laboratory included.*

### **CSE 140: Computer Architecture [4]**

Fundamental concepts of digital computer design, including instruction sets, memory systems and registers, logic and mathematics units, and off-cpu communication and control. Also surveys the diversity of contemporary computer designs.

*Prerequisite: CSE 031. Offered spring only. Laboratory included.*

### **CSE 150: Operating Systems [4]**

Concepts of computer operating systems including memory management, file systems, multitasking, performance analysis, and security.

*Prerequisite: CSE 031. Offered spring only. Laboratory included.*

### **CSE 160: Computer Networks [4]**

Design concepts and implementation features of computer networks. Concepts of network robustness, scalability, addressing, routing, and security. Several contemporary networking protocols are analyzed.

*Prerequisite: CSE 031. Offered fall only. Laboratory included.*

### **CSE 170: Computer Graphics [4]**

Basic algorithms in computer graphics enabling students to understand and experience the process of implementing modern computer graphics applications. The topics covered are: rasterization, clipping, hidden surface removal, transformations, rendering pipeline, scene graphs, graphics libraries, interpolation, curves and surfaces, constructive solid geometry, boundary representation, spatial partition methods, texture mapping, color models, illumination and shading.

*Prerequisite: CSE 031. Offered spring only. Letter grade only. Laboratory included.*

### **CSE 171: Programming Interactive 3D Graphics and Games [4]**

The main algorithms and techniques used in the implementation of interactive 3D Graphics applications, such as in Computer Games, Robotics Simulators and Virtual Reality, with a focus on implementing large projects. The topics covered are: keyframe animation, articulated figures, direct and inverse kinematics, motion capture, physically-based simulation, path planning, behavior-based animation, scripting

behaviors, finite state machines and other AI topics.

*Prerequisite: CSE 170. Letter grade only. Laboratory included.*

### **CSE 173: Computational Cognitive Neuroscience [4]**

Design and analysis of computational simulations of human behavior and brain function. Techniques for modeling active membranes, individual neurons, the dynamics produced by recurrent excitation and lateral inhibition, synaptic plasticity, and the computational role of neurotransmitters. Formal models of perception, attention, learning, memory, language, categorization, and cognitive control.

*Prerequisite: (COGS 001 or PSY 001) and one additional upper division COGS course or consent of instructor. Offered alternate years, spring only. Laboratory included.*

### **CSE 175: Introduction to Artificial Intelligence [4]**

An overview of the main concepts and algorithms underlying the understanding and construction of intelligent systems: agents, problem solving, search, representation, reasoning, planning, communication, perception, robotics, neural networks. Includes practical experimentation of algorithms in computer labs.

*Prerequisite: CSE 020 and CSE 021 or consent of instructor. COGS 001 recommended. Offered fall only. Letter grade only. Laboratory included.*

### **CSE 176: Machine Learning [4]**

Survey of techniques for the development and analysis of software that learns from experience. An introduction to computational learning theory. Bayesian approaches to learning. Instance-based methods and case-based learning. Decision tree learning. Inductive logic. Artificial neural networks. Kernel methods. Reinforcement learning. Learning from demonstrations and explicit instruction.

*Prerequisite: MATH 032 and CSE 175 or consent of instructor. Offered alternate years, spring only. Laboratory included.*

### **CSE 180: Introduction to Robotics [4]**

The course covers the basic of robotics focusing on the algorithmic side, rather than technology. Students will be introduced to basic computational techniques concerning spatial modeling, planning, and sensor processing. The course has a strong hands-on component. Implementation of different techniques in simulation will complement the theoretical lectures.

*Prerequisite: CSE 100. Letter grade only. Laboratory and tutorial included.*

### **CSE 185: Introduction to Computer Vision [4]**

Overview of fundamental image processing and pattern recognition techniques including image formation, edge detection, image segmentation, optical flow, recovery of three-dimensional structure from shading or stereo information, shape representations, and issues in object recognition.

*Prerequisite: Junior standing and CSE 031 or equivalent programming skills. Mathematical background commensurate with upper division engineering students. Offered fall only. Letter grade only. Laboratory included.*

**CSE 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**CSE 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**CSE 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## ECONOMICS

**ECON 001: Introduction to Economics [4]**

Introduction to economics principles and methods, including microeconomics (operation of the economy at the individual and firm level) and macroeconomics (nature and functions of the national economy in a global context).

**ECON 010: Statistical Inference [4]**

Introduction to the application of social scientific methods to the study of economics, politics, and management. Covers research design, random sampling, descriptive and inferential statistics, hypothesis testing, and the linear regression model with an emphasis on applications.

*Prerequisite: MATH 005 or equivalent score on the Math Placement Exam. Laboratory included.*

**ECON 011: History of Economic Thought [4]**

A survey of the theories of major economists from Adam Smith to Keynes.

*Prerequisite: ECON 001.*

**ECON 090X: Freshman Seminar [1]**

Examination of a topic in economics.

*May be repeated for credit.*

**ECON 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**ECON 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ECON 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ECON 100: Intermediate Microeconomic Theory [4]**

Exploration of the foundations of microeconomic theory, focusing on the behavior of individuals and firms, and the interaction of these agents in the market. Price determination and resource distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics.

*Prerequisite: ECON 001 and MATH 021 or consent of instructor. Discussion included.*

**ECON 101: Intermediate Macroeconomic Theory [4]**

Analysis of output, employment, interest rates, and the price level. The effects of these on changes in monetary and fiscal variables.

*Prerequisite: ECON 001 and MATH 021 or consent of instructor. Discussion included.*

**ECON 111: American Economic History [4]**

Analysis of output, employment, interest rates, and the price level. A survey of trends in the American economy; emphasis on factors explaining economic growth and on the changing distribution of the gains and losses associated with growth.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 115: Economics of Industrial Organization [4]**

The organization and structure of industrial production in the United States economy.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 116: Organizational Strategy [4]**

Discussion of critical issues in the design and functioning of effective organizations. Topics covered include: the boundary of the firm, firm structure, arrangements within the firm, alliances and contracts between firms, and trust and culture in the firm. Combines case studies with relevant economic theory to provide insight into the functioning of organizations.

*Prerequisite: ECON 100 or MGMT 100. Letter grade only.*

**ECON 120: Economics of the Environment [4]**

Analysis of public policy measures that pertain to human environments.

*Prerequisite: ECON 100 or MGMT 100. Laboratory included.*

**ECON 121: The Economics of Money, Banking, and Financial Institutions [4]**

This course addresses issues of money, banking, and financial institutions. Topics covered include: the structure of central banks and the Federal Reserve system, theories of money demand and money supply, the relationship between money supply and overall economic activity, and the role the Federal Reserve plays in economic stabilization.

*Prerequisite: ECON 001. Letter grade only.*

**ECON 130: Econometrics [4]**

Introduction of problems of observation, estimation, and hypotheses testing in economics through the study of the theory and application of linear regression models, critical evaluation of selected examples of empirical research, and exercises in applied economics.

*Prerequisite: (ECON 010 or POLI 010) and MATH 021. Letter grade only. Laboratory included.*

**ECON 140: Labor Economics [4]**

Analysis of the economic forces that shape labor markets, institutions, and performance in the United States and other countries, with special attention to the determinants of labor supply and demand, human capital investment, and government policy.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 141: Human Resource Economics [4]**

Examination of how firms make decisions involving human resources. Topics covered

include employee hiring and recruitment, compensation and use of incentives, and employee motivation and teamwork. Builds on both economic theory and practical examples to illuminate key concepts.

*Prerequisite: ECON 100 or MGMT 100. Letter grade only.*

**ECON 142: The Economics of Gender and Poverty [4]**

Analysis of the economic issues pertaining to gender with an emphasis on studying and evaluating U.S. policy. Topics include work-life balance, occupational choice, the gender earnings/wage gap, housework, and changing social norms. The intersection between gender and poverty is also discussed, particularly as it pertains to U.S. welfare policy.

*Prerequisite: ECON 001.*

**ECON 145: Health Economics [4]**

An economic analysis of policies and institutions in the U.S. health care sector: supply and demand for health services, conceptual and policy issues relating to health insurance, and economic analysis of efficient regulatory policies toward the health care sector.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 150: Economic Development [4]**

Problems of underdevelopment and poverty, policy issues, and development strategy.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 151: Public Economics [4]**

The influence of governmental revenue and expenditure decisions on economic performance. Examines such issues as public goods and externalities, as well as specific expenditure and taxation programs.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 152: Law and Economics [4]**

The economic analysis of legal rules and institutions, including property, contract, and tort law. We also consider issues surrounding crime and punishment.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 155: Political Economics [4]**

Tools of political economics: preferences and institutions, electoral competition, agency, partisan politics. Redistributive politics: general interest politics, special interest politics. Comparative politics: electoral rules, separation of powers, political regimes. Dynamic politics: fiscal policy, growth.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 160: International Microeconomics [4]**

International trade theory: impact of trade on the domestic and world economies; public policy toward external trade.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 161: International Macroeconomics [4]**

Macroeconomic theory of an open economy. Balance of payments adjustment mechanism, international monetary economics issues, international financial institutions and their policies.

*Prerequisite: ECON 101 or MGMT 101.*



**ECON 162: Corporate Finance [4]**

Exploration of the valuation of assets including stocks, bonds, options, and futures contracts using modern financial theoretical models, including CAPM and APT. Optimal portfolio selection and risk management issues are also explored.

*Prerequisite: ECON 100 or MGMT 100.*

**ECON 170: Game Theory [4]**

Consideration of non-cooperative games in the strategic and extensive form as well as applications of game theory to issues in social science and philosophy. Topics may include: solution concepts for non-cooperative games; epistemic foundations for solution concepts; indefinitely repeated games; theories of equilibrium selection; experimental game theory.

*Prerequisite: ECON 100 or MGMT 100. Letter grade only.*

**ECON 190: Topics in Economics [4]**

Intensive treatment of a special topic or problem in economics. May be repeated for credit in different subject area.

*Prerequisite: Junior standing and ECON 100, MGMT 100 or consent of instructor. May be repeated for credit with different topics.*

**ECON 191: Fieldwork in Economics [1 - 4]**

Supervised field studies in economics.

*Prerequisite: Junior standing and ECON 001 or consent of instructor. Letter grade only.*

**ECON 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**ECON 196: Senior Thesis in Economics I [4]**

First part in a year-long capstone seminar that culminates in the presentation of a senior thesis in economics. In this semester, students study research methods in economics, formulate a theoretical or empirical question for their thesis, and conduct a literature review.

*Prerequisite: Senior standing and (ECON 100 or MGMT 100) and (ECON 130 or MGMT 130). Letter grade only.*

**ECON 197: Senior Thesis in Economics II [4]**

Second part in a year-long capstone seminar that culminates in the presentation of a senior thesis in economics. In this semester, students develop and conduct the research proposed in the first semester, write the thesis, and present their work to faculty and peers.

*Prerequisite: Senior standing and ECON 196. Letter grade only.*

**ECON 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ECON 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ECON 240: Advanced Labor Economics I [4]**

Covers recent developments in research on labor economics and provide a basis for students to develop a research program in this area. We discuss human capital investment, the wage structure and inequality, labor demand, labor

market institutions, internal and local labor markets.

*Permission of instructor required. Letter grade only. May be repeated for credit twice.*

**ECON 290: Quantitative Labor Studies Seminar [3]**

Research presentations by visiting scholars in the area of quantitative labor studies.

**ECON 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**ECON 298: Directed Group Study [1 - 6]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**ECON 299: Directed Independent Study [1 - 12]**

Independent project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## EDUCATION

**EDUC 010: The Essentials of Educational Practice and Policy [4]**

Introduction to key elements in education: teaching and learning, school organization, education policy, politics, and philosophical goals of education. Topics include: educational reform, testing and accountability, school finance, student diversity, and bilingual education. Focus is on California's education system, with comparative perspectives from other states and countries.

*Discussion included.*

**EDUC 090X: Freshman Seminar [1]**

Examination of a topic in education.

## ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

**EECS 205: Probability and Stochastic Processes [4]**

Introduction of probability theory and stochastic processes. Topics: discrete-time Markov chains, conditional expectation and martingales, limiting behavior of sequences of random variables, Poisson process and continuous-time Markov chains, renewal processes and queuing theory, detection and estimation, wide-sense stationary processes and spectral density, Kalman filter and Wiener filter, and Brownian motion.

*Prerequisite: MATH 032 and MATH 141 or consent of instructor. Offered in fall only. Discussion included.*

**EECS 250: Advanced Topics Computer Systems [4]**

Computer systems research, including operating systems, database systems, internet infrastructure systems and sensor networks systems. The goal of the course is to cover a broad array of research topics in computer systems, and to engage you in top-flight systems research. The first part is devoted to basic thematic issues and underlying techniques in computer systems, while the second part goes deeper into topics related to scalable,

parallel and distributed systems. The class is based on a discussion of important research papers, and a research project.

*Letter grade only. May be repeated for credit. Laboratory included.*

**EECS 252: Embedded Computer Systems [4]**

Concentration on methodologies and technologies for design of embedded systems. Topics include hardware and software platforms for embedded systems, techniques for modeling and specification of system behavior, software organization, real-time operating system scheduling, real-time communication and packet scheduling, low-power battery and energy-aware system design, timing synchronization, fault tolerance and debugging, and techniques for hardware and software architecture optimization. We cover theoretical foundations as well as practical design methods.

*Offered fall only. Letter grade only. May be repeated for credit. Laboratory included.*

**EECS 260: Optimization [4]**

Introduction of theory and numerical methods for continuous multivariate optimization (unconstrained and constrained), including: line-search and trust-region strategies; conjugate-gradient, Newton, quasi-Newton and large-scale methods; linear programming; quadratic programming; penalty and augmented Lagrangian methods; sequential quadratic programming; and interior-point methods.

*Prerequisite: MATH 023, MATH 024, MATH 141 or consent of instructor. Offered in spring only. Letter grade only. Laboratory included.*

**EECS 262: Networking of Embedded Sensor Systems [4]**

Wireless and sensor systems have achieved significant maturity in the past five years. Experimental systems research in this area has developed a wide range of innovative solutions to practical problems. There is also a fairly large literature on practical experience with these systems. In this class, we sample a wide range of current research on experimental networked wireless and sensor systems. Our exploration ranges from low-level systems and components (self-configuration, localization, time-synchronization), to networking (medium access, routing, transport), and higher-level systems issues (programming, deployment, and management).

*Offered fall only. Permission of instructor required. Letter grade only. May be repeated for credit. Laboratory included.*

**EECS 270: Robot Algorithms [4]**

In depth study of algorithmic techniques to solve fundamental robotic problems, with a particular emphasis on probabilistic aspects. Sensor fusion, mission planning, and other selected topics are covered as well. Theory is complemented by a personal semester long project assigned to every student. Permission of instructor required.

*Offered fall only. Permission of instructor required. Letter grade only. Laboratory included.*

**EECS 273: Computational Cognitive Neuroscience [4]**

Design and analysis of computational simulations of human behavior and brain function. Techniques for modeling active membranes, individual neurons, the dynamics produced by recurrent excitation and lateral inhibition,

synaptic plasticity, and the computational role of neurotransmitters. Formal models of perception, attention, learning, memory, language, categorization, and cognitive control.

*Offered alternate years, spring only. Permission of instructor required. Laboratory included.*

#### **EECS 274: Computer Vision [4]**

The course introduces algorithms and techniques for understanding contents in single and multiple images. It covers low-level, mid-level, high-level vision and recent research developments.

*Prerequisite: CSE 185 or instructors consent, linear algebra, vector calculus, basic knowledge in probability and statistics, as well as programming skills. Letter grade only. May be repeated for credit. Laboratory included.*

#### **EECS 275: Matrix Computation [4]**

Numerous engineering problems can be formulated and solved via matrices. This course covers advanced algorithms for matrix computation and analysis. The introduced algorithms and numerical techniques are also important for solving linear/nonlinear systems and optimization problems.

*Prerequisite: Linear algebra, programming skills. Letter grade only. May be repeated for credit twice. Laboratory included.*

#### **EECS 276: Machine Learning [4]**

Survey of techniques for the development and analysis of software that learns from experience. An introduction to computational learning theory. Bayesian approaches to learning. Instance-based methods and case-based learning. Decision tree learning. Inductive logic. Artificial neural networks. Kernel methods. Reinforcement learning. Learning from demonstrations and explicit instruction.

*Offered alternate years, spring only. Permission of instructor required. Laboratory included.*

#### **EECS 280: Advanced Topics in Computer Networks and Distributed Systems [4]**

Overview of Internet development history and fundamental principles underlying TCP/IP protocol design. Discussion of current networking and distributed systems research topics, including latest research results in routing protocols, transport protocols, network measurements, network security protocols, and clean-slate approach to network architecture design. Fundamental issues in network protocol design and implementations applied to a variety of different applications and environments.

*Offered fall only. Permission of instructor required. Letter grade only. May be repeated for credit. Laboratory included.*

#### **EECS 281: Advanced Topics in Robotics [4]**

Contemporary issues in mobile robotics, Topics include but are not limited to: cooperative mobile robotics, mathematical models for complex tasks (e.g. manipulation), humanoid robotics, human-robot interfaces, robot hardware and middleware.

*Offered fall only. Letter grade only. May be repeated for credit. Laboratory included.*

#### **EECS 282: Advanced Topics in Machine Learning [4]**

The course reviews advanced topics in machine learning. Each edition of the course will focus on a different topic. It will consist of formal lectures, presentation and discussion of papers and implementation of algorithms in Matlab or C.

*Permission of instructor required. Letter grade only. May be repeated for credit. Laboratory included.*

#### **EECS 283: Advanced Topics in Intelligent Systems [4]**

Research in intelligent systems is multi-disciplinary and its foundation can be found from fields such as estimation, communication, and control. Other areas such as artificial intelligence, machine learning, networking, robotics, security, and signal processing are also highly related. This class will review the most current results in intelligent systems and help students prepare for research in intelligent systems. Topics will vary from semester to semester.

*May be repeated for credit. Discussion included.*

#### **EECS 285: Advanced Topics in Motion Planning [2 - 4]**

Advanced algorithms in the motion planning research domain and reviews selected topics in applications to robotics, computer animation, cognitive science and bioinformatics. Includes development of a sizeable programming project and student-lead seminars.

*Prerequisite: Consolidated programming skills, notions of computer graphics and robotics. Offered in fall only. Permission of instructor required. Letter grade only.*

#### **EECS 286: Advanced Topics in Computer Vision [2 - 4]**

Current and advanced topics in computer vision. Students develop verbal and written presentation skills through critical evaluation of seminal works.

*Prerequisite: CSE 185 or consent of instructor. Offered in spring only. Letter grade only. May be repeated for credit.*

#### **EECS 287: Advanced Topics in Computer Animation [2 - 4]**

A review of advanced topics in computer animation, including: character animation, motion capture techniques, physics-based animation, deformable surfaces, collision detection and motion planning. Includes development of a sizeable programming project and student-lead seminars.

*Offered fall only. Permission on instructor required. Letter grade only. Laboratory and seminar included.*

#### **EECS 290: Electrical Engineering and Computer Science Seminar [1]**

The topics include the entire range of body knowledge within the electrical engineering and computer science domain areas. It is primarily intended to give electrical engineering and computer science graduate students breadth exposure to all the areas in the field, not just their specific individual areas of research. Students are required to attend eighty percent (80%) of the seminars scheduled in the semester unless they are excused by written authorization of the student advisor. Attendance is registered by the faculty delivering the seminar, hosting the distinguished guest, or advising the Ph.D. graduate student presenting an advance topic.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit twice.*

#### **EECS 295: Graduate Research [1 - 12]**

Supervised research in computer science.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

#### **EECS 298: Directed Group Study [1 - 12]**

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

#### **EECS 299: Directed Independent Study [1 - 12]**

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## ENGINEERING

#### **ENGR 045: Introduction to Materials [4]**

Relationship between the structure, processing, properties, and performance of materials. The application of physical and chemical principles in the context of engineering materials: atomic bonding, crystal structure, defects, thermodynamics, and kinetics.

*Prerequisite: CHEM 002, MATH 021 and PHYS 008 or consent of instructor. Offered spring only. Letter grade only. Laboratory included.*

#### **ENGR 050: Statics [2]**

Fundamental concepts of mechanics, including statics, dynamics, and kinetics of particles and rigid bodies.

*Prerequisite: MATH 021 and PHYS 008. Offered fall only. Letter grade only.*

#### **ENGR 052: Computer Modeling and Analysis [3]**

Basic tools needed for the design and analysis of engineering systems, including data collection, basic algorithm design, implementation and testing, and systems simulation.

*Prerequisite: CSE 001 and MATH 010. Letter grade only. Laboratory included.*

#### **ENGR 053: Materials and the Environment [3]**

Impact of materials mining, processing, synthesis, use, and disposal on the environment, including cost-benefit analyses of environmentally "friendly" vs. "unfriendly" materials. Energy properties, cost, durability, disposal, and other considerations in materials selection. Materials challenges in fuel cell, battery, solar, and water filtration applications. Environmental costs and benefits of emerging nanotechnologies.

*Prerequisite: MATH 021, PHYS 008 and CHEM 002 or consent of instructor. Letter grade only.*

#### **ENGR 057: Dynamics [4]**

Fundamentals of statics. Kinematics and equations of motion of a particle for rectilinear and curvilinear motion. Planar kinematics of rigid bodies. Kinetics for planar motion of rigid bodies, including equations of motion and principles of energy and momentum.

*Prerequisite: MATH 021 and (PHYS 008 or PHYS 018). Offered spring only. Letter grade only.*

#### **ENGR 065: Circuit Theory [3]**

This course is intended for the lower division engineering student to facilitate the student's development into bioengineering investigation. The course has been designed to introduce fundamental principles of circuit theory commonly used in biomedical research.

*Prerequisite: MATH 024 and PHYS 009. Letter grade only.*

**ENGR 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**ENGR 097: Service Learning: Engineering Projects in Community Service [1 - 3]**

Multi-disciplinary teams of freshman through senior students work with community organizations to design, build, and implement engineering-based solutions for real-world problems. Students gain insight into the design and development process. Students are encouraged to participate for two or more semesters at the lower division [ENGR 97] and upper division [ENGR 197] level.

*Permission of instructor required. Letter grade only. May be repeated for credit. Fieldwork included.*

**ENGR 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ENGR 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ENGR 108: BioEntrepreneurship [3]**

Introduces upper division undergraduate and graduate students to entrepreneurship. We start with a history of biotechnology and medical devices which hopefully inspires them to integrate entrepreneurship with engineering and/or life sciences. We work through case studies of start-up companies (including Genetech) brainstorm ideas about new inventions, and walk them through the requisite steps to start a new business venture (IP issues, team formation, raising capital).

*Letter grade only. Discussion included.*

**ENGR 120: Fluid Mechanics [4]**

Introduction to and application of the mechanics of fluids and fluid flow in natural and engineered systems.

*Prerequisite: ENGR 057 and MATH 024. MATH 024 may be taken concurrently. Offered spring only. Letter grade only. Laboratory included.*

**ENGR 130: Thermodynamics [3]**

Fundamentals of equilibrium, temperature, energy, and entropy. Equations of state and thermodynamic properties, with engineering applications.

*Prerequisite: CHEM 002, MATH 023, MATH 024 and (PHYS 009 or PHYS 019). Offered fall only. Letter grade only.*

**ENGR 135: Heat Transfer [4]**

Study of conduction, convection, and radiation heat transfer, with applications to engineering problems.

*Prerequisite: ENGR 120. Offered fall only. Letter grade only. Laboratory included.*

**ENGR 140: Introduction to Object Oriented Programming [4]**

Object and database principles, including data models, access control, database systems architecture, functional data manipulation, database organizational design, indexing, and performance analysis.

*Prerequisite: CSE 001. Letter grade only.*

**ENGR 151: Strength of Materials [4]**

Stresses and strain in solids with symmetric and asymmetric loads. Stresses in pressure vessels and rotating shafts. Strength and failure, plastic deformation, fatigue and elastic instability.

*Prerequisite: ENGR 057. Offered fall only. Letter grade only. Laboratory included.*

**ENGR 155: Engineering Economics Analysis [3]**

Microeconomic principles and methods. Time value of money, interest and equivalences, analysis of economic alternatives, depreciation, inflation and taxes, estimates of demand, cost and risk, decision theory.

*Prerequisite: Junior standing. Offered fall and spring.*

**ENGR 160: Discrete Math and Computer Modeling [3]**

Combinatorics, graph theory, cryptography, discrete optimization, mathematical programming, coding theory, information theory, game theory, principles of computer science, including algorithms, complexity, and performance modeling.

*Prerequisite: CSE 001. Letter grade only.*

**ENGR 166: Analog and Digital Electronics [3]**

This course is intended for the upper division engineering student to facilitate the student's development into bioengineering investigation. The course has been designed to introduce fundamental principles of analog and digital electronics commonly used in biomedical research.

*Prerequisite: ENGR 065. Letter grade only.*

**ENGR 170: Introduction to Electron Microscopy [3]**

Principles and techniques of electron microscopy used in the study of materials. Emphasis upon practical applications.

*Offered spring only. Letter grade only.*

**ENGR 170L: Introduction to Electron Microscopy Laboratory [1]**

Laboratory for principles and techniques of electron microscopy used in the study of materials. ENGR 170 must be taken concurrently.

*Offered spring only. Letter grade only.*

**ENGR 180: Spatial Analysis and Modeling [4]**

Principles of geographic information systems [GIS]; applications of GIS to environmental, water, and resource management issues; problem solving with GIS. Other topics include spatial analysis interpolation techniques and model integration.

*Prerequisite: MATH 021. Offered fall only. Letter grade only. Laboratory included.*

**ENGR 191: Professional Seminar [1]**

Presentation and discussion of professional engineering practices. Professional ethics and the roles and responsibilities of public institutions and private organizations pertaining to engineering.

*Prerequisite: Senior standing. Permission of instructor required. Pass/No Pass grading only.*

**ENGR 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**ENGR 197: Service Learning: Engineering Projects in Community Service [1 - 3]**

Multi-disciplinary teams of freshman through senior students work with community organizations to design, build, and implement engineering-based solutions for real-world problems. Students gain insight into the design and development process.

*Permission of instructor required. Letter grade only. May be repeated for credit. Fieldwork included.*

**ENGR 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ENGR 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ENGR 208: BioEntrepreneurship [3]**

Introduction for upper division undergraduate and graduate students to entrepreneurship. We start with a history of biotechnology and medical devices which inspires them to integrate entrepreneurship with engineering and/or life sciences. Case studies of start-up companies (including Genetech) brainstorm ideas about new inventions, and the requisite steps to start a new business venture (IP issues, team formation, raising capital).

*Letter grade only. Discussion included.*

**ENGR 270: Introduction to Electron Microscopy [3]**

Principles and techniques of electron microscopy used in the study of materials. Emphasis upon practical applications. Graduate requirements include additional assignments, quiz problems, and a project.

*Offered spring only. Letter grade only.*

**ENGR 270L: Introduction to Electron Microscopy Laboratory [1]**

Laboratory for principles and techniques of electron microscopy used in the study of materials. Graduate requirements include additional laboratory reports and a research project.

*Prerequisite: ENGR 270, which may be taken concurrently. Offered spring only. Letter grade only.*

**ENGR 295: Graduate Research [1 - 6]**

Supervised research in engineering.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**ENGR 298: Directed Group Study [1 - 6]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**ENGR 299: Directed Independent Study [1 - 6]**

Independent project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## ENVIRONMENTAL ENGINEERING

### ENVE 010: Environment in Crisis [4]

Human effects on Earth's ecosystems, air, and waters. Social and technological solutions to interacting pressures from environmental pollution, biodiversity loss, water pollution, climate warming, and feeding Earth's population. Science and policy topics appropriate for students majoring in fields other than science or engineering. Not open to majors for credit.

*Offered fall only. Letter grade only.*

### ENVE 020: Introduction to Environmental Science and Technology [4]

Introduction to historical and current issues in the diverse field of environmental engineering. Principles of mass and energy balance. In-depth analysis of several key innovations from the field that have been instrumental in advancing the field. Design project.

*Prerequisite: CSE 021, CHEM 002 and MATH 032. Offered spring only. Letter grade only.*

### ENVE 095: Lower Division Undergraduate Research [1 - 5]

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### ENVE 098: Lower Division Directed Group Study [1 - 5]

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### ENVE 099: Lower Division Individual Study [1 - 5]

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### ENVE 100: Environmental Chemistry [4]

Chemical principles of Earth and environmental systems focusing on environmental processes in water, soil, and air. Emphasis on acid-base chemistry, aqueous speciation, mineral and gas solubility, oxidation and reduction, and isotopes.

*Prerequisite: CHEM 010 and (MATH 022 or PHYS 008). Offered fall only. Laboratory included.*

### ENVE 105: Environmental Data Analysis [3]

The objective of this class is to provide students with probabilistic and statistical methods to analyze environmental data. This class emphasizes both theoretical and applied aspects of data analysis methods. Weekly lab exercises are from environmental applications. Topics include: distribution, hypothesis test, linear regression, multiple regression, uncertainty analysis, outlier detection, sample design, and spatial and temporal data analysis.

*Prerequisite: MATH 021 and PHYS 008. Offered spring only. Letter grade only.*

### ENVE 110: Hydrology and Climate [4]

Basics of the hydrological cycle and the global climate system. Fundamentals of surface water hydrology, hydrometeorology, evaporation, precipitation, statistical and probabilistic methods, unit hydrograph, and flood routing.

*Prerequisite: ENVE 020 or ESS 020. Letter grade only.*

### ENVE 112: Subsurface Hydrology [4]

Hydrologic and geologic factors controlling the occurrence and use of groundwater on regional and local scales. Physical, mathematical, geologic, and engineering concepts fundamental to subsurface hydrologic processes. Introduction to ground-water flow and transport modeling, with emphasis on model construction and simulation.

*Prerequisite: ENVE 110 or ESS 110. Offered spring only. Letter grade only.*

### ENVE 114: Mountain Hydrology of the Western United States [3]

Principles of snow formation, occurrence, and measurement; components of evapotranspiration; runoff generation; groundwater recharge processes; water resource assessments; and resource management. Focus on California and the southwestern US. Design project.

*Prerequisite: ENVE 110 or ESS 110. Offered spring only. Letter grade only.*

### ENVE 116: Applied Climatology [3]

Spatial and temporal patterns in climate and their association with land surface characteristics and processes. Methods for exploiting these for hypothesis testing, modeling, and forecasting. Applications include seasonal forecasting, ecological modeling, and analysis of processes such as flooding and wildfire.

*Prerequisite: ENVE 110, ESS 110 or consent of instructor.*

### ENVE 118: Global Change [4]

Detection of, adaptation to, and mitigation of global climate change. Climate-change science, sources, sinks, and atmospheric cycling of greenhouse gases. Societal context for implementing engineered responses. Assessment of options for responding to the threat of climate change.

*Prerequisite: CHEM 002. Discussion included.*

### ENVE 121: Environmental Microbiology [4]

Fundamentals of environmental microbiology: physiology, biochemistry, metabolism, growth energetics and kinetics, ecology, pathogenicity, and genetics, with application to both engineered and natural environmental systems. Specific applications to water, wastewater, and the environmental fate of pollutants.

*Prerequisite: BIO 001 and ENVE 020. Letter grade only. Laboratory included.*

### ENVE 130: Meteorology and Air Pollution [4]

Basic physics and thermodynamics of the atmosphere; fundamentals of atmospheric sciences important to environmental problems; chemistry and physics of atmospheric pollutants; visibility; air quality modeling; emissions; and air pollution control strategies.

*Prerequisite: ENVE 020 or ESS 020. Offered spring only. Letter grade only.*

### ENVE 132: Air Pollution Control [3]

Topics include government regulations, design and economics of air pollution control for point and spatial sources, strategies for regional air pollution control and engineering solutions. Air pollution control for both point and mobile sources is addressed in the context of case studies.

*Prerequisite: ENVE 130. Offered spring only. Letter grade only.*

### ENVE 140: Water Resources Planning and Management [3]

Quantitative analytical methods in water resources planning and management; introduction to systems analysis, multi-objective planning and risk assessment. Design Project.

*Prerequisite: ENVE 020 and ENGR 155. Letter grade only.*

### ENVE 152: Remote Sensing of the Environment [4]

Fundamentals of electromagnetic remote sensing, concepts of information extraction and applications pertinent to environmental engineering and earth systems science. Topics include remote sensing principles, aerial photography, photogrammetry, image interpretation, image processing, and applications of remote sensing in a range of environmental applications (e.g. water resource, terrestrial ecosystems, climate change and other environmental topics).

*Prerequisite: MATH 021 and PHYS 008. Offered fall only. Letter grade only. Laboratory included.*

### ENVE 155: Decision Analysis in Management [4]

Presents the tools of decision science using a quantitative approach with a focus on investment, finance, management, technology and policy decisions. These tools include decision tree analysis, risk and uncertainty analysis, stochastic dominance, the value of information, probability bias, and subjective probability.

*Prerequisite: (ECON 100 or MGMT 100) and (ECON 010 or POLI 010) or consent of instructor. Letter grade only.*

### ENVE 160: Sustainable Energy [4]

Current systems for energy supply and use. Renewable energy resources, transport, storage, and transformation technologies. Technological opportunities for improving end-use energy efficiency. Recovery, sequestration, and disposal of greenhouse gases from fossil-fuel combustion.

*Prerequisite: ENVE 020 or ESS 020. Offered fall only. Letter grade only.*

### ENVE 162: Modeling and Design of Energy Systems [3]

Concepts and applications of solar thermal processes; applications of solar collectors for water heating; active and passive building heating and cooling; fundamentals and design of wind energy systems; economics of solar energy.

*Prerequisite: ENGR 135 and ENGR 160 and ENVE 160. Offered spring only. Letter grade only.*

### ENVE 170: Contaminant Fate and Transport [3]

Properties and behavior of organic and metal contaminants, in soils, groundwater, surface waters, and air. Emphasis on phase transfer and transport for organic compounds; complexation and surface processes for metals. Topics include modeling of environmentally important compounds, photochemical reactions, natural organic matter, sorption phenomena.

*Prerequisite: ENVE 100 or ESS 100. Offered alternate years, fall only. Letter grade only.*

### ENVE 171: Environmental Organic Chemistry [3]

Processes governing the distribution and transformation of anthropogenic organic chemicals in the environment. Topics include

chemical-physical properties of organic chemicals, sorption processes, bioaccumulation, chemical transformations, photochemical transformations, modeling concepts.

*Prerequisite:* ENVE 100 or ESS 100 or consent of instructor. Offered fall only.

### ENVE 176: Water and Wastewater Treatment [3]

Water treatment, use, reclamation, and reuse. Introduction to modeling and designing treatment systems; both conventional and advanced technology. Use of mass balances for system evaluation and design. Design project.

*Prerequisite:* (ENVE 020 or ESS 020) and (ENVE 100 or ESS 100) and ENGR 120. Letter grade only.

### ENVE 181: Field Methods in Snow Hydrology [1 - 3]

Properties and measurement of snow. Principles of snow metamorphism and melting. Field workshops.

*Prerequisite:* ENVE 110 or ESS 110. Offered spring only. Pass/No Pass grading only.

### ENVE 182: Field Methods in Surface Hydrology [1 - 3]

Measurement and interpretation of data; stream gauging, hydrography, and limnology exercises; evaporation studies; micrometeorological instruments and methods; discharge measurement; flood plain mapping; preparation of hydrologic reports. Field workshops.

*Prerequisite:* ENVE 110 or ESS 110.

### ENVE 183: Field Methods in Subsurface Hydrology [1 - 3]

Introduction to fundamental field instruments used for vadose zone and subsurface field investigations. Analysis of groundwater wells and of a (hypothetical) contaminated site. Field workshops.

*Prerequisite:* ENVE 112. Offered fall only.

### ENVE 184: Field Methods in Environmental Chemistry [1 - 3]

Introduction to the fundamental field instruments used for environmental chemistry field investigations. Air, water, and soil sample collection and preservation procedures. Particle separation and analysis, ion selective electrodes, colorimetric assays for nutrients and metallic species, extraction of organic species. Experimental design, measurements, and interpretation of data.

*Prerequisite:* ENVE 100.

### ENVE 191: Professional Seminar [1]

Presentation and discussion of professional environmental and water resources engineering practices. Professional ethics and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.

### ENVE 192: Topics in Environmental Systems [1 - 6]

Examination of a topic in environmental engineering.

*May be repeated for credit.*

### ENVE 195: Upper Division Undergraduate Research [1 - 5]

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### ENVE 198: Upper Division Directed Group Study [1 - 5]

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### ENVE 199: Upper Division Individual Study [1 - 5]

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## ENVIRONMENTAL SYSTEMS

### ES 200: Environmental Systems [3]

Exploration of linkages in environmental systems and tools to evaluate important features of those systems. This is done by examining the characteristics of different Earth compartments (pedosphere, lithosphere, biosphere, atmosphere and hydrosphere) in terms of mass and energy balance, residence times and interactions. To provide a context, we examine how each of these compartments interacts with the global water cycle.

*Offered spring only. Letter grade only.*

### ES 202: Chemistry and Mineralogy of Soils [3]

Thermodynamics and kinetics of chemical process in soil systems. Topics include the formation and identification of common minerals, adsorption/desorption, precipitation/dissolution, and electrochemical reactions in soils. Graduate requirements include individual additional exercises and preparation of a research paper.

### ES 203: Geochemistry of Earth Systems [3]

Quantitative analysis of Earth systems using principles of thermodynamics, kinetics, and isotope geochemistry; solution-mineral equilibrium and phase relations; equilibrium and reactive transport approaches to modeling geochemical processes at ambient and elevated temperatures. Graduate requirements include individual student projects.

### ES 204: Organic Geochemistry [3]

Focus on organic chemical reactions in soils and sedimentary environments. Topics include the formation and weathering of natural organic matter and reactions of natural organic matter with pollutants. Graduate requirements include individual additional exercises and preparation of a research paper.

### ES 205: Watershed Biogeochemistry [3]

Movement, storage, and transformations involving water, nutrients, and solutes in natural and human impacted watersheds; biological and chemical processes; modeling of biogeochemical processes. Interactions of watersheds with lakes and streams. Graduate requirements include more in-depth investigation of one or more topics and preparation of paper.

### ES 206: Instructional Methods in Environmental Systems [3]

Instrumental analytical methods and quantitative analysis applied to the study of environmental materials, including inorganic, organic, and biological substances. Completion of an individual research project and preparation of a project report is required for graduate credit.

*Laboratory included.*

### ES 207: Environmental Data Analysis [3]

The objective of this class is to provide students with probabilistic and statistical methods to analyze environmental data. This class emphasizes both theoretical and applied aspects of data analysis methods. Weekly lab exercises are from environmental applications. Topics include: distribution, hypothesis test, linear regression, multiple regression, uncertainty analysis, outlier detection, sample design, and spatial and temporal data analysis.

*Letter grade only.*

### ES 208: Surface and Colloid Chemistry of Earth Materials [3]

Surface, colloid, and interfacial chemistry related to soil, environmental, and microbial applications; properties, energetics, and reactivity of surfaces and interfaces of Earth materials; the role of mineral surfaces in promoting and catalyzing chemical phenomena at phase boundaries. Graduate requirements include individual additional exercises and preparation of a research paper.

### ES 209: Chemistry and Mineralogy of Earth Materials [3]

Chemical principles, structure, and bonding of minerals and Earth materials, including crystallography (symmetry, space groups, group theory), coordination chemistry, bonding models (valence bond, crystal field, and MO theories), and electronic and magnetic properties.

*Prerequisite:* ESS 100, CHEM 010 or consent of instructor. May be repeated for credit.

### ES 212: Subsurface Hydrology [4]

Hydrologic and geologic factors controlling the occurrence and use of groundwater on regional and local scales. Physical, mathematical, geologic, and engineering concepts fundamental to subsurface hydrologic processes. Introduction to ground-water flow and transport modeling, with emphasis on model construction and simulation. Graduate requirements include completion of advanced analysis in problem sets, completion of a term paper or project, and development of project management skills in the course design project.

### ES 214: Mountain Hydrology of the Western United States [3]

Principles of snow formation, occurrence, and measurement; components of evapotranspiration; runoff generation; groundwater recharge processes; water resource assessments; and resource management. Focus on California and the southwestern US. Design project. Graduate requirements include more in-depth investigation of one or more topics and preparation of paper.

### ES 218: Global Change [4]

Detection of, adaptation to, and mitigation of global climate change. Climate-change science, sources, sinks, and atmospheric cycling of greenhouse gases. Societal context for implementing engineered responses. Assessment of options for responding to the threat of climate change. Graduate requirements include preparation of a detailed case analysis.

### ES 221: Environmental Microbiology [4]

Fundamentals of environmental microbiology: physiology, biochemistry, metabolism, growth energetics and kinetics, ecology, pathogenicity, and genetics, with application to both engineered and natural environmental systems. Specific applications to water, wastewater, and the

environmental fate of pollutants. Graduate requirements include additional projects.

**ES 224: Terrestrial Ecosystem Ecology [3]**

Ecosystem ecology is the study of interactions between organisms and their environment. Focus on energy, water and nutrient flows through the living (plants, animals, microbes) and nonliving (soils, atmosphere) components of ecosystems. We examine both natural and human-modified terrestrial ecosystems. Graduate requirements include preparation and peer review of a research proposal.

**ES 225: Microbial Ecology [4]**

Advanced study of microbiological systems and techniques. Graduate requirements include additional exercises and preparation of a research paper.

**ES 226: Environmental Genomics [4]**

Introduction to the principles and methods of genomics as applied to the understanding of ecosystems. Topics include population genetics, adaptation to environmental change, and genomic analysis of environmental microbial communities; experimental and computational methods relevant to environmental genomics. Graduate requirements include additional exercises and preparation of a research paper.

*Laboratory included.*

**ES 228: Ecological Modeling [3]**

An advanced study of modeling population dynamics and the flow of energy and matter in ecosystems. Graduate requirements include additional exercises and preparation of a research paper.

**ES 232: Applied Climatology [3]**

Spatial and temporal patterns in climate and their association with land surface characteristics and processes. Methods for exploiting these for hypothesis testing, modeling, and forecasting. Applications include seasonal forecasting, ecological modeling, and analysis of processes such as flooding and wildfire.

**ES 234: Air Pollution and Resources [3]**

Chemistry and physics of atmospheric pollutants, urban air pollution, visibility, mitigation, and resource economics.

*Prerequisite: ESS 100 or consent of instructor. May be repeated for credit once.*

**ES 235: Heat Transfer [4]**

Study of conduction, convection, and radiation heat transfer, with applications to engineering problems. Graduate requirements include in-depth investigation of one or more topics and preparation of paper.

*Laboratory included.*

**ES 236: Advanced Mass Transfer [4]**

Steady and unsteady mass diffusion; mass convection, simultaneous heat and mass transfer; Fick's law in a moving medium; similarity and integral methods in mass transfer; high mass transfer theory; research project in mass transport.

*Prerequisite: ES 235 or ENGR 135. Offered spring only. Letter grade only. May be repeated for credit once.*

**ES 237: Viscous Flows [4]**

Study of the Navier-Stokes equations; Stokes' problems; creeping flows; internal and external flows; similarity and integral methods in

boundary layer flows; stability and transition to turbulence.

*Prerequisite: ES 235 or ENGR 135. Offered fall only. Letter grade only. May be repeated for credit once.*

**ES 238: Air Pollution Control [3]**

Physical and chemical principles for the capturing of air pollutants. Design of air pollution controls devices for particulate and gaseous pollutants emitted from stationary and mobile sources. State and Federal Regulations for point, mobile and area sources. Economics aspects of air pollution control to meet ambient air quality standards. In case studies, particular issues are addressed as they relate to the San Joaquin Valley.

**ES 240: Water Resources Planning and Management [3]**

Basic concepts of and issues in water resources management, water resources planning, institutional and policy processes. Quantitative analytical methods in water resources planning and management; introduction to systems analysis, multi-objective planning, and risk assessment. Design project. Graduate requirements include preparation of a detailed case analysis.

**ES 252: Remote Sensing of the Environment [4]**

Fundamental and advanced concepts of electromagnetic remote sensing, information extraction and applications in environmental monitoring. Advanced topics include principles of image extraction, image correction, image enhancement, classification methods, and new development of sensor techniques. Reading materials and final research projects are required for graduate students.

*Prerequisite: Letter grade only. Laboratory included.*

**ES 260: Sustainable Energy [4]**

Current systems for energy supply and use. Renewable energy resources, transport, storage, and transformation technologies. Technological opportunities for improving end-use energy efficiency. Recovery, sequestration, and disposal of greenhouse gases from fossil-fuel combustion. Graduate requirements include preparation of a detailed case analysis.

**ES 262: Modeling and Design of Energy Systems [3]**

Concepts and applications of solar thermal processes; applications of solar collectors for water heating; active and passive building heating and cooling; fundamentals and design of wind energy systems; economics of solar energy. Graduate-level requirements include preparation of a detailed case analysis.

**ES 270: Contaminant Fate and Transport [3]**

Properties and behavior of organic and metal contaminants, in soils, groundwater, surface waters, and air. Emphasis on phase transfer and transport for organic compounds; complexation and surface processes for metals. Topics include modeling of environmentally important compounds, photochemical reactions, natural organic matter, sorption phenomena. Graduate-level requirements include preparation of a detailed case analysis.

**ES 291: Environmental Systems Seminar [1 - 3]**

Seminar on advanced engineering and science topics, environmental systems research, and relevant case studies.

*Offered fall and spring. Satisfactory/Unsatisfactory grading only. May be repeated for credit once.*

**ES 292: Topics in Environmental Systems [1 - 6]**

Treatment of a special topic or theme in environmental systems.

*May be repeated for credit in a different subject area.*

**ES 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**ES 298: Directed Group Study [1 - 12]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**ES 299: Directed Independent Study [1 - 12]**

Independent project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## EARTH SYSTEMS SCIENCE

**ESS 001: Introduction to Earth Systems Science [4]**

An introduction to basic principles of earth systems for non-science majors and prospective majors. A multidisciplinary approach that draws from geology, chemistry, physics, and biology to understand how the Earth functions as a complex system, and the role and impact of human beings on earth systems.

*Laboratory included.*

**ESS 005: Introduction to Biological Earth Systems [4]**

An introduction to basic principles of coupled biological and earth systems for non-science majors and prospective majors. An interdisciplinary approach that combines concepts from biology and earth science to understand how the Earth functions as a biological incubator, the origin and evolution of molecular life, the rise of complex biological and ecological earth systems, human impacts, and the sustainable Earth.

*Laboratory included.*

**ESS 010: Earth and Society [4]**

We are users and changers of our planet. We discuss the materials and resources our planet supplies to human society, the impact of natural disasters on human history and sociological development, and anthropogenic influences on climate, land use, and sustainable resources.

*Discussion included.*

**ESS 012: Geology of California [4]**

Introduction to the geology of California for non-science majors. A tour of the major geologic features of our state, its geologic hazards, and its

natural earth resources in the context of basic plate tectonics and earth science principles.

*Discussion included.*

#### **ESS 020: Fundamentals of Earth Processes [4]**

Introduction to Earth science with emphasis on physical and chemical processes that have shaped our planet through time; topics include plate tectonics, mountain building, mineral and rock formation, weathering, and landscape and soil formation. Weekly laboratories focus on the practical study of earth processes, materials, and history.

*Prerequisite: (ESS 001, ESS 005, BIO 001 or CHEM 002) and MATH 021. Laboratory included.*

#### **ESS 025: Introduction to Ecosystem Science [4]**

Fundamentals of ecosystem science; organization, function and development of ecological systems; energy and mass flow; biogeochemical cycling; biodiversity, population dynamics, and sustainability.

*Prerequisite: (ESS 001, ESS 005 or BIO 001) and MATH 021 and PHYS 008. Laboratory included.*

#### **ESS 040: Air Quality, Air Resources and Environmental Health [4]**

A survey of principles and issues related to air quality and resources from global to regional scales, including evolution of the earth's atmosphere, urban smog formation, visibility, acid rain, stratospheric and tropospheric ozone, effects of meteorology on air pollution, air pollution transport across political boundaries, and health effects of exposure to air pollution.

*Discussion included.*

#### **ESS 050: Ecosystems of California [4]**

An introduction to ecological principles and processes through the examination of California's varied ecosystems; discussion of native and invasive species, land use, human impacts, and biodiversity; two Saturday field trips to a variety of California habitats.

*Discussion included.*

#### **ESS 060: Global Environmental Change [4]**

History, causes, and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial ecosystems; geologic evidence for glacial cycles and climate changes, modern marine and atmosphere circulation, greenhouse gases, deforestation and species extinctions, and human population growth and impacts on climate and resources.

*Discussion included.*

#### **ESS 070: Soil Foundations of Terrestrial Ecosystems [4]**

Examines the physical, chemical and biological properties of soils that influence terrestrial and freshwater ecosystems. Topics include processes that control soil formation, evolution, development, and chemical properties. Particular emphasis is placed on the quantitative descriptions of energy nutrient and contaminant fluxes into, out of and through soils.

*Prerequisite: (ESS 001 or BIO 001) and CHEM 002. Fieldwork and discussion included.*

#### **ESS 090X: Freshman Seminar [1]**

Examination of a topic in earth systems science. Pass/No Pass grading only.

#### **ESS 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **ESS 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **ESS 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **ESS 100: Environmental Chemistry [4]**

Chemical principles of Earth and environmental systems focusing on environmental processes in water, soil, and air. Emphasis on acid-base chemistry, aqueous speciation, mineral and gas solubility, oxidation and reduction, and isotopes.

*Prerequisite: CHEM 010 and (MATH 022 or PHYS 008). Laboratory included.*

#### **ESS 102: Chemical Processes in the Soil Environment [3]**

Thermodynamics and kinetics of chemical process in soil systems. Topics include the formation and identification of common minerals, adsorption/desorption, precipitation/dissolution, and electrochemical reactions in soils.

*Prerequisite: ENVE 100 or ESS 100. Letter grade only.*

#### **ESS 103: Geochemistry of Earth Systems [3]**

Quantitative analysis of earth systems using principles of thermodynamics, kinetics, and isotope geochemistry; solution-mineral equilibrium and phase relations; equilibrium and reactive transport approaches to modeling geochemical processes at ambient and elevated temperatures.

*Prerequisite: ENVE 100 or ESS 100. Letter grade only.*

#### **ESS 104: Organic Geochemistry [3]**

Focus on organic chemical reactions in soils and sedimentary environments. Topics include the formation and weathering of natural organic matter and reactions of natural organic matter with pollutants.

*Prerequisite: ENVE 100 or ESS 100. Letter grade only.*

#### **ESS 105: Watershed Biogeochemistry [3]**

Movement, storage, and transformations involving water, nutrients, and solutes in natural and human impacted watersheds; biological and chemical processes; modeling of biogeochemical processes. Interactions of watersheds with lakes and streams.

*Prerequisite: (ENVE 100 or ESS 100) and (ENVE 110 or ESS 110). Letter grade only.*

#### **ESS 106: Instrumental Methods in Environmental Systems [3]**

Instrumental analytical methods and quantitative analysis applied to the study of environmental materials, including inorganic, organic, and biological substances.

*Prerequisite: ENVE 100, ESS 100 or CHEM 010. Laboratory included.*

#### **ESS 108: Surface and Colloid Chemistry of Earth Materials [3]**

Surface, colloid, and interfacial chemistry related to soil, environmental, and microbial applications; properties, energetics, and reactivity of surfaces and interfaces of Earth materials; the role of mineral surfaces in promoting and catalyzing chemical phenomena at phase boundaries.

*Prerequisite: ENVE 100 or ESS 100. Letter grade only.*

#### **ESS 109: Inorganic Chemistry of Earth's Materials [3]**

Chemical principles, structure, and bonding of minerals and Earth materials, including crystallography (symmetry, space groups, group theory), coordination chemistry, bonding models (valence bond, crystal field, and MO theories), and electronic and magnetic properties.

*Prerequisite: ESS 100, ENVE 100 or CHEM 010.*

#### **ESS 110: Hydrology and Climate [4]**

Basics of the hydrological cycle and the global climate system. Fundamentals of surface water hydrology, hydrometeorology, evaporation, precipitation, statistical and probabilistic methods, unit hydrograph, and flood routing.

*Prerequisite: ENVE 020 or ESS 020. May be repeated for credit once.*

#### **ESS 112: Subsurface Hydrology [4]**

Hydrologic and geologic factors controlling the occurrence and use of groundwater on regional and local scales. Physical, mathematical, geologic and engineering concepts fundamental to subsurface hydrologic processes. Introduction to ground-water flow and transport modeling, with emphasis on model construction and simulation.

*Prerequisite: ENVE 110 or ESS 110. Letter grade only.*

#### **ESS 120: Introduction to Ecological and Environmental Microbiology [4]**

Fundamentals of microbiology in ecological and environmental systems, including the distribution of microbial diversity throughout terrestrial, extreme, and marine environments; microbial control of global biogeochemical cycles; and environmental services provided by microorganisms. Both classical and contemporary biochemical, molecular, and genomic approaches to microbial physiology, metabolism, and ecology will be discussed.

*Prerequisite: CHEM 010 and (ESS 001, BIO 001 or ENVE 020) or consent of instructor. Discussion included.*

#### **ESS 124: Terrestrial Ecosystem Ecology [4]**

Ecosystem ecology is the study of interactions between organisms and their environment. Focus on energy, water and nutrient flows through the living (plants, animals, microbes) and nonliving (soils, atmosphere) components of ecosystems. Examines both natural and human-modified terrestrial ecosystems.

*Prerequisite: Junior standing and BIO 148 or ESS 025 or consent of instructor. Letter grade only.*

#### **ESS 125: Microbial Ecology [4]**

Advanced study of microbiological systems and techniques.

*Prerequisite: ESS 120. Letter grade only. Laboratory included.*

**ESS 126: Environmental Genomics [4]**

Introduction to the principles and methods of genomics as applied to the understanding of ecosystems. Topics include population genetics, adaptation to environmental change, and genomic analysis of environmental microbial communities; experimental and computational methods relevant to environmental genomics.

*Prerequisite:* BIO 141 or ESS 120. Letter grade only. Laboratory included.

**ESS 128: Theoretical Ecology [4]**

Advanced study of the application of theoretical and quantitative methods for the analysis and interpretation of populations, communities and ecosystems.

*Prerequisite:* MATH 022 and BIO 145. Letter grade only. Discussion included.

**ESS 131: Atmospheric Chemistry and Physics [4]**

Chemistry and physics of the troposphere and stratosphere, including atmospheric aerosols.

*Prerequisite:* (ESS 020 or ENVE 020) and CHEM 008 and PHYS 009. Discussion included.

**ESS 132: Applied Climatology [3]**

Spatial and temporal patterns in climate and their association with land surface characteristics and processes. Methods for exploiting these for hypothesis testing, modeling, and forecasting. Applications include seasonal forecasting, ecological modeling, and analysis of processes such as flooding and wildfire.

*Prerequisite:* ENVE 110, ESS 110 or consent of instructor. Laboratory included.

**ESS 134: Air Pollution and Resources [3]**

Chemistry and physics of atmospheric pollutants, urban air pollution, visibility, mitigation, and resource economics.

*Prerequisite:* ESS 100 or ENVE 100.

**ESS 141: Environmental Science Policy [4]**

In depth-analysis of environmental case studies. Focus on science critical to policy development and implementation, the policy-making process, and policy outcomes. Special emphasis on interaction between scientific information and policy-making. Example topics include Western water resources, biodiversity conservation, and global warming. Emphasis on written and oral communication and critical analysis.

*Prerequisite:* Any course in BIO, ESS, ENVE, POLI or ECON and WRI 010. Discussion included.

**ESS 147: Astrobiology [4]**

Astrobiology refers to the study of the origin and evolution of life in the cosmos. It is an integrative, multidisciplinary field that includes areas of biology, astronomy, geology, chemistry and physics. Students in the class face some of the most fundamental topics addressed by science today such as who we are, where we came from, and where we might go. We cover three main themes: How did life begin and evolve? Does life exist elsewhere in the universe? What is life's future on Earth and beyond?

*Prerequisite:* CORE 001 and (BIO 001, BIO 005, PHYS 006, CHEM 002 or ESS 001) or consent of instructor. Letter grade only. Discussion included.

**ESS 148: Fundamentals of Ecology [4]**

Introduction to the principles of ecology at population, community, ecosystem, landscape, and global scales.

*Prerequisite:* BIO 001, BIO 005, ESS 001 or ESS 005 or consent of instructor. Letter grade only. Fieldwork and discussion included.

**ESS 149: Conservation Biology [4]**

Detailed examination of the evolutionary, ecological, management, and policy issues related to the conservation of ecosystems, species, and genetic diversity. Theory and practical aspects of biological conservation are presented, with special reference to case studies from California.

*Prerequisite:* BIO 001 and (MATH 018 or MATH 032). BIO 148 recommended. Letter grade only. Discussion included.

**ESS 150: Geomorphology and Surface Processes [4]**

Observation and analysis of earth surface processes and the development of landforms and landscape. The interaction between surficial processes and tectonic, biologic, hydrologic, climatic, and atmospheric processes. Evaluation of environmental hazards and engineering solutions.

*Prerequisite:* ESS 020 or ENVE 020. Laboratory included.

**ESS 180: Field Methods in Earth Systems [4]**

Field techniques in chemistry, hydrology, geology, ecology, and microbiology, emphasizing principles of measurement, observation, and interpretation; integration of diverse data sets.

*Prerequisite:* CHEM 010 and (MATH 022 or PHYS 008). Fieldwork and laboratory included.

**ESS 190: Undergraduate Seminar [1]**

Weekly seminar of current topics in earth and environmental systems.

*Prerequisite:* Junior standing.

**ESS 192: Topics in Environmental Systems [1 - 6]**

Treatment of a special topic or theme in Environmental Systems. May be repeated for credit in a different subject area.

*Prerequisite:* Junior standing or consent of instructor. May be repeated for credit.

**ESS 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**ESS 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**ESS 199: Upper Division Individual Study [1 - 5]**

*Prerequisite:* Junior standing. Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.

## FRENCH

No credit is allowed for completing a less advanced course after successful completion of a more advanced course in the foreign languages. This applies only to lower division foreign language courses, not upper division courses.

**FRE 001: Elementary French I [4]**

Introduction to speaking, reading, writing and understanding French. Classes conducted in French.

*Letter grade only.*

**FRE 002: Elementary French II [4]**

Introduction to speaking, reading, writing and understanding French. Classes conducted in French.

*Prerequisite:* FRE 001 or appropriate score on French placement test. Letter grade only.

**FRE 003: Intermediate French I [4]**

A review of French grammar with emphasis on building speaking and writing skills and on reading to build cultural understanding. Classes conducted in French.

*Prerequisite:* FRE 002 or appropriate score on French Placement Exam. Letter grade only.

**FRE 004: Intermediate French II [4]**

A review of French grammar with emphasis on building speaking and writing skills and on reading to build cultural understanding. Classes conducted in French.

*Prerequisite:* FRE 003 or appropriate score on French Placement Exam. Letter grade only.

**FRE 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**FRE 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**FRE 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**FRE 103: French Composition and Conversation [4]**

This course will develop students' abilities to communicate in spoken and written French at an advanced level. The course emphasizes the importance of the interaction between writer, reader, purpose and message. FRE 103 focuses on the four major modes of writing and oral practice.

*Prerequisite:* FRE 004 or appropriate score on French Placement Exam. Letter grade only.

## GLOBAL ARTS STUDIES PROGRAM

**GASP 001: Introduction to Global Arts Studies [4]**

Study of global arts with an integrated approach that examines visual arts, music, and a variety of other subjects offered by the Global Arts Studies Program.

*Letter grade only.*

**GASP 002: Introduction to Music Studies [4]**

Explores the fundamentals of music through various idioms, genres and traditions.

*Letter grade only.*



**GASP 003: Introduction to Visual Culture [4]**

An introduction to visual material in art and mass media from cultures throughout the world. Emphasizes the development of students' own critical skills in analyzing and understanding visual culture. Topics include artworks from the antiquity to postmodernism, as well as issues in mass media, pop culture, and cyberspace.

*Letter grade only.*

**GASP 004: Introduction to Arts and Cultural Studies [4]**

Introduction to a range of debates in cultural studies concerned with the impact race, gender, sexuality and class, for example, exert on cultural production, cultural identity and representation and/or aesthetics.

*Letter grade only.*

**GASP 005: Introduction to Arts and Technology [4]**

Familiarizes students with academic debates regarding the relationship between technology writ large and artistic production, distribution and consumption—as well as creation, critique and pleasure.

*Letter grade only.*

**GASP 012: Asia Pacific Art [4]**

Introduces students to the artistic traditions of cultures within Asia and/or the Pacific Ocean region.

*Letter grade only.*

**GASP 013: Latin American Art [4]**

Introduces students to the artistic traditions of Latin American cultures.

*Letter grade only.*

**GASP 021: Ethnomusicology [4]**

Introduces and familiarizes students with the theoretical and methodological issues and concerns in the field of ethnomusicology.

*Letter grade only.*

**GASP 023: Music of Asia Pacific [4]**

Introduces and familiarizes students with a musical tradition from Asia and/or the Pacific Ocean.

*Letter grade only.*

**GASP 025: Music of the Middle East [4]**

Introduces and familiarizes students with a musical tradition from the Middle East.

*Letter grade only.*

**GASP 031: Critical Popular Music Studies [4]**

Introduces students to current concerns in critical popular music studies, including issues of identity (e.g., race, gender) and representation. Students learn a variety of theories used in critical analyses of popular music. They also learn various methodological approaches used to research popular music.

*Letter grade only.*

**GASP 034: The American Musical [4]**

Explores the relationship between the American musical and American-ness. Ideas about what it means to be an American have been expressed on the musical stage and have both reflected and helped form those ideas. Readings help link ideas about America and Americans as well as the

historical contexts for the songs and narratives of the musicals.

*Letter grade only.*

**GASP 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**GASP 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**GASP 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**GASP 101: Visual Arts of the Twentieth Century [4]**

Surveys major artists and ideas in the twentieth century with a global perspective. Students read pertinent critical theories and examine artworks from around the world in their cultural, social and political contexts.

*Letter grade only.*

**GASP 102: Asian American Art [4]**

Examines the artistic production of American artists of Asian descent (both foreign and U.S. born). This class provides an overview of these artists' works in relation to issues of diaspora, immigration policies, social and civic engineering, racial relations, as well as formal and stylistic developments.

*Prerequisite: Junior standing. Letter grade only.*

**GASP 135: African American Music [4]**

Focuses on a central question: how do we locate African American music, i.e., how can we define African American music? In attempting to answer this question, we think through concepts such as authenticity, representation, recognition, cultural ownership, appropriation, origin(s).

*Prerequisite: Junior standing. Letter grade only.*

**GASP 141: History and Practice of Photography [4]**

In this course students examine critical texts on the history and theory of photography, study the work of photographers from diverse backgrounds, and investigate cultural and sociopolitical issues in photographic practice and production. Students will also learn some basic techniques of taking photographs through various in-class exercises and assignments.

*Prerequisite: Sophomore standing and any lower-division GASP or ARTS course. Letter grade only.*

**GASP 151: Topics in Visual Culture [4]**

Special topics in the study of visual culture in a global context.

*Prerequisite: Junior standing. Letter grade only.*

**GASP 152: Topics in Music Studies [4]**

Focuses on a combination of individual and group research projects in music studies.

*Prerequisite: Junior standing. Letter grade only.*

**GASP 175: Race and Nationalism in American Art [4]**

Addresses issues concerning pictorial representations of racial and national identities in twentieth-century American art through readings of historical, cultural, and sociopolitical

documents and theories. Special emphasis is placed on artists who are considered outside the canon and on debates relating to assimilation and nationalism.

*Prerequisite: Junior standing and GASP 001 or consent of instructor. Letter grade only.*

**GASP 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**GASP 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**GASP 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## GEOGRAPHY

**GEOG 010: Introduction to Spatial Analysis [4]**

Teaches the value of geography as a basis for organizing and discovering information; the nature and meaning of maps, and the concepts and tools for spatial analysis: the description, organization, linkage, manipulation and communication of geographical information.

*Discussion included.*

**GEOG 141: Environmental Science and Policy [4]**

In depth-analysis of environmental case studies. Focus on science critical to policy development and implementation, the policy-making process and policy outcomes. Special emphasis on interaction between scientific information and policy-making. Example topics include Western water resources, biodiversity conservation and global warming. Emphasis on written and oral communication and critical analysis.

*Prerequisite: Any course in BIO, ESS, ENVE, POLI or ECON or consent of instructor. Discussion included.*

**GEOG 142: Geography of Resource Management [4]**

Climate and biogeography of Western US relevant to Forestry, Fire, and Water Resources management introduced via the writings of 19th Century explorers and surveyors of the West and recent scientific literature. Analyze role of climate and biogeographic information in public resource management policy debates of 1870s-1910s versus present day. Geographic perspective on long term repercussions of early 20th Century resource management policy choices.

*Prerequisite: Any course in HIST, LIT, PUBP, BIO, ENVE or ESS or consent of instructor. Discussion included.*

## HUMAN BIOLOGY

**HBIO 190: Research Seminar [1]**

Student-led presentations of current topics in human biology, including independent research presentations.

*Prerequisite: Junior standing. Permission of instructor required.*

**HBIO 195: Research Project in Human Biology [1 - 5]**

Group or individual research projects in human biology under the direction of a BIO faculty member and a faculty member from the School of Social Sciences, Humanities and the Arts.

*Prerequisite: Junior standing. Permission of instructor required. May be repeated for credit.*

**HBIO 198: Directed Group Study in Human Biology [1 - 5]**

Group directed study in human biology under the direction of a BIO faculty member and a faculty member from the School of Social Sciences, Humanities and the Arts.

*Prerequisite: Junior standing. Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**HBIO 199: Directed Independent Study in Human Biology [1 - 5]**

Independent study in human biology under the direction of a BIO faculty member and a faculty member from the School of Social Sciences, Humanities, and the Arts.

*Prerequisite: Junior standing. Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## HISTORY

**HIST 005: History of Cartography [4]**

Interpretation of historical maps from East Asia, the Islamic world, Europe, and indigenous societies, and the relationship of map making traditions to state power, science, religion, and other areas of thought and practice. The final unit of the course addresses GIS and mapping in the computer age.

**HIST 010: Introduction to World History to 1500 [4]**

World History from the origins of civilization to the European encounter with the Americas. Major topics include the growth of human populations, the rise of empires and states, routes of trade and migration, the spread of ideas and religions, and the impact of human settlement upon the natural world.

*Letter grade only. Discussion included.*

**HIST 011: Introduction to World History Since 1500 [4]**

World history from the European encounter with the Americans to the present century. Major topics include colonization and decolonization, the rise of modern imperialism, capitalism and its opponents, urbanization and mass communication, technologies for war and peace, and the impact of human settlement upon the natural world.

*Prerequisite: HIST 010 or consent of instructor. Discussion included.*

**HIST 016: Forging of the United States, 1607-1877 [4]**

The history of the U.S. from colonial roots through the Civil War and Reconstruction. Major topics include the coming of the Revolution, the impact of slavery on the development of the United States, westward expansion, and the creation of a distinctively American culture.

*Discussion included.*

**HIST 017: The Modern United States, 1877-Present [4]**

The history of the United States from the Gilded Age through the early 21st century. Major topics include the impact of the Industrial Revolution on American life, the rise of the U.S. to a world power, the changing role of the federal government, and the ongoing struggle for civil rights.

*Discussion included.*

**HIST 020: History of the American West 1500 - 1849 [4]**

An exploration of the idea of the west as it developed in the United States from Columbus to the advent of Gold Rush California. Emphasis will be upon the age of exploration and discovery, the notion of the frontier, and the impact of westward expansion upon the colonizer as well as the indigenous people of the west.

*Discussion included.*

**HIST 021: History of the American West, 1850-2000 [4]**

The history of the idea of the west in the United States from the aftermath of the California Gold Rush to the rise of the Silicon Valley. Emphasis is upon the various roles that technology and the modern notion of the frontier played in the settlement and exploitation of the west before and after the Civil War.

*Prerequisite: HIST 020. Discussion included.*

**HIST 025: Introduction to Environmental History [4]**

This course studies the interaction between environment and society, focusing on climate change and environmental degradation. This course will look at examples from historical cases including China, the Roman Empire, the Middle East and Medieval Europe, focusing on the effects of famine, resource depletion and migration.

*Discussion included.*

**HIST 030: Early European History [4]**

A survey of the economic, social/cultural, and political history of Europe from the emergence of early societies to the advent of modern Europe.

*Discussion included.*

**HIST 031: Modern European History [4]**

A survey of the economic, social/cultural and political history of Europe from the early modern era to the present day.

*Discussion included.*

**HIST 060: The Silk Road [4]**

For millennia, monks, merchants, warriors and brides traveled a network of routes throughout Eurasia, exchanging religious beliefs, disease pathogens, foodstuffs and luxury goods. This interdisciplinary and multi-media course examines the Silk Road through maps, art, travel narratives, archaeological reports, and other genres.

*Prerequisite: HIST 010 or HIST 011 or consent of instructor.*

**HIST 070: History of Islam I: From Muhammad to the Caliphate [4]**

Fundamental principles of the Islamic religion, the emergence of Islam under the Prophet Muhammad, and the expansion of Islam under the First Four Caliphs to 661 A.D. Students examine Islam as a religion, a historical phenomenon, and a cultural impulse.

*Discussion included.*

**HIST 071: History of Islam II: From the Caliphate to the Present [4]**

Covers the spread of Islam from the end of the Era of Rightly Guided Caliphs (661 AD) until the present, including Islamic empires, art and culture, colonization and the contemporary Muslim world; and cultural and political contacts between Islam and the West.

*Discussion included.*

**HIST 090X: Freshman Seminar [1]**

Examination of a topic in history.

*May be repeated for credit.*

**HIST 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**HIST 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**HIST 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**HIST 100: The Historian's Craft [4]**

Focuses upon the various techniques of research and writing used by historians, from Thucydides to the so-called revisionists of today's "culture wars," and the changing audience of the historian.

*Prerequisite: Junior standing or consent of instructor.*

**HIST 108: Topics in World History [4]**

Topics in the field of World History. May be repeated twice with different topics.

*Prerequisite: HIST 010 and HIST 011 or consent of instructor. Letter grade only. May be repeated for credit twice with different topics.*

**HIST 109: Topics in the History of Science and Technology [4]**

Addresses the relationship between historical change and significant scientific or technological developments. Possible areas include technologies of war, scientific revolutions, agricultural intensification, hydrology or other topics as determined by the instructor.

*Prerequisite: (HIST 010 and HIST 011) or (HIST 016 and HIST 017) or HIST 100 or consent of instructor. Letter grade only. May be repeated for credit twice with different topics.*

**HIST 110: Climate Change and World History [4]**

Draws upon both environmental science and history to examine how the rise and fall of civilizations; the evolution of farming, pastoralism, and trade; the course of wars, and patterns of migration have been affected by fluctuations in temperature and rainfall. It also examines how humans have contributed to climate change.

*Prerequisite: One lower-division HIST or ESS recommended.*

**HIST 111: The Legacy of Genghis Khan [4]**

This course will examine Genghis Khan's life and legacy in Asia and the world, emphasizing topics such as the life of the Khan, Mongol military

tactics, economic and trade policies, international relations, the interaction between nomadic and settled peoples, pre-modern state formation, and Mongol-influenced artistic and literary achievements.

*Prerequisite:* (HIST 010 and HIST 011) or (HIST 016 and HIST 017). Letter grade only.

#### **HIST 112: History of Islamic Art and Architecture [4]**

This course studies the cultural history of Islamic societies as expressed by their art and architecture from the 7th century to the present. Changes in artistic styles, architectural advances and expression of the written word will be compared across time and geography in social context.

*Prerequisite:* Any course in HIST or consent of instructor

#### **HIST 116: History of Decolonization in the Twentieth Century [4]**

This class will explore the ways that decolonization shaped the political, social, and economic landscape of the late twentieth century. Case studies of colonies throughout the world, and of imperial responses to decolonization, will illustrate the changing relationships among empires and subject peoples seeking self-determination.

*Prerequisite:* HIST 010 or HIST 011.

#### **HIST 117: Topics in Regional or State History [4]**

In-depth study of a particular topic in the history of a region or state. Possible topics include the social, cultural, economic, or political history of that region or state. May be repeated for credit twice with different topics.

*Prerequisite:* (HIST 010 and HIST 011) or (HIST 016 and HIST 017) or HIST 100 or consent of instructor. May be repeated for credit twice with different topics.

#### **HIST 118: Topics in Environmental History [4]**

In-depth study of a particular topic in environmental history. Possible topics include the impact of industrialization upon the natural world, the changing notion of "wilderness," the role of national parks, California's "water wars," and others.

*Prerequisite:* (HIST 010 and HIST 011) or (HIST 016 and HIST 017) or HIST 100 or consent of instructor. May be repeated for credit twice with different topics.

#### **HIST 119: Topics in the History of Migration and Immigration [4]**

In-depth study of a particular topic in the history of migration and/or immigration. Possible topics include the origins and history of America's culturally diverse population with a focus upon the experiences of European, Native, African, Chicano/Latino and Asian Americans. May be repeated twice with different topics.

*Prerequisite:* (HIST 010 and HIST 011) or (HIST 016 and HIST 017) or HIST 100 or consent of instructor. May be repeated for credit twice with different topics.

#### **HIST 120: Essence of Decision: Case Studies in History [4]**

Examines the art and science of decision-making with specific examples from historical case studies. The focus is upon the historical determinates of both successful and unsuccessful

decisions, and upon decisions that had both foreign policy and domestic implications.

*Prerequisite:* HIST 016 and HIST 017 or consent of instructor.

#### **HIST 124: African American History from Slavery to Civil Rights [4]**

Examines the history of African Americans from the era of slavery through emancipation, Jim Crow segregation, and the Civil Rights and Black Power movements. Topics include the development of a distinct African American culture as well as political movements ranging from abolitionism to black nationalism.

*Prerequisite:* Junior standing or consent of instructor. Lower division survey in American literature or history recommended. Letter grade only.

#### **HIST 128: The United States and the Vietnam War [4]**

Examines the roots and conduct of the war from the initial American involvement after World War II through the withdrawal of American troops in 1973. Additionally, students explore the way in which the war both reflected and amplified divisions within American society during this period.

*Prerequisite:* HIST 016 or HIST 017 or consent of instructor.

#### **HIST 130: The Cold War, 1941-1991 [4]**

The political, cultural, and intellectual history of America's confrontation with Communist at home and abroad, from U.S. entry into the Second World War to the collapse of the Soviet Union and its aftermath.

*Prerequisite:* HIST 016 and HIST 017 or consent of instructor.

#### **HIST 131: Topics in National History: "Manifest Destiny:" The United States and the World, 1840s-Present [4]**

Beginning with the Mexican-American war and the conquest of the West, this seminar examines the way in which the U.S. has aggressively expanded its role on the world stage. Major themes include the impact of economics and religion and ongoing debates over globalization and imperialism.

*Prerequisite:* (HIST 010 and HIST 011) or (HIST 016 and HIST 017) and HIST 100 or consent of instructor. HIST 100 may be taken concurrently. May be repeated for credit.

#### **HIST 132: Intelligence and National Security, 1945-2000 [4]**

Focuses upon the roles that intelligence and espionage have played in U.S. national security since 1945. A particular emphasis lies in those historical instances where technical intelligence had a part in resolving, or avoiding, major Cold War crises.

*Prerequisite:* HIST 016 and HIST 017 or consent of instructor.

#### **HIST 134: History and Literature of the Great Depression [4]**

Focusing on the turbulent decade of the 1930s, we use the lens of history and literature to explore how events from 1929 -1941 helped shape modern America. Particular attention is paid to the impact of these years upon California and the West.

*Prerequisite:* Junior standing and LIT 020, LIT 021, HIST 016 or HIST 017. Letter grade only.

#### **HIST 135: History and Literature of the 1960s [4]**

Examines American politics, culture, and society in the 1960s. Topics include civil rights, feminism, the Vietnam War, the Beat and other counterculture movements, and the sexual revolution.

*Prerequisite:* LIT 030, LIT 031, HIST 016 or HIST 017. Letter grade only.

#### **HIST 139: Topics in United States History [4]**

Topics in the History of the United States.

*Prerequisite:* HIST 016 and HIST 017 or consent of instructor. May be repeated for credit twice with different topics.

#### **HIST 150: The Cold War, 1941-1991 [4]**

The political, cultural, and intellectual history of America's confrontation with Communism at home and abroad, from U.S. entry into the second World War to the collapse of the Soviet Union and its aftermath.

*Prerequisite:* HIST 016 and HIST 017 or consent of instructor.

#### **HIST 165A: China in the Ancient World [4]**

This course introduces the history of ancient China. It begins with the emergence of lifeways associated with farming and pastoralism. It covers kingship and empire, philosophy, religion, and the interactions between China and its neighbors. It ends with the reunification of China under the Sui dynasty in the sixth century.

*Prerequisite:* Any course in HIST or consent of instructor.

#### **HIST 165B: From Tang to Song: China in the Medieval World [4]**

From the seventh to the fourteenth century, China was the world's most powerful and technologically sophisticated society. This course examines the history of middle period China in the context of the Eurasian world. By emphasizing primary sources we will see how people envisioned their world.

*Prerequisite:* Any course in HIST or consent of instructor.

#### **HIST 165C: Late Imperial China [4]**

This course introduces late imperial Chinese history. It begins with the Mongol conquest and its impacts. It explores Ming contraction and resurgence, the Manchu Qing and their ethnically hybrid state, the eighteenth century golden age, and the decline of empire in the context of Japanese and European imperialism.

*Prerequisite:* Any course in HIST or consent of instructor.

#### **HIST 165D: China in the Modern World [4]**

This course covers the history of modern China. It begins with the decline of the Chinese empire in the nineteenth century, describes the twentieth century Republican and Communist revolutions, and charts the emergence of China as a twenty-first century world power.

*Prerequisite:* Any course in HIST or consent of instructor.

#### **HIST 170: Law and Society In England 1066-1800 [4]**

An examination of the social, political and cultural factors shaping the development of English law and constitutional practice from the Norman Conquest until the 19th century.

Attention to both the daily practice of law and constitutional principles.

*Prerequisite:* HIST 010 and HIST 011 or junior standing. Letter grade only.

#### **HIST 171: Modern European Intellectual History [4]**

Examines the ideas and ideologies which transformed modern Europe: the French Revolution, nationalism, totalitarianism, the world wars, and the Cold War. Throughout, we place the major (and lesser) figures of the modern European intellectual scene in relation (or contrast) to the political and social scene in which they found themselves.

*Prerequisite:* HIST 030 or HIST 031 or consent of instructor.

#### **HIST 172: Europe and the Early Modern Atlantic World [4]**

Survey of Europe's involvement in the Atlantic, including the process of colonizing the Americas, the development of the slave trade, and the European response to both Africa and American colonies.

*Prerequisite:* (HIST 010 and HIST 011) or (HIST 016 and HIST 017) or consent of instructor. Letter grade only.

#### **HIST 179: Topics in European History [4]**

In-depth study of a particular topic in the history of Europe. Possible topics include the social, cultural, economic, or political/diplomatic history of Europe.

*Prerequisite:* (HIST 010 and HIST 011) or (HIST 030 and HIST 031) or consent of instructor. May be repeated for credit twice with different topics.

#### **HIST 190: Applied Research [4]**

Directed individual or group project designed around either an internal UCM faculty-directed research project or that of external agency in an area of vital public interest. End product may be in the form of a written report, interpretive text for the public, web site, etc. Extensive writing is required.

*Prerequisite:* Junior standing and HIST 100.

#### **HIST 191: Senior Thesis [4]**

Capstone course for majors. Completion of a senior thesis. Extensive writing required.

*Prerequisite:* Senior standing and HIST 190.

#### **HIST 193: Advanced Thesis Research [4]**

Advanced thesis research. Part of a two-semester sequence. Recommended for students considering graduate school in History. Extensive writing required. Permission of instructor required.

*Prerequisite:* Senior standing and HIST 190. Permission of instructor required.

#### **HIST 194: Honors Thesis [4]**

Students write a 50-100 page Honors thesis under the supervision of a faculty mentor.

*Prerequisite:* Senior standing and HIST 193. Permission of instructor required.

#### **HIST 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **HIST 196: Internship in History [4]**

Oversight and structure for a student's internship in a field related to History. Students are required

to write an original research paper based on the internship.

*Prerequisite:* Junior standing. Permission of instructor required. Pass/No Pass grading only. May be repeated for credit twice.

#### **HIST 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **HIST 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **HIST 200: The Uses and Abuses of the Past: History's Role in Society [4]**

Examines the role of history, and the historian, in modern American society. Topics to be considered include the various potential roles of the historian as writer and biographer, curator, social critic, ethicist, and the phenomenon of "history for hire."

#### **HIST 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **HIST 298: Directed Group Study [1 - 12]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

#### **HIST 299: Directed Independent Study [1 - 12]**

Independent project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## INTEGRATED CALCULUS AND PHYSICS

#### **ICP 001A: Integrated Calculus and Physics: Calculus Component [4]**

Introduction to differential and integral calculus of a single variable together with an introduction to kinematics and dynamics. For the most part, we cover the same subject material as Math 21 and Phys 8, but the structure of the course is designed to teach the two subjects in a cohesive fashion, emphasizing their historic and logical connections. Students receive a separate grade for the calculus component (ICP 001A) and the physics component (ICP 001B). ICP 001B must be taken concurrently.

*Prerequisite:* MATH 005 or equivalent score on the Math Placement Exam. Laboratory included.

#### **ICP 001B: Integrated Calculus and Physics: Physics Component [4]**

Introduction to differential and integral calculus of a single variable together with an introduction to kinematics and dynamics. For the most part, we cover the same subject material as Math 21 and Phys 8, but the structure of the course is designed to teach the two subjects in a cohesive fashion, emphasizing their historic and logical connections. Students receive a separate grade for the calculus component (ICP 001A) and the physics component (ICP 001B). ICP 001A must be taken concurrently.

*Prerequisite:* MATH 005 or equivalent score on the Math Placement Exam. Laboratory included.

## JAPANESE

No credit is allowed for completing a less advanced course after successful completion (C- or better) of a more advanced course in the foreign languages. This applies only to lower division foreign language courses, not upper division courses.

#### **JPN 001: Elementary Japanese I [4]**

Introduction to speaking, reading, writing and understanding modern Japanese.

*Letter grade only.*

#### **JPN 002: Elementary Japanese II [4]**

Introduction to speaking, reading, writing and understanding modern Japanese.

*Prerequisite:* JPN 001 or appropriate score on Japanese Placement Exam. Letter grade only.

#### **JPN 003: Intermediate Japanese I [4]**

Continuation of elementary Japanese. Emphasizes the further development of speaking, writing and reading skills, with an intensive review of basic grammar as well as an introduction to more advanced grammar and vocabulary.

*Prerequisite:* JPN 002 or appropriate score on Japanese Placement Exam. Letter grade only.

#### **JPN 004: Intermediate Japanese II [4]**

Continuation of elementary Japanese and Japanese 3. Emphasizes the further development of speaking, writing and reading skills, with an intensive review of basic grammar as well as an introduction to more advanced grammar and vocabulary.

*Prerequisite:* JPN 003 or appropriate score on Japanese Placement Exam. Letter grade only.

#### **JPN 103: Advanced Japanese I [4]**

Continuation of Intermediate Japanese II. Emphasizes the further development of reading, writing and speaking Japanese, with learning social and cultural issues of contemporary Japanese society.

*Prerequisite:* JPN 004 or consent of instructor. Letter grade only.

#### **JPN 104: Advanced Japanese II [4]**

Continuation of Advanced Japanese II. Emphasizes the further development of reading, writing and speaking Japanese, with learning social and cultural issues of contemporary Japanese society.

*Prerequisite:* JPN 103 or consent of instructor. Letter grade only.

## LITERATURE

#### **LIT 020: Introduction to World Culture and Literature I [4]**

Introduction to the connections between language, literature, and culture over time and across national traditions through a variety of literary genres. Introduces the masterworks of world literature in their cultural contexts, through comparative analysis.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Discussion included.

**LIT 021: Introduction to World Culture and Literature II [4]**

Introduction to the connections between language, literature, and culture over time and across national traditions through a variety of literary genres. Introduces the masterworks of world literature in their cultural contexts, through comparative analysis.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Discussion included.

**LIT 030: Introduction to American Literature I [4]**

Survey of the history and major works of literature of the United States from colonial times to the present, with a special emphasis on the range of American cultural traditions in a comparative context.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Discussion included.

**LIT 031: Introduction to American Literature II [4]**

Survey of the history and major works of literature of the United States from colonial times to the present, with a special emphasis on the range of American cultural traditions in a comparative context.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Discussion included.

**LIT 032: American Women Writers [4]**

This course will feature selected works of writers from pre-Columbian to the present, with an emphasis on social, cultural and historical constraints on women's arts; the rise in feminist artistic strategies; and contemporary trends in literary production. Includes some study of influences on American women writers.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Letter grade only. Discussion included.

**LIT 040: Introduction to British Literature I [4]**

Survey of the history and major works of the literature of the British Isles from the Middle Ages to the present.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Discussion included.

**LIT 041: Introduction to British Literature II [4]**

Survey of the history and major works of the literature of the British Isles from the Middle Ages to the present.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Letter grade only. Discussion included.

**LIT 042: British Women Writers [4]**

From selected works of British women writers, we include a variety of texts, from early religious treatise through the birth of the British novel and beyond. Students study economic, social and cultural constraints, and examine the relationship between historical context and artistic production of women writers.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Letter grade only.

**LIT 050: Introduction to Hispanic Literature I [4]**

Survey of the history and major works of Peninsular, Latin American and Latino literatures until the nineteenth century.

*Prerequisite:* SPAN 004 or SPAN 011 or equivalent score on the Spanish Placement Exam. Discussion included.

**LIT 051: Introduction to Hispanic Literature II [4]**

Survey of the history and major works of Peninsular, Latin American and Latino literatures from the 19th. C to the 21st. C.

*Prerequisite:* SPAN 004 or SPAN 011 or equivalent score on the Spanish Placement Exam. Discussion included.

**LIT 055: Introduction to Portuguese and Brazilian Literature and Culture [4]**

Emphasis on reading and discussion of literary texts representative of different literary movements and authors of the Luso-Brazilian world. Discussion of significant historical, social and cultural trends in the Portuguese-speaking world. We focus on Portugal, Azores, Portuguese Africa, the Portuguese in the United States and Brazil.

**LIT 061: Hispanic/Latino Children's Literature and Film [4]**

Explores Latino/Hispanic children's literature and film from theoretical and cultural perspectives. We study texts, contexts, illustrations, traditions, as well as issues related to production, reception, publishing and marketing. Special attention is paid to linguistic issues, including bilingualism and translation, and to visual forms of representation, including comic books.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Discussion included.

**LIT 063: Hispanic Film and Popular Culture [4]**

Theoretical and historical overview of Hispanic film and popular culture, including music, performing arts, traditional storytelling, mass entertainment, among others. Particular attention is paid to connections with the arts and literature. Course, films, and readings are given in Spanish.

*Prerequisite:* SPAN 004 and (WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent). Letter grade only.

**LIT 067: Multicultural Children's Literature [4]**

Explores the field of children's literature from a theoretical and a cultural perspective. Readings include books from many cultural traditions as well as secondary sources on multiculturalism and cultural literacy. We study texts, contexts, illustrations, traditions, as well as issues related to publishing and marketing.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Letter grade only. Discussion included.

**LIT 069: US Latino Literature [4]**

A representative overview of U.S. Latino literature, from its colonial and pre-colonial origins to the present. A socio-historical framework is first outlined in order to situate the different periods in the history of this literature. Main groups studied include Chicanos, Puerto Ricans, and Cuban-Americans, though others are represented as well.

*Prerequisite:* WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Discussion included.

**LIT 090X: Freshman Seminar [1]**

Examination of a topic in Literature.  
May be repeated for credit.

**LIT 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**LIT 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**LIT 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**LIT 100: Engaging Texts: Introduction to Critical Practice [4]**

An introduction to issues and approaches in literary theory and criticism, with an emphasis on applications of methods to selected literary texts.

*Prerequisite:* Junior standing or consent of instructor.

**LIT 110: Topics in World Literature [4]**

Topics may include literature of one country or region of the world or comparisons of multiple literatures.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. May be repeated for credit twice with different topics.

**LIT 111: Empire, the Postcolonial, and Representation: Reading East and West [4]**

Study though literature, film and mass media of emancipatory uprisings and postcolonial challenges of the last 200 years that unsettled the old Eurocentric and the U.S. colonial order. Includes Occidental readings on Asian and African cultures. Topics: racism, xenophobia, illegal migrations and terrorism. Strong interdisciplinary approach to case examination.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. Letter grade only.

**LIT 112: Literature and History [4]**

Emphasizes historical contextualization of literature, including theoretical approaches such as Marxism, Post colonialism, Intellectual and Social Historicism. Explores ways in which literary histories are written. Course may focus on a specific historical period in order to understand the distinct relationship among literature, history and cultural production.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. Letter grade only.

**LIT 120: Topics in the Literature of Difference [4]**

In-depth study of representative literary works in a single genre: novel, poetry, drama, et.al.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. May be repeated for credit.

**LIT 125: Literary Genres [4]**

Explores how individual literary genres articulate larger cultural, aesthetic, and social issues. In addition, we analyze literary genres alongside other media in which those issues are also articulated, exploring differences and similarities in their treatment of those matters.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. Letter grade only.

**LIT 130: Topics in American Literature [4]**

In-depth study of a period, theme, et.al. in American literature.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. May be repeated for credit.

**LIT 131: American Literature of the Expanding Nation [4]**

We focus on the narratives by which America constructed its "manifest destiny." Some writers or works that may be covered: Bradford, Bradstreet, Edwards, early Native American texts and colonial captivity narratives, and early exploration narratives. Also, we look at writers who justified and critiqued westward expansion.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. Letter grade only.

**LIT 132: American Protest Literature [4]**

Readings and discussion focus on literary genres that have voiced dissent, protest, and social displacements. While race and gender play a significant role in the course, protests against subjugation and/or oppression based on labor issues, religious preference, class, and age also are covered.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. Letter grade only.

**LIT 133: New Voices in American Fiction and Poetry [4]**

Provides an exploration of contemporary practices in the field of American literature. Students study themes and forms in the fields of poetry, prose and fiction as they have been developed and interrogated by America's young and new writers.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. Letter grade only.

**LIT 134: Literature and History of the Great Depression [4]**

Focusing on the turbulent decade of the 1930s, we use the lens of history and literature to explore how events from 1929 -1941 helped shape modern America. Particular attention is paid to the impact of these years upon California and the West.

*Prerequisite:* Junior standing and LIT 020, LIT 021, HIST 016 or HIST 017. Letter grade only.

**LIT 135: Literature and History of the 1960s [4]**

Examines American politics, culture, and society in the 1960s. Topics include civil rights, feminism, the Vietnam War, the Beat and other counterculture movements, and the sexual revolution.

*Prerequisite:* Junior standing and LIT 030, LIT 031, HIST 016 or HIST 017. Letter grade only.

**LIT 136: Literature and Culture of African Americans [4]**

American literature from the slavery period through the Harlem Renaissance and into the present. We emphasize African American writers in the context of cultural history that influenced and often repressed their literary production, with special emphasis on specific discursive practices and the rise and fall of various literary movements.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. Letter grade only.

**LIT 140: Topics in British Literature [4]**

In-depth study of a period, theme et.al. in British literature.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. May be repeated for credit twice with different topics.

**LIT 141: British Literature of the Expanding Empire [4]**

A look at British colonial literature, from early travel narratives such as Behn's Oroonoko to Forster, Orwell and current writers. Emphasis is on understanding the processes which literature helped to construct the idea of an empire. Attention is paid to relationships between postcolonial narratives and emerging character of colonized nations.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051.

**LIT 143: New Voices in British Fiction and Poetry [4]**

Exploration of contemporary practices in the field of British literature. Students study themes and forms in the fields of poetry, prose and fiction as they have been developed and interrogated by young and new writers in Britain and Ireland.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051.

**LIT 145: Plays and Poetry of Shakespeare [4]**

Introduction and analysis of Shakespeare's major plays and works of poetry.

*Prerequisite:* Junior standing.

**LIT 146: Shakespeare: Early Works [4]**

Selected work from Shakespeare's early period up to the middle works, between 1599 and 1604.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051.

**LIT 147: Shakespeare: Later Works [4]**

Selected work from Shakespeare's middle works, between 1599 and 1604, until the end of his career.

*Prerequisite:* LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051.

**LIT 150: Topics in Hispanic Literature [4]**

In depth study of Spanish literature of a single country, one or more countries in a comparative context, a period et.al.

*Prerequisite:* LIT 050 or LIT 051 or consent of instructor. May be repeated for credit.

**LIT 151: Golden Age Spanish Literature [4]**

Study through theater, novel and poetry of Renaissance and Baroque Peninsular literature (1492-1680): poetry of Garcilaso, Lope de Vega and the Spanish Baroque Theater; Cervantes and the origins of the modern novel; Conceptism

and Culteranism; and relevant Portuguese figures (e.g., Gil Vicente and Camoes). Course is conducted in Spanish.

*Prerequisite:* LIT 050 or LIT 051 or consent of instructor.

**LIT 152: The Transatlantic Baroque [4]**

Course centers around Transatlantic exploration of Golden Age Spain and colonial Latin America. Special attention and analysis is paid to commerce and cultural contact, travel writing, center and periphery, literary representation, arts, music, and other relevant cultural forms of the times. Course and readings are conducted in Spanish.

*Prerequisite:* LIT 050 or LIT 051 or consent of instructor.

**LIT 153: Spanish Literature Since the 20th Century [4]**

From Generations of 1898 through 1927, the Civil War, Francoist and Post-Francoist literature, to contemporary voices. Selected readings on Spanish nationalisms: from Rizal to Teixidor. Course critically examines the constructions of Spain and "Spanishness", seeking to build a more complex understanding of its cultures. Conducted in Spanish.

*Prerequisite:* LIT 050 or LIT 051 or consent of instructor.

**LIT 155: Latin American Colonial Literature [4]**

Selected readings on chronicles, poetry and theater from Columbus travel narratives to Fernandez de Lizardi's El periquillo sarniento. Emphasis on understanding the various processes by which literature helped to construct the idea of identity and independence. Theoretical frame based on cultural studies: the relationship between knowledge and power, the text and its context. Conducted in Spanish.

*Prerequisite:* LIT 050 or LIT 051 or consent of instructor.

**LIT 156: Latin American Literature Since the Independence [4]**

Primary concentration is on Romantic poetry; Indigenist, Anti-slavery and Indianist novel: Marti, Ruben Dario and Modernismo; Rodo and the essayist of the early XX century; the novel of the Mexican Revolution; and the Latin American 'Boom' and 'Post Boom'. Some selected readings on Brazilian literature after Dom Pedro Primeiro are included. Conducted in Spanish.

*Prerequisite:* LIT 050 or LIT 051 or consent of instructor.

**LIT 157: Caribbean Literatures and Cultures [4]**

Explores the cultures and literatures of the Hispanic Caribbean, including those of Cuba, Puerto Rico, and the Dominican Republic. We also explore multiple cultural substrata (e.g. Spanish, African, Anglo-American, Native) as well as their current presence in the Caribbean islands. Course and readings are conducted in Spanish.

*Prerequisite:* LIT 050 or LIT 051 or consent of instructor.

**LIT 158: Transatlantic Modernismo [4]**

Study through poetry, novel, essay and chronicle of principal characteristics of Spanish-American and Peninsular Modernismo. We examine the issue of the influence of Latin American writers in Spain (e.g. Ruben Dario, Gomez Carrillo), and the evolution of poets or prose writers out

of Modernismo into the Generation of '98 (e.g. Antonio Machado) or into a unique, independent voice (e.g. Juan Ramon Jimenez, Valle-Inclan, Unamuno). Conducted in Spanish.

*Prerequisite: LIT 050 or LIT 051 or consent of instructor.*

#### **LIT 159: Diasporas and Exiles in the Hispanic World [4]**

Concentration on literary works of political exiles from oppressive regimes (e.g., Spain's Franco, Portugal's Salazar) and 70's and 80's South American dictatorships. Focus on diasporas produced by economical constraints in the U.S., Latin America and Spain. Strong interdisciplinary approach in examining of cases and ideas. Conducted in Spanish.

*Prerequisite: LIT 050 or LIT 051 or consent of instructor.*

#### **LIT 160: Hispanic Women Writers [4]**

Explores the development of writing by women in the Hispanic world, including the formation of a feminine aesthetics, the reception of works by women writers, canons and exclusions, and connections with writings by women from other cultures. Course and readings are conducted in Spanish.

*Prerequisite: LIT 051.*

#### **LIT 162: Bilingualism and Borders in Hispanic Literatures [4]**

Explores cultural and linguistic contacts in borderland areas throughout the Hispanic world, from medieval times to the present. We focus on the artistic, social, and historical effects of coexistence around borders, with special attention to issues of bilingualism and cultural hybridism. Course and readings are conducted in Spanish.

*Prerequisite: LIT 051.*

#### **LIT 164: Hispanic Drama and Performing Arts [4]**

Both textual and non-textual dramatic works from all around the Hispanic world are covered. Special attention is paid to Golden Age theatre, didactic and ritual dramas in the Americas, contemporary dance, Latin American theater, and the rise and development of Chicano theater. Course and most readings are conducted in Spanish.

*Prerequisite: LIT 051. Discussion included.*

#### **LIT 165: Great Writers [4]**

In-depth examination of the works of a single writer, read in the original language of that writer.

*Prerequisite: LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051.*

#### **LIT 168: Chicano Literature [4]**

Representative overview of Chicano literature, from its colonial and pre-colonial origins to the present. Through the analysis of works from different genres, students are exposed to the main themes, techniques, styles, etc. of some of the most influential Chicano writers to date.

*Prerequisite: LIT 021, LIT 031 or LIT 051.*

#### **LIT 169: US Latino Literature [4]**

Representative overview of U.S. Latino literature, from its colonial and precolonial origins to the present. A socio-historical framework is first outlined in order to situate the different periods in the history of this literature. Main groups studied include Chicanos, Puerto Ricans, Cuban-Americans and Central Americans.

*Prerequisite: LIT 021, LIT 031 or LIT 051.*

#### **LIT 170: Topic in Language and Linguistics [4]**

Topics may include linguistic theories, history of the English language.

*Prerequisite: LIT 020, LIT 021, LIT 030, LIT 031, LIT 040, LIT 041, LIT 050 or LIT 051. May be repeated for credit twice with different topics.*

#### **LIT 171: Teaching Literature and Culture [4]**

An exploration of historical and contemporary issues related to the teaching of literature and culture. Discussions include teaching practices, pedagogy and assignments. Students are required to submit a semester project. Strongly recommended for teaching credential candidates.

*Prerequisite: LIT 021. LIT 100 recommended.*

#### **LIT 180: American Nature Writing and Literature of the Environment [4]**

Study of the wilderness and environment in major texts. Attention paid to Biblical and British influences and "founding" nature writers such as Thoreau; Muir and Mary Austin, as well as more recent environmental thinkers, Gary Snyder, Edward Abbey, Leslie Marmon Silko.

*Prerequisite: Junior standing.*

#### **LIT 181: Literature of California [4]**

Exploration of the developing identity of California, with emphasis on how that identity is reflected in and shaped by its literature. Covers early Native and California life, the Gold Rush, the major waves of immigration, and contemporary issues, all within a political, cultural and intellectual framework. Term paper required.

*Prerequisite: Any lower division LIT course.*

#### **LIT 183: Literature and the Other Arts [4]**

Study of the relationship of literature to other arts, including visual and performance. May be focused on a detailed study of one period or artistic development.

*Prerequisite: Junior standing.*

#### **LIT 185: Literature and Power [4]**

Subjects of discussion based on selected texts that deal with the use and abuse of power. We address all literary genres and concentrate in XIX through XXI century writings. Strong theoretical frame based on Foucault and Post-structuralism, Colonial and Postcolonial studies.

*Prerequisite: LIT 021.*

#### **LIT 186: Novel of the Latin American Dictator [4]**

This course examines the representation of the Latin American dictator and the mediation of the mysteries of power as seen in several novels published during the second half of the 20th century and the beginning of the 21st.

*Prerequisite: LIT 050 or LIT 051. Letter grade only.*

#### **LIT 190: Senior Thesis [4]**

Capstone course for majors. Completion of a senior thesis. Extensive writing required.

*Prerequisite: Senior standing. Letter grade only.*

#### **LIT 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. Letter grade only. May be repeated for credit.*

#### **LIT 196: Internship in Literature and Cultures [4]**

Oversight and structure for a student's internship in a field related to Literatures and Cultures. Students are required to write an original research paper based on the internship.

*Prerequisite: Junior standing. Permission of instructor required. Pass/No Pass grading only. May be repeated for credit once.*

#### **LIT 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **LIT 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## MATHEMATICS

#### **MATH 005: Preparatory Calculus [4]**

Preparation for calculus. Elementary functions, trigonometry, polynomials, rational functions, systems of equations and analytical geometry.

*Course cannot be taken after obtaining credit for MATH 021. Letter grade only.*

#### **MATH 015: Introduction to Scientific Data Analysis [2]**

Fundamental analytical and computational skills to find, assemble and evaluate information, and to teach the basics of data analysis and modeling using spreadsheets, statistical tool, scripting languages, and high-level mathematical languages. Not for students from the School of Engineering.

*Prerequisite: Equivalent score on the Math Placement Exam or MATH 005. MATH 005 may be taken concurrently. Laboratory included.*

#### **MATH 018: Statistics for Scientific Data Analysis [4]**

Analytical and computational methods for statistical analysis of data. Descriptive statistics, graphical representations of data, correlation, regression, causation, experiment design, introductory probability, random variables, sampling distributions, inference and significance.

*Prerequisite: (MATH 005 or equivalent score on the Math Placement Exam) and MATH 015. Letter grade only. Laboratory and discussion included.*

#### **MATH 021: Calculus of a Single Variable I [4]**

An introduction to differential and integral calculus of functions of one variable. Elementary functions such as the exponential and the natural logarithm, rates of change and the derivative with applications to natural sciences, engineering and social sciences.

*Prerequisite: MATH 005 or equivalent score on the Math Placement Exam. Letter grade only. Discussion included.*

#### **MATH 022: Calculus of a Single Variable II [4]**

Continuation of MATH 021. Analytical and numerical techniques of integration with applications, infinite sequences and series, first order ordinary differential equations.

*Prerequisite: MATH 021. Letter grade only. Discussion included.*

**MATH 023: Vector Calculus [4]**

Calculus of several variables. Topics include parametric equations and polar coordinates, algebra and geometry of vectors and matrices, partial derivatives, multiple integrals, and introduction to the theorems of Green, Gauss, and Stokes.

*Prerequisite: MATH 022. Letter grade only. Discussion included.*

**MATH 024: Linear Algebra and Differential Equations [4]**

Introduces ordinary differential equations, systems of linear equations, matrices, determinants, vector spaces, linear transformations and linear systems of differential equations.

*Prerequisite: MATH 022. Letter grade only. Discussion included.*

**MATH 030: Calculus II for Biological Sciences [4]**

A version of Math 22 for students majoring in the life sciences. Analytical and numerical techniques of integration, modeling differential equations for biology.

*Prerequisite: MATH 021. Letter grade only. Discussion included.*

**MATH 032: Probability and Statistics [4]**

Concepts of probability and statistics. Conditional probability, independence, random variables, distribution functions, descriptive statistics, transformations, sampling errors, confidence intervals, least squares and maximum likelihood. Exploratory data analysis and interactive computing.

*Prerequisite: MATH 021. Discussion included.*

**MATH 090X: Freshman Seminar [1]**

Topics in mathematics.

*Letter grade only.*

**MATH 091: General Topics in Applied Mathematics [1]**

Introduction to a variety of concepts useful in applied mathematics. Topics covered included floating point arithmetic, methods of proofs, random walks, stereographic projections, transforms, etc. Students are exposed to advanced mathematical topics in preparation for their ongoing studies.

*Prerequisite: MATH 023 and MATH 024, both of which may be taken concurrently. Pass/No Pass grading only.*

**MATH 095: Lower Division Undergraduate Research [1 - 6]**

Supervised research in mathematics.

*Permission of instructor required. Letter grade only. May be repeated for credit.*

**MATH 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**MATH 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**MATH 121: Applied Math Methods I: Introduction to Partial Differential Equations [4]**

Introduction to Fourier series. Physical derivation of canonical partial differential equations of

mathematical physics (heat, wave and Laplace's equation). Separation of variables, Fourier integrals and general eigenfunction expansions.

*Prerequisite: MATH 023 and MATH 024. Discussion included.*

**MATH 122: Applied Math Methods II: Complex Variables and Applications [4]**

Introduction to complex variables, analytic functions, contour integration and theory of residues. Mappings of the complex plane. Introduction to mathematical analysis.

*Prerequisite: MATH 023 and MATH 024. Discussion included.*

**MATH 131: Numerical Analysis I [4]**

Introduction to numerical methods with emphasis on algorithm construction, analysis and implementation. Programming, round-off error, solutions of equations in one variable, interpolation and polynomial approximation, approximation theory, direct solvers for linear systems, numerical differentiation and integration, initial-value problems for ordinary differential equations.

*Prerequisite: MATH 024. Letter grade only. Discussion included.*

**MATH 132: Numerical Analysis II [4]**

Initial-value problems for ordinary differential equations, interactive techniques for solving linear systems, numerical solutions of nonlinear systems of equations, boundary-value problems for ordinary differential equations, numerical solutions to partial differential equations.

*Prerequisite: MATH 121 and MATH 131. Letter grade only. Discussion included.*

**MATH 140: Mathematical Methods for Optimization [3]**

Linear programming and a selection of topics from among the following: matrix games, integer programming, semidefinite programming, nonlinear programming, convex analysis and geometry, polyhedral geometry, the calculus of variations and control theory.

*Prerequisite: MATH 023. Letter grade only.*

**MATH 141: Linear Analysis I [4]**

Applied linear analysis of finite dimensional vector spaces. Review of matrix algebra, vector spaces, orthogonality, least-squares approximations, eigenvalue problems, positive definite matrices, singular value decomposition with applications in science and engineering.

*Prerequisite: MATH 122 and MATH 131. MATH 131 may be taken concurrently. Letter grade only. Discussion included.*

**MATH 142: Linear Analysis II [4]**

Applied linear analysis of infinite dimensional vector spaces. Inner product spaces, operators, adjoint operators, Fredholm alternative, spectral theory, Sturm-Liouville operators, distributions and Green's functions with applications in science and engineering.

*Prerequisite: MATH 141. Letter grade only. Discussion included.*

**MATH 171: Mathematical Logic [4]**

Introduction to the meta-theory of first-order logic. Topics include the consistency, compactness, completeness and soundness proofs for propositional and first-order logic; model theory; the axiomatization of number theory;

Godel's incompleteness theorems and related results.

*Prerequisite: PHIL 005 or consent of instructor. Discussion included.*

**MATH 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**MATH 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**MATH 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**MATH 201: Teaching and Learning in the Sciences [1]**

Students are introduced to 'scientific teaching'—an approach to teaching science that uses many of the same skills applied in research. Topics include how people learn, active learning, designing, organizing and facilitating teachable units, classroom management, diversity in the classroom and assessment design.

*Satisfactory/Unsatisfactory grading only.*

**MATH 221: Partial-Differential Equations I [4]**

Partial differential equations (PDEs) of applied mathematics. Topics include modeling physical phenomena, linear and nonlinear first-order PDEs, D'Alembert's solution, second-order linear PDEs, characteristics, initial and boundary value problems, separation of variables, Sturm-Liouville problem, Fourier series, Duhamel's Principle, linear and nonlinear stability.

*Prerequisite: MATH 122 or consent of instructor. Letter grade only. Discussion included.*

**MATH 222: Partial-Differential Equations II [4]**

Continuation of Math 221. Topics include integral transforms, asymptotic methods for integrals, integral equations, weak solutions, point sources and fundamental solutions, conservation laws, Green's functions, generalized functions, variational properties of eigenvalues and eigenvectors, Euler-Lagrange equations, Maximum principles.

*Prerequisite: MATH 221 or consent of instructor. Letter grade only. Discussion included.*

**MATH 223: Asymptotics and Perturbation Methods [4]**

Asymptotic evaluation of integrals, matched asymptotic expansions, multiple scales, WKB, and homogenization. Applications are made to ODEs, PDEs, difference equations, and integral equations to study boundary and shock layers, nonlinear wave propagation, bifurcation and stability, and resonance.

*Prerequisite: MATH 222 or consent of instructor. Letter grade only. Discussion included.*

**MATH 231: Numerical Solution of Differential Equations I [4]**

Examines fundamental methods typically required in the numerical solution of differential equations. Topics include direct and indirect methods for linear systems, nonlinear systems, interpolation and approximation, eigenvalue



problems, ordinary-differential equations (IVPs and BVPs), and finite differences for elliptic partial-differential equations. A significant amount of programming is required.

*Prerequisite: MATH 132 or consent of instructor. Letter grade only. Discussion included.*

### **MATH 232: Numerical Solution of Differential Equations II [4]**

Fundamental methods presented in Math 231 are used as a base for discussing modern methods for solving partial-differential equations. Numerical methods include variational, finite element, collocation, spectral, and FFT. Error estimates and implementation issues are discussed. A significant amount of programming is required.

*Prerequisite: MATH 231 or consent of instructor. Letter grade only. Discussion included.*

### **MATH 233: Scientific Computing [4]**

Theoretical and practical introduction to parallel scientific computing. Survey of hardware and software environments, and selected algorithms and applications. Topics include linear systems, N-body problems, FFTs, and methods for solving PDEs. Practical implementation and performance analysis are emphasized in the context of demonstrative applications in science and engineering.

*Prerequisite: MATH 232 or consent of instructor. Letter grade only. Discussion included.*

### **MATH 291: Applied Mathematics Seminar [1]**

Seminar series covering various topics in applied mathematics presented by faculty, graduate students, and visiting speakers.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

### **MATH 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

### **MATH 298: Directed Group Study [1 - 12]**

Group project under faculty supervision.

*Permission of instructor required. May be repeated for credit.*

### **MATH 299: Directed Independent Study [1 - 6]**

*Permission of instructor required. May be repeated for credit.*

### **MATH 399: University Teaching [1]**

Centered on a student's classroom experiences as a Teaching Assistant in an undergraduate Applied Mathematics course. Provides a faculty-directed opportunity to implement teaching practices presented in the course Teaching and Learning in the Sciences. Involves video-taping of teaching, peer review, and weekly meetings with faculty.

*Prerequisite: MATH 201 or QSB 201, either of which may be taken concurrently. Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit once. Laboratory and discussion included.*

## MECHANICAL ENGINEERING

### **ME 120: Component Design [3]**

Three-dimensional stress analysis; deflection and stiffness; static and dynamic loading; failure theories and fatigue; fasteners; welded joints; mechanical springs; bearing; gears; shafts; clutches; brakes and couplings; belts and pulleys.

*Prerequisite: ENGR 151. Offered spring only. Letter grade only.*

### **ME 135: Finite Element Analysis [3]**

Introduces finite element methods used for solving linear problems in structural and continuum mechanics. Covers modeling, mathematical formulation, and computer implementation. Students develop a 2D plane-stress finite element program. Topics in nonlinear finite-element analysis, heat transfer, and fluid dynamics are introduced as time permits.

*Prerequisite: MATH 131. Offered spring only. Letter grade only.*

### **ME 137: Computer Aided Engineering [4]**

Introduction to the use of modern computational tools used for design and analysis. Primary focus is on product design with solid modeling and finite-element analysis. Software used is representative of that found in industry. Topics such as 2-D and 3-D drawing, tolerance specification, and FEA validation are also covered.

*Prerequisite: ME 135. Offered fall only. Letter grade only. Laboratory included.*

### **ME 140: Vibration and Control [4]**

Dynamics of particles and rigid bodies. Vibration of discrete systems with finite degrees of freedom and continuous structures including beams and plates. Resonance, anti-resonance, damping, and modal coupling. Modal analysis. Proportional, derivative and integral feedback controls of vibrations. Stability concept. Control design by root locus and frequency domain method.

*Prerequisite: MATH 024 and ENGR 057. Offered spring only. Letter grade only. Laboratory included.*

### **ME 142: Mechatronics [4]**

Introduction to digitally controlled electro-mechanical systems. We focus on design and implementation of software to achieve functional specifications for mechanical systems. It covers design methodology, real time computing, sensing, actuating, networking, analog and digital signal domains, operator interface, applicable computational technology, and basic interfacing.

*Prerequisite: ENGR 057 and ENGR 065. Offered fall only. Letter grade only. Laboratory included.*

### **ME 170: Capstone Design [4]**

Design project must be selected and approved; project feasibility study and outline of the design project is completed; design methodology, optimization, product reliability and liability, economics, use of ASME codes. A final presentation is given at the end of the semester.

*Prerequisite: ME 137. Offered spring only. Letter grade only. Laboratory included.*

### **ME 190: Special Topics in Mechanical Engineering [3]**

Lectures on special topics are announced at the beginning of the semester in which the course is offered. Topics may include special mechanisms, non-Newtonian fluid mechanics, non-equilibrium thermodynamics, design methods for special applications, among other possibilities.

*Prerequisite: Junior standing. Permission of instructor required. Letter grade only. May be repeated for credit twice with different topics.*

### **ME 195: Upper Division Undergraduate Research [1 - 4]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### **ME 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **ME 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## MECHANICAL ENGINEERING AND APPLIED MECHANICS

### **MEAM 201: Advanced Dynamics [4]**

Rigid body dynamics, including topics such as: dynamical systems, motion representation and constraints, Newtonian, Lagrangian and Hamiltonian mechanics, stability analysis and introduction to multibody dynamics.

*Prerequisite: MATH 024 and ENGR 057. Offered in fall only. Letter grade only. May be repeated for credit once.*

### **MEAM 202: Transport Phenomena [4]**

Systematic analysis of fluid flow, heat transfer and mass transfer phenomena, with emphasis on the analogies and specific techniques used in treating such boundary value problems.

*Prerequisite: ES 235 or ENGR 135. Offered spring only. Letter grade only.*

### **MEAM 210: Linear Control Systems [3]**

Concepts related to Feedback Control, State-Space Representation of Dynamic Systems, Dynamics of Linear Systems, Frequency-Domain Analysis, Controllability and Observability, Linear Observers, Compensator Design, Linear Quadratic Optimum Control.

*Prerequisite: MATH 024. Letter grade only. May be repeated for credit once.*

### **MEAM 211: Nonlinear Controls [4]**

Phase plane and singularities. Methods for nonlinear analysis. Lyapunov stability theory. Passivity. Lyapunov control design. Topics of nonlinear controls including feedback linearization, sliding control and back stepping design. Adaption algorithms and system identification. Discussion of current research topics in nonlinear controls.

*Permission of instructor required. Letter grade only.*

### **MEAM 220: Continuum Mechanics [4]**

Cartesian tensors in mechanics, coordinate transformations, analysis of stress and strain, principal values, invariants, equilibrium and compatibility equations, constitutive relations, field equations; problems in elasticity; computational methods.

*Prerequisite: ENGR 120. Offered in fall only. Letter grade only.*

### **MEAM 221: Rheology [4]**

Basic concepts (forces, displacements, stress, tensor, strain, etc.), linear and nonlinear elastic

solids, linear viscous fluids, linear viscoelastic fluids and solids, and selected topics in nonlinear viscoelastic behavior.

*Prerequisite:* MEAM 220. Letter grade only.

**MEAM 236: Advanced Mass Transfer [4]**

Steady and unsteady mass diffusion; mass convection, simultaneous heat and mass transfer; Fick's law in a moving medium; similarity and integral methods in mass transfer; high mass transfer theory; research project in mass transport.

*Prerequisite:* ES 235 or ENGR 135. Letter grade only. May be repeated for credit once.

**MEAM 251: Viscous Flows [4]**

Study of the Navier-Stokes equations; Stokes' problems; creeping flows; internal and external flows; similarity and integral methods in boundary layer flows; stability and transition to turbulence.

*Prerequisite:* ES 235 or ENGR 135. Offered fall only. Letter grade only. May be repeated for credit once.

**MEAM 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**MEAM 298: Directed Group Study [1 - 6]**

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**MEAM 299: Directed Independent Study [1 - 6]**

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## MANAGEMENT

**MGMT 002: Case Study Seminar on Business and Management [1]**

Survey of the field of business management. Invited speakers from local companies and public organizations cover topics that include the business environment, human relations, technology in business, ethical behavior, global and economic forces, organization, quality, products and services, functional management, and current issues and developments.

*Prerequisite:* ECON 001. May be repeated for credit once.

**MGMT 025: Introduction to Finance [4]**

Particular attention is paid to how managers maximize shareholder wealth. This class covers the foundations of financial management, including the time value of money, capital budgeting and evaluation, capital structure, and valuation of various capital sources.

*Laboratory included.*

**MGMT 026: Introduction to Accounting [4]**

A broad introduction and accounting. Students are equipped to draw up and interpret accounts and are introduced to some key ideas of auditing. Covers the fundamental accounting concepts and how to apply them; record accounting entries, prepare accounts for different business entities and understand the differences between them, the basic principles of auditing.

*Laboratory included.*

**MGMT 090X: Freshman Seminar [1]**

Examination of a topic in management.

May be repeated for credit.

**MGMT 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**MGMT 097: Service Learning: Engineering Projects in Community Service [1 - 3]**

Multi-disciplinary teams of freshman through senior students work with community organizations to design, build, and implement engineering-based solutions for real-world problems. Students gain insight into the design and development process, and Management students gain practical experience working in a team of engineers and managing a project. Students are encouraged to participate at both the lower division and upper-division (MGMT 197) levels.

*Permission of instructor required. May be repeated for credit twice.*

**MGMT 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**MGMT 099: Lower Division Individual Study [1 - 5]**

The objective of an independent study is to provide advanced and capable students an opportunity to pursue a topic of their interest with in depth supervision of a faculty member. The study can be done in combination with an internship in a business or government organization.

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**MGMT 100: Intermediate Microeconomic Theory [4]**

We explore the foundations of microeconomic theory, focusing on the behavior of individuals and firms, and the interaction of these agents in the market. Price determination and resource distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics.

*Prerequisite:* ECON 001 and MATH 021 or consent of instructor. Discussion included.

**MGMT 101: Intermediate Macroeconomic Theory [4]**

Analysis of output, employment, interest rates, and the price level. The effects of these on changes in monetary and fiscal variables.

*Prerequisite:* ECON 001 and MATH 021 or consent of instructor. Discussion included.

**MGMT 115: Economics of Industrial Organization [4]**

The organization and structure of industrial production in the United States economy.

*Prerequisite:* ECON 100 or MGMT 100.

**MGMT 116: Organizational Strategy [4]**

Discussion of critical issues in the design and functioning of effective organizations. Topics covered include: the boundary of the firm, firm structure, arrangements within the firm, alliances and contracts between firms, and trust and

culture in the firm. We combine case studies with relevant economic theory to provide insight into the functioning of organizations.

*Prerequisite:* ECON 100 or MGMT 100. Letter grade only.

**MGMT 120: Marketing [4]**

Marketing is about identifying consumer needs, developing products and services which meet the changing consumer needs or market conditions. We provide an examination of principles of customer marketing as well as business-to-business marketing. It focuses those aspects of marketing which most frequently demand strategic attention in any business.

*Prerequisite:* Junior standing or consent of instructor.

**MGMT 121: The Economics of Money, Banking, and Financial Institutions [4]**

This course addresses issues of money, banking, and financial institutions. Topics covered include: the structure of central banks and the Federal Reserve system, theories of money demand and money supply, the relationship between money supply and overall economic activity, and the role the Federal Reserve plays in economic stabilization.

*Prerequisite:* ECON 001. Letter grade only.

**MGMT 130: Econometrics [4]**

Introduction of problems of observation, estimation and hypotheses testing in economics through the study of the theory and application of linear regression models, critical evaluation of selected examples of empirical research and exercises in applied economics.

*Prerequisite:* (ECON 010 or POLI 010) and MATH 021. Letter grade only. Laboratory included.

**MGMT 135: Business Law [4]**

Conceptual and functional analysis of legal principles relevant to the conduct and understanding of commercial business transactions. Topics include personal and real; government regulations; negotiable instruments; debtor/creditor relationships; and bankruptcy and reorganization. Salient legal aspects of international business are also discussed.

*Prerequisite:* MGMT 025 and MGMT 026 or consent of instructor.

**MGMT 141: Industrial Relations and Human Resource Economics [4]**

Examines how firms make decisions involving human resources. Topics covered include employee hiring and recruitment, compensation and use of incentives, and employee motivation and teamwork. Builds on both economic theory and practical examples to illuminate key concepts.

*Prerequisite:* ECON 100 or MGMT 100. Letter grade only.

**MGMT 150: Services Science and Management [4]**

Services - e.g., restaurants, hotels, lawyers, information technology operations, business consulting—account for more than 70% of the US economy. Through case studies of businesses and scientific studies of people in real service settings, we focus on how to align people and technology effectively to generate value.

*Prerequisite:* ECON 001. Letter grade only.

**MGMT 151: Public Economics [4]**

The influence of governmental revenue and expenditure decisions on economic performance. Examines such issues as public goods and externalities, as well as specific expenditure and taxation programs.

*Prerequisite:* ECON 100 or MGMT 100.

**MGMT 152: Law and Economics [4]**

The economic analysis of legal rules and institutions, including property, contract, and tort law. We also consider issues surrounding crime and punishment.

*Prerequisite:* ECON 100 or MGMT 100.

**MGMT 153: Judgment and Decision Making [4]**

An introduction to the study of human judgment and decision making. Topics include decision making under uncertainty, financial choices, health decision making, group decisions, rational theories of choice behavior, and improving decision making. The material is related to cognitive science, psychology, economics, and other social sciences.

*Prerequisite:* COGS 001 or PSY 001.

**MGMT 154: Cognitive Science Applications for Management [4]**

Covers thought, behavior, and interaction in modern businesses, where knowledge workers interact with one another and with technology. Topics include business decision making, risk behavior, attitudes toward risk, planning, communication, information management, information systems, human-computer interaction, neuroeconomics, and organizational behavior.

*Prerequisite:* COGS 001 or PSY 001 or consent of instructor.

**MGMT 155: Decision Analysis in Management [4]**

Presents the tools of decision science using a quantitative approach, with a focus on investment, finance and management decisions. These tools include decision tree analysis, risk and uncertainty analysis, stochastic dominance, the value of information, probability bias, and subjective probability.

*Prerequisite:* (ECON 100 or MGMT 100) and (ECON 010 or POLI 010) or consent of instructor.

**MGMT 165: Intermediate Finance [4]**

Expansion upon the ideas introduced in MGMT 25, by exploring advanced capital budgeting topics, (estimating future operating cash flows and analyzing real options), financing decisions (corporate structure and restructuring, long-term financing, securities), advanced working capital management, and multinational finance.

*Prerequisite:* MGMT 025.

**MGMT 180: Entrepreneurship [4]**

Integrates the skills students have developed in prior MGMT courses, and provides a framework for the consideration of new business ventures. Topics covered include: market research, creation of a formal business plan, marketing strategy, financing, establishing channels of distribution and bringing products or services to market.

*Prerequisite:* Junior standing and MGMT 165 or consent of instructor.

**MGMT 190: Internship in Management [1 - 4]**

Oversight and structure for the student's internship in a field related to Management. While the student is responsible for finding her or his own internship for the semester or subsequent summer, the class assists students with the process and helps them evaluate their experience. May be repeated upon approval of a new Internship proposal that demonstrates new tasks and objectives related to business and management and that continues to advance application of academic theory in the workplace.

*Prerequisite:* Junior standing or consent of instructor. May be repeated for credit twice.

**MGMT 191: Topics in Management [4]**

Intensive treatment of a special topic or problem in management. May be repeated for credit in different subject areas.

*Prerequisite:* Junior standing and MGMT 025 and MGMT 026 or consent of instructor. May be repeated for credit.

**MGMT 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**MGMT 196: Case Study Seminar in Management [4]**

Seminar and capstone experience presents case studies in the field of business management. Issues explored are the ethical behavior, global and economic forces, organization, quality, products and services, functional management, and current issues and developments. Students work in teams analyzing the cases presented.

*Prerequisite:* Senior standing and MGMT 025, MGMT 026, ECON 010 and (ECON 130 or MGMT 130) and (ECON 100 or MGMT 100) or consent of instructor. Letter grade only.

**MGMT 197: Service Learning: Engineering Projects in Community Service [1 - 3]**

Multi-disciplinary teams of freshman through senior students work with community organizations to design, build, and implement engineering-based solutions for real-world problems. Students gain insight into the design and development process, and Management students gain practical experience working in a team of engineers and managing a project. Students are encouraged to participate at both the lower division (MGMT 097) and upper-division (MGMT 197) levels.

*Permission of instructor required. May be repeated for credit twice.*

**MGMT 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**MGMT 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**MGMT 290: Labor Studies Seminar [3]**

Research presentations by visiting scholars in the area of quantitative labor studies.

*Satisfactory/Unsatisfactory grading only.*

## MATERIALS SCIENCE AND ENGINEERING

**MSE 110: Solid State Materials Properties [4]**

Structure of atomic and molecular solids; crystallography of inorganic and organic solids; symmetry; short range order; 1-, 2- and 3-dimensional defects; energy levels; band theory of conductors, semiconductors and insulators; mechanical, thermal, optical and magnetic properties of materials and their relevance to processing and devices.

*Prerequisite:* CHEM 002, ENGR 045, MATH 021 and PHYS 008. Laboratory included.

**MSE 111: Materials Processing [4]**

Thermodynamics of solid solutions; enthalpy, entropy and free energy of mixing; Ellingham diagrams; phase diagrams for 2- and 3-component systems; phase rule; lever rule; nucleation and growth; spinodal decomposition; control of microstructure; materials extraction/synthesis, forming and joining processes.

*Prerequisite:* MATH 021, PHYS 008, CHEM 002 and ENGR 045.

**MSE 112: Materials Selection and Performance [3]**

Design considerations in the use of materials; safety factors; statistical methods of assessing performance; quality control; selecting materials to optimize multiple properties; materials failure; long-term materials properties, materials behavior under extreme conditions; corrosion.

*Prerequisite:* MSE 110 and MSE 111.

**MSE 113: Materials Characterization [4]**

Characterization of materials structure and properties. Interactions between electromagnetic radiation and matter, and between electron beams and matter. Principles of image formation; Fourier methods and convolution; image processing. X-ray diffraction, optical and electron imaging and diffraction; scanned probe methods. Thermal analysis. Mechanical property and failure characterization.

*Prerequisite:* MATH 021, PHYS 008 and PHYS 009. Offered spring only. Letter grade only. Laboratory included.

**MSE 114: Polymeric Materials [3]**

Polymer synthesis, characterization and processing techniques. Relationships between configuration, conformation, molecular order, microstructure and properties of polymeric materials; concepts relevant to tailoring polymer molecules and microstructures for specific applications.

*Prerequisite:* Junior standing and MATH 021, PHYS 008, CHEM 002, CHEM 008, PHYS 009 and ENGR 045 or consent of instructor. Offered spring only. Letter grade only. Laboratory included.

**MSE 115: Ceramic Materials [3]**

Crystallography of inorganic compounds; packing and connectivity of co-ordination polyhedral. Defects in ionic and covalent crystals and their effect on properties. Ceramics, glasses and cements. Engineering ceramics. Production of powders; compaction; sintering; control of nanostructure and microstructure; bulk defects. Zeolites. Hydration of cement and concrete. Biological ceramics.

*Prerequisite: MATH 021, PHYS 008, PHYS 009 and ENGR 045.*

### **MSE 116: Composites [3]**

Hard materials and soft materials. Roles of matrix and filler phases. "Rule of mixtures" as a function of morphology and connectivity. Length scale effects: nanocomposites, microcomposites and macrocomposites. Biological composites. Porous materials. Interface characteristics and their effect on properties. Toughening mechanisms in composites. Processing and joining. Structure and property characterization.

*Prerequisite: PHYS 009 and ENGR 045.*

### **MSE 117: New Materials [3]**

Materials requirements for electronics, communication, transportation, energy, data storage, homeland security, healthcare. Non-linear optical materials. Liquid crystals. "Whole life cycle" concepts and sustainability. Green materials. Self-assembling materials. Self healing materials. Biological and bioinspired materials. Biomedical materials.

*Prerequisite: MATH 021, PHYS 008, PHYS 009 and ENGR 045. Offered spring only.*

### **MSE 118: Introduction to Nanotechnology and Nanoscience [3]**

An introduction for engineers in nanotechnology and nanoscience. Topics covered include nanoscale phenomena; nanofabrication (top-down and bottom-up approaches); and applications relevant to engineering, the physical sciences and biology. Interdisciplinary aspects of nanotechnology and nanoscience are discussed, including perspectives from materials science, chemistry, physics, and biology.

*Prerequisite: (MATH 021 and PHYS 008) and CHEM 002. Offered fall only. Letter grade only.*

### **MSE 119: Materials Modeling [3]**

Difference between modeling and theory. Atomic and molecular scale modeling. Ab initio, Monte Carlo and molecular dynamics methods. Lattice models. Mesoscale and multiscale modeling. Finite element methods. Modeling phase separation, nanostructure and microstructure evolution and material properties.

*Prerequisite: MATH 023, MATH 024, MATH 021, and PHYS 008.*

### **MSE 120: Materials Capstone Design [3]**

Design project based on materials selection and performance evaluation, with reference to engineering standards and realistic constraints that include most of the following considerations: economic environmental, sustainability, processability, ethical, health and safety, social, political.

*Prerequisite: MSE 112 and MSE 113.*

### **MSE 126: Nanodevice Fabrication: Bridging Research and Education [3]**

This course will teach basic properties of nanomaterials and their applications (the lecture part). A nanoscale transducer will be chosen as a sensing element and sensors will be fabricated and tested (the lab part). The interactive and Experiential education will be blended into theoretical concept teaching.

*Prerequisite: Junior standing and CHEM 002 and (PHYS 009 or PHYS 019) and (ENGR 165, BIOE 102 or BIOE 103). Letter grade only. Laboratory included.*

### **MSE 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### **MSE 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **MSE 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## NATURAL SCIENCES EDUCATION

### **NSED 023: Introduction to Teaching Science in Elementary School [1]**

Introduction to teaching science in elementary school. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. Activities include seminars, discussions, and experimentation using inquiry-based learning modules.

### **NSED 024: Fieldwork: Introduction to Teaching Science in Elementary School [1]**

Fieldwork component for the NSED 23 course. Classroom observations and teaching practicum at an elementary school under the guidance of a mentor teacher. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. NSED 023 must be taken concurrently.

### **NSED 033: Introduction to Teaching Mathematics in Elementary School [1]**

Introduction to teaching mathematics in elementary school. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. Activities include seminars, discussions, and experimentation using inquiry-based learning modules.

### **NSED 034: Fieldwork - Introduction to Teaching Mathematics in Elementary School [1]**

Fieldwork component for the NSED 33 course. Classroom observations and teaching practicum at an elementary school under the guidance of a mentor teacher. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. NSED 033 must be taken concurrently.

### **NSED 043: Introduction to Teaching Science in Middle School [1]**

Introduction to teaching science in middle school. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. Activities include seminars, discussions, and experimentation using inquiry-based learning modules.

### **NSED 044: Fieldwork - Introduction to Teaching Science in Middle School [1]**

Fieldwork component for the NSED 43 course. Classroom observations and teaching practicum at a middle school under the guidance of a mentor teacher. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. NSED 043 must be taken concurrently.

### **NSED 053: Introduction to Teaching Mathematics in Middle School [1]**

Introduction to teaching mathematics in middle school. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. Activities include seminars, discussions, and experimentation using inquiry-based learning modules.

### **NSED 054: Fieldwork - Introduction to Teaching Mathematics in Middle School [1]**

Fieldwork component for the NSED 53 course. Classroom observations and teaching practicum at a middle school under the guidance of a mentor teacher. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. NSED 053 must be taken concurrently.

### **NSED 063: Introduction to Teaching Science in High School [1]**

Introduction to teaching science in high school. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. Activities include seminars, discussions, and experimentation using inquiry-based learning modules.

### **NSED 064: Fieldwork - Introduction to Teaching Science in High School [1]**

Fieldwork component for the NSED 63 course. Classroom observations and teaching practicum at a high school under the guidance of a mentor teacher. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. NSED 063 must be taken concurrently.

### **NSED 073: Introduction to Teaching Mathematics in High School [1]**

Introduction to teaching mathematics in High school. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. Activities include seminars, discussions, and experimentation using inquiry-based learning modules.

### **NSED 074: Fieldwork - Introduction to Teaching Mathematics in High School [1]**

Fieldwork component for the NSED 73 course. Classroom observations and teaching practicum at a high school under the guidance of a mentor teacher. Emphasis on inquiry-based learning practices and effective research-based teaching strategies. NSED 073 must be taken concurrently.

### **NSED 090X: Introduction to Teaching Science/Math [1]**

Freshman seminar.

*Pass/No Pass grading only.*

### **NSED 095: Lower Division Undergraduate Research [1 - 6]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### **NSED 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **NSED 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**NSED 100: Introduction to Instruction, Assessment, and Management for Beginning Teachers [4]**

The course prepares students for careers in K-12 education. Students gain knowledge of classroom management strategies and learn how to organize a classroom, to plan units and to develop lesson plans. A special focus will be the techniques necessary to effectively teach in multicultural and multilingual schools.

*Letter grade only.*

**NSED 120: Diversity in Education [4]**

Focusing on American education, we examine historical and current issues of diversity, noting controversial initiatives such as mainstreaming, bilingual education, multiculturalism, and gender-neutral or gender-segregated instruction. Students also consider cultural and linguistic challenges of teaching English language learners, including those who are generation 1.5 students.

*Letter grade only. Laboratory and discussion included.*

## PHILOSOPHY

**PHIL 001: Introduction to Philosophy [4]**

An introduction to the main areas of philosophy using classic and contemporary sources. Consideration of central and enduring problems in philosophy, such as skepticism about the external world, the mind-body problem and the nature of morality.

*Discussion included.*

**PHIL 005: Logic and Critical Reasoning [4]**

Introduction to formal and informal logic. Topics include argumentation analysis, fallacies, soundness vs. validity, inductive vs. deductive reasoning, truth tables, proof techniques in statement and predicate logic, and the probability calculus.

*Discussion included.*

**PHIL 009: Phenomenology and Existentialism [4]**

Consideration of central themes in phenomenology and existentialism and their philosophical origins in nineteenth century philosophy. Readings from such figures as Nietzsche, Husserl, Sartre, Freud, Merleau-Ponty, and Heidegger.

**PHIL 090X: Freshman Seminar [1]**

Examination of a topic in philosophy.

*May be repeated for credit.*

**PHIL 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**PHIL 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PHIL 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PHIL 101: Metaphysics [4]**

Inquiry into the fundamental nature of reality; the categories of being; the differences between

abstract entities, concrete entities, substances, properties, and processes; what constitutes identity of objects through time; necessity and possibility; free will and determinism; space, time, and causation.

*Prerequisite: PHIL 001 and PHIL 005 or consent of instructor.*

**PHIL 103: Philosophy of the Mind [4]**

Selected topics in the philosophy of mind, including the relation between mind and body, the self, personal identity, consciousness, the unconscious, materialism, functionalism, behaviorism, determinism and free will, and nature of psychological knowledge.

**PHIL 107: Philosophy of Religion [4]**

An examination of core issues in the philosophy of religion, using classical and contemporary sources. Topics may include: arguments for and against the existence of God, differing concepts of the divine, the rationality of religious belief, mysticism, divine foreknowledge and free will, death and immortality.

*Prerequisite: Junior standing and PHIL 001 or consent of instructor.*

**PHIL 108: Political Philosophy [4]**

An examination of core issues in political philosophy. Topics may include: descriptive and normative analyses of institutions, alternative justifications of political authority, classical and modern accounts of the social contract, theories of justice.

*Prerequisite: PHIL 001. Letter grade only.*

**PHIL 110: Philosophy of Cognitive Science [4]**

Consideration of philosophical and foundational issues in cognitive science, including the Turing Test, the Chinese Room argument, the nature of cognitive architecture, animal cognition, connectionism vs. symbolic artificial intelligence, and the possibility of thinking machines.

*Prerequisite: PHIL 001 and (COGS 001 or PSY 001).*

**PHIL 111: Philosophy of Neuroscience [4]**

Questions at the intersection of philosophy and neuroscience. Relevance of recent research in neuroscience to epistemology and metaphysics. Specific topics include the mind-body problem, free will, consciousness, religion, and the nature of the self.

**PHIL 150: Topics in Phenomenology [4]**

Study of the foundations of phenomenology in Husserl and its background in Bolzano, Frege, Brentano, Meinong, Kant, and Descartes. Topics include phenomenological method, theory of intentionality, meaning, perception, evidence, ego, other minds, intersubjectivity, and the life-world, as well as application of phenomenological methods to themes in natural science, social science, art, and literature.

*May be repeated for credit once with different topics.*

**PHIL 160: Mathematical Logic [4]**

Introduction to the meta-theory of first-order logic. Topics include the consistency, compactness, completeness and soundness proofs for propositional and first-order logic; model theory; the axiomatization of number theory; Gödel's incompleteness theorems and related results.

*Prerequisite: PHIL 005 or consent of instructor.*

*Discussion included.*

**PHIL 190: Advanced Seminar in Philosophy [4]**

Intensive treatment of a special topic or problem within philosophy. May be repeated for credit in different subject area.

*Prerequisite: Junior standing. Permission of instructor required. Pass/No Pass grading only. May be repeated for credit once.*

**PHIL 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**PHIL 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PHIL 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## PHYSICS

**PHYS 005: Energy and the Environment [3]**

Introduction to energy and the environment. Examines different types of renewable and nonrenewable energy sources and the environmental effects of using these energy resources. We cover environmental, economic and sustainability considerations associated with fossil fuels and alternative energy sources.

*Letter grade only.*

**PHYS 006: The Cosmos, Science and You [4]**

Introduction to physics and astronomy for non science and engineering majors. Topics include: Scientific method as illustrated by astronomical discoveries about the Cosmos; and the concepts of matter and energy; and the formation of the Universe, galaxies, stars and the Solar System. Throughout the course our physical connection and dependence the Cosmos are illustrated using new discoveries in astrophysics, astrochemistry and astrobiology.

*Discussion included.*

**PHYS 008: Introductory Physics I [4]**

Introduction to classical and contemporary physics. Intended for students with preparation in calculus and algebra. Topics include introduction to forces, kinetics, equilibria, fluids, waves, and heat. Experiments and computer exercises are integrated into the course content.

*Prerequisite: MATH 021, which may be taken concurrently. Laboratory and discussion included.*

**PHYS 009: Introductory Physics II [4]**

Continuation of introduction to classical and contemporary physics. Topics include introduction to electricity, magnetism, electromagnetic waves, optics, and modern physics. Experiments and computer exercises are integrated into the course content.

*Prerequisite: PHYS 008, MATH 021, MATH 022 and MATH 030. MATH 022 and MATH 030 may be taken concurrently. Laboratory and discussion included.*

**PHYS 010: Introductory Physics III [4]**

An introduction to developments in modern physics over the last 150 years that have radically altered our view of nature. Particular emphasis is placed on relativity, quantum theory, and thermodynamics with applications to atoms, molecules, solids, and light.

*Prerequisite:* PHYS 009. *Laboratory and discussion included.*

**PHYS 012: Light, Color, and Vision [4]**

Introduction to the physics, chemistry, and biology of light and vision for nonscientists. Covers basic optics, optical instruments, photography, light and color in nature, human and animal vision, visual perception and optical illusions, and aspects of modern technology including fiber optics and lasers. Includes classroom demonstrations and out-of-class observational exercises.

*Discussion included.*

**PHYS 018: Introductory Physics I for Biological Sciences [4]**

First introductory physics course for biological science majors. Topics include vectors, kinematics, Newton's Laws, Work, Energy and Conservation, Torque and rotation, Fluids and Elasticity, Oscillations and Waves all with an emphasis on biological applications.

*Prerequisite:* MATH 021, which may be taken concurrently. *Letter grade only. Laboratory and discussion included.*

**PHYS 019: Introductory Physics II for Biological Sciences [4]**

The physical principles of electromagnetism and thermodynamics are introduced, examined, and discussed in the context of biological applications.

*Prerequisite:* PHYS 018 and MATH 021. *Laboratory and discussion included.*

**PHYS 090X: Freshman Seminar [1]**

Examination of a topic in physics.

*May be repeated for credit.*

**PHYS 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research

*Permission of instructor required. May be repeated for credit.*

**PHYS 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PHYS 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PHYS 105: Analytic Mechanics Core [4]**

Rigorous, mathematical foundation in classical mechanics. Topics include Newtonian mechanics; motion of particles in one, two and three dimensions; central force motion; moving coordinate systems; mechanics of continuous media; oscillations; normal modes; Lagrange's equations; and Hamiltonian methods.

*Prerequisite:* PHYS 008 and MATH 022. *Discussion included.*

**PHYS 110: Electrodynamics Core [4]**

Intermediate Electrodynamics. Topics covered include vector calculus including divergence, curl and vector field theorems; Electrostatics

including field, potential, work and energy; Laplace's equation including solutions in different geometries, separating variables, method of images and multipole expansions; Electrostatics in media including polarization and dielectrics (linear/nonlinear); Magnetostatics including the Biot-Savart Law, Ampere's Law and vector potentials; Magnetic fields in matter including magnetization, linear and non-linear media; and Electrodynamics including EMF, induction and Maxwell's equations as well as conservation of charge, energy, and momentum in EM fields.

*Prerequisite:* PHYS 009 and MATH 023. *Discussion included.*

**PHYS 111: Electromagnetic Radiation Minicourse [2]**

This half-semester minicourse covers plane electromagnetic waves including polarization, reflection, refraction and dispersion. Electromagnetic waves in wave guides and cavities also are covered. Additional topics include radiation, both dipole and multipole as well as scattering and diffraction.

*Prerequisite:* PHYS 110 and PHYS 122. *Discussion included.*

**PHYS 112: Statistical Mechanics Core [4]**

Covers the fundamental concepts of statistical mechanics, which form the microscopic basis for thermodynamics. Topics include applications to macroscopic systems, condensed states, phase transformations, quantum distributions, elementary kinetic theory of transport processes, and fluctuation phenomena.

*Prerequisite:* PHYS 010 and MATH 022. *Discussion included.*

**PHYS 120: Physics of Materials [4]**

Electrical, optical, and magnetic properties of solids. Free electron model, introduction to band theory. Crystal structures and lattice vibrations. Mechanisms and characterization of electrical conductivity, optical absorption, magnetic behavior, dielectric properties, and p-n junctions.

*Prerequisite:* PHYS 009 and CHEM 112. *Laboratory included.*

**PHYS 122: Waves Minicourse [2]**

This half-semester minicourse covers scalar wave phenomena and mathematical methods in Physics.

*Prerequisite:* PHYS 010 and MATH 024. *Discussion included.*

**PHYS 124: Rotational Mechanics Minicourse [2]**

This half-semester minicourse covers classical and quantum rotational dynamics. Classical topics include rigid body rotations, tops, and gyroscopes. Quantum topics include molecular rotational spectra, nuclear magnetic resonance, and the hydrogen atom. The connection between classical and quantum angular momentum is emphasized.

*Prerequisite:* PHYS 137 and PHYS 105. *Discussion included.*

**PHYS 126: Special Relativity Minicourse [2]**

This half-semester minicourse introduces the exciting and thought-provoking physics of special relativity. Topics include hallmark experiments; Lorentz transformations; time dilation and length contraction; relativistic optics; tensor techniques; mass, energy, and momentum; relativistic mechanics; and relativistic electricity and magnetism.

*Prerequisite:* PHYS 009. *PHYS 110 recommended. Discussion included.*

**PHYS 137: Quantum Mechanics Core [4]**

This course covers the fundamentals of quantum mechanics, which forms the foundation of our modern understanding of matter at the atomic and molecular level. Topics include the Schrodinger equation, Hilbert spaces, the operator formalism, the Heisenberg Uncertainty Principle, tunneling, perturbation and WKB theory, fermions, and bosons.

*Prerequisite:* PHYS 010, MATH 023 and MATH 024. *Discussion included.*

**PHYS 141: Condensed Matter Physics [3]**

Classification of solids and their bonding; electromagnetic, elastic, and particle waves in periodic lattices; thermal, magnetic, and dielectric properties of solids; energy bands of metals and semiconductors; superconductivity; magnetism; ferroelectricity; magnetic resonance.

*Prerequisite:* PHYS 137.

**PHYS 144: Modern Atomic Physics [4]**

The description and calculation of the properties of atomic energy levels based on the central field approximation. Modern experimental methods in atomic physics and some of the important physics obtained from them. Examples include magnetic resonance, lasers and masers, ion and neutral atom traps, optical pumping and beam foil spectroscopy.

*Prerequisite:* PHYS 124. *Discussion included.*

**PHYS 148: Modern Optics [4]**

Geometrical optics, radioactive transfer, partial coherence, lasers, quantum optics.

*Prerequisite:* PHYS 111. *Discussion included.*

**PHYS 150: Energy Sources [3]**

Fossil energy resources, nuclear energy, solar energy, and other renewable energy sources (wind, hydro, geothermal.)

*Prerequisite:* (PHYS 008 or MATH 022) and PHYS 009.

**PHYS 151: Solar Energy [3]**

The solar energy resource, modeling and simulation, thermal collectors, photovoltaic collectors, solar energy systems, special applications (solar lasers, material processing).

*Prerequisite:* MATH 022 and PHYS 009.

**PHYS 159: Particle Physics [4]**

Tools of particle and nuclear physics. Properties, classification, and interactions of particles including the quark-gluon constituents of hadrons. High-energy phenomena analyzed by quantum mechanical methods. Quantum number determination of resonances, hadron structure functions, introductory electroweak theory with Dirac matrices, Standard Model (overview), grand unified theories.

*Prerequisite:* PHYS 137. *Discussion included.*

**PHYS 160: Modern Physics Lab [4]**

Provides a rigorous foundation in physics laboratory techniques, with an emphasis on hands-on laboratory training. The nature of the experiments available to students cover a range of modern topics, from nonlinear dynamics and chaos through nonlinear optics and spectroscopy. Emphasis is placed on error estimation, data analysis, and interpretation.

*Prerequisite: PHYS 010 or consent of instructor. Laboratory included.*

### **PHYS 161: Astrophysics and Cosmology [3]**

Elements of general relativity. Physics of pulsars, cosmic rays, black holes. The cosmological distance scale, elementary cosmological models, properties of galaxies and quasars. The mass density and age of the universe. Evidence for dark matter and concepts of the early universe and of galaxy formation. Reflections on astrophysics as a probe of the extrema of physics.

*Prerequisite: MATH 022 and PHYS 009.*

### **PHYS 192: Special Topics in Physics [1 - 4]**

Treatment of a special topic or theme in Physics. May be repeated for credit in a different subject area.

*Prerequisite: PHYS 009 or PHYS 019 or consent of instructor. May be repeated for credit. Laboratory and seminar included.*

### **PHYS 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### **PHYS 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **PHYS 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **PHYS 204: Biophysics [4]**

This course aims to give students an understanding of relevant physical principles for biological systems, introduce them to experimental and theoretical techniques of biophysics and to communicate the excitement of cutting-edge biophysics research. Topics include diffusion, fluids, entropic force, motor proteins, enzymes, nerve impulses, networks and evolution.

*Letter grade only. Discussion included.*

### **PHYS 205: Classical Mechanics [4]**

Topics in classical mechanics, including Lagrangian and Hamiltonian formulations, Conservation Laws and Symmetry and the relationship, Calculus of variations and variational principle, Euler angles and rigid body dynamics, Oscillations and normal modes.

*Letter grade only. Discussion included.*

### **PHYS 210: Electrodynamics and Optics I [4]**

Introduction to electrodynamics. Electrostatics including Poisson and Laplace Equations, Green's Theorem and different Boundary Value Problems, Polarizability, Susceptibility and dielectric media. Magnetostatics, Maxwell's equations, Plane Electromagnetic Waves, Polarization of light, Electromagnetic radiation in different media.

*Letter grade only. Discussion included.*

### **PHYS 211: Electrodynamics and Optics II [4]**

Continuation of electrodynamics. Wave guides and resonant cavities, Multipole radiation, Relativistic charged particles in electromagnetic fields, Collisions between charged particles and radiation from moving charges with relativistic corrections, introductory magnetohydrodynamics.

*Prerequisite: PHYS 210. Letter grade only. Discussion included.*

### **PHYS 212: Statistical Mechanics [4]**

Topics include: General principles of statistical mechanics including microcanonical, macrocanonical and grand canonical ensembles, fluctuations and equilibrium. Thermodynamics including Legendre transforms and Maxwell relations, fluctuations and stability and Landau theory. Quantum statistical mechanics including Bose-Einstein and Fermi-Dirac statistics.

*Prerequisite: Letter grade only. Discussion included.*

### **PHYS 237: Quantum Mechanics I [4]**

Introductory Quantum Mechanics starting with simple Quantum two-state systems and onedimensional problems, Uncertainty relations, Solution of Schrodinger's equation for important two and three dimensional physical situations, Angular momentum, identical particles and spin statistics. Hydrogen and multi-electron atoms.

*Prerequisite: Letter grade only. Discussion included.*

### **PHYS 238: Quantum Mechanics II [4]**

Perturbation methods, both stationary and time-dependent, Scattering, interaction with electromagnetic fields, Stark effect, Measurement theory and decoherence, Quantum Hall effect.

*Prerequisite: PHYS 237. Letter grade only.*

*Discussion included.*

### **PHYS 290: Current Topics in Physics and Chemistry [3]**

Exploration of current research directions, problems, and techniques in molecular and materials chemistry, physics and engineering. Course format emphasizes student-led presentation, analysis, and discussion of reading assignments from the current and recent scientific literature. Topics determined by the instructor and changes each semester.

*May be repeated for credit.*

### **PHYS 291: Physics and Chemistry Seminar [1]**

Graduate seminar on current research in molecular and materials chemistry, physics, and engineering.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

### **PHYS 292: Special Topics in Physics [1 - 4]**

Treatment of a special topic or theme in Physics at the graduate level. May be repeated for credit in a different subject area.

*May be repeated for credit. Discussion included.*

### **PHYS 293: Physics Colloquium [1]**

This is a colloquium series with talks on a wide range of research topics in Physics. Speakers for the colloquia are primarily invited researchers from other Institutions. Some of the seminars additionally showcase the research performed by UC Merced Physics faculty, post doctoral researchers and graduate students. This is a forum to introduce the undergraduate and graduate students to cutting edge research in Physics conducted on-site and elsewhere, and to give them an opportunity to meet researchers and faculty from other Universities/Research Institutions.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

### **PHYS 295: Graduate Research [1 - 15]**

Supervised research.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

### **PHYS 298: Directed Group Study [1 - 12]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

### **PHYS 299: Directed Independent Study [1 - 12]**

Independent project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## POLITICAL SCIENCE

### **POLI 001: Introduction to American Politics [4]**

A general introduction to political institutions and political behavior in the United States. Specific topics include the U.S. Constitution, Congress, the presidency, the federal judiciary, political parties, interest groups, mass public opinion, elections, and voting behavior.

*Discussion included.*

### **POLI 002: Controversies in American Politics [4]**

Examination of select problems in contemporary American politics. Possible subjects include campaign finance, culture wars and party polarization, barriers to third party success, and media coverage of politics.

*Discussion included.*

### **POLI 003: Introduction to Comparative Politics [4]**

Introduction to the cross-national study of political institutions and behavior. Formal and informal aspects of politics in selected countries are covered, as are comparative research methods.

*Discussion included.*

### **POLI 005: Introduction to International Relations [4]**

Introduction to the study of the politics of conflict and war, diplomacy, international cooperation, and international institutions.

*Discussion included.*

### **POLI 006: Global Issues [4]**

Examination of select problems in international relations and foreign policy. Possible topics include terrorism, proliferation of nuclear weapons, and conflict in the Middle East.

*Discussion included.*

### **POLI 009: Community Mobilization and Politics [4]**

Examination of political and social mobilization at the local level, including strategies for organization and advocacy.

*Discussion included.*

### **POLI 010: Analysis of Political Data [4]**

Overview of the application of social scientific methods to the study of politics. Covers research design, measurement, descriptive and inferential statistics, and the linear regression model as applied to political phenomena.

*Prerequisite: MATH 005 or equivalent score on the Math Placement Exam. Laboratory included.*

**POLI 090X: Freshman Seminar [1]**

Examination of a topic in political science.

*May be repeated for credit once.*

**POLI 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**POLI 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**POLI 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**POLI 100: Congressional Politics [4]**

Elections and representation, legislative organization and process, legislative parties and leadership, lobbying, legislative outcomes, and the determinants of these outcomes in the U.S. Congress.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 101: The Presidency [4]**

Powers, constraints, and behavior of the U.S. president and executive branch. Includes specific topics such as legislative-executive interactions, presidential control of the bureaucracy, nomination campaigns and general elections, and public opinion and the presidency.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 102: Judicial Politics [4]**

Structure, function, and politics of the U.S. court system, with a particular focus on the selection of judges, judicial decision making, external political influences on the judiciary, and the impact of court decisions.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 105: Interest Groups and Political Parties [4]**

Formation, strategies, and effectiveness of interest groups and political parties in the U.S.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 106: Urban Politics [4]**

This course examines urban political development and policy processes in the United States. It will trace the historical development of local government, analyze urban coalitions and the distributions of power, and tackle the relationship between politics and policy making in the areas of growth, education, cultural issues, and welfare.

*Prerequisite: POLI 001. Letter grade only.*

**POLI 107: State Politics [4]**

The structure and performance of state governments, including California state politics.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 108: Direct Democracy [4]**

The politics of the initiative, referendum, and recall in the American states. Specific topics may include the history and origins of direct democracy, voter support for ballot measures, the role of interest groups, the effect of initiatives

and referenda on candidate elections and civic engagement, and policy implications.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 110: Governmental Power and the Constitution [4]**

Introduces students to the manner in which Supreme Court decisions shape our political system by delineating the sources and limits of governmental power. The powers of the three branches of the federal government are covered, as is the relationship between the federal government and the states.

*Prerequisite: Junior standing and POLI 001 or consent of instructor.*

**POLI 111: Liberty, Equality and the Constitution [4]**

Examines the constitutional politics of landmark U.S. Supreme Court cases involving civil liberties and civil rights. Specific topics may include First Amendment freedoms, privacy, the rights of criminal suspects, and discrimination based on race, gender, and sexual orientation.

*Prerequisite: Junior standing and POLI 001 or consent of instructor.*

**POLI 120: Voting Behavior, Campaigns, and Elections [4]**

Voting behavior, voter turnout, campaign strategies, and election outcomes.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 125: Public Opinion [4]**

An examination of the nature and origins of public opinion in the United States and the role of public opinion in the policy process.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 127: Race, Gender, and Politics [4]**

Contemporary and historical identity politics in the U.S., with a focus on the importance of race and gender in political representation, attitude formation, and civil rights.

*Prerequisite: POLI 001 and (POLI 010 or ECON 010).*

**POLI 130: Comparative Political Institutions [4]**

Cross-national comparison of the design, evolution, and impact of political institutions, such as electoral systems, legislatures, executives, courts, and parties.

*Prerequisite: POLI 003 and (POLI 010 or ECON 010).*

**POLI 135: Comparative Political Behavior [4]**

Analysis of multiple forms of political behavior across a variety of countries. Includes public opinion, political culture, voting, and less conventional forms of participation.

*Prerequisite: POLI 003 and (POLI 010 or ECON 010).*

**POLI 140: Democratization [4]**

Formation of democratic institutions and norms. Particular attention is paid to nations labeled as developing democracies.

*Prerequisite: POLI 003 and (POLI 010 or ECON 010).*

**POLI 150: Causes of International Conflict [4]**

Investigation of the causes of international conflict and war, the conduct of war, its ultimate termination, and the possibility of its prevention.

*Prerequisite: POLI 005 and (POLI 010 or ECON 010).*

**POLI 155: International Political Economy [4]**

The connections between politics, policy, and international economics.

*Prerequisite: POLI 005 and (POLI 010 or ECON 010).*

**POLI 160: US Foreign Policy [4]**

The formation of U.S. foreign policy, with an emphasis on the modern era and an introduction to analytical tools for understanding current foreign policy issues and debates.

*Prerequisite: POLI 005 and (POLI 010 or ECON 010).*

**POLI 170: Theoretical Models of Politics [4]**

The development, utility, and limitations of theoretical models of the political world. May include rational choice theory, game theory, and psychological theories of politics.

*Prerequisite: POLI 010 or ECON 010.*

**POLI 190: Topics in Political Science [4]**

Intensive treatment of a special topic or problem in political science. May be repeated for credit in different subject area.

*Prerequisite: Junior standing and POLI 001 or consent of instructor. May be repeated for credit.*

**POLI 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**POLI 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**POLI 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## PSYCHOLOGY

**PSY 001: Introduction to Psychology [4]**

Introduction to psychology as a science of behavior, including history, research methods, biological bases of behavior, cognition, personality, social behavior, psychological disorders, techniques of therapy and applied science.

**PSY 010: Analysis of Psychological Data [4]**

Design and analysis of psychological research including experimental design, correlational research, and descriptive and inferential statistics. Students in the Psychology major or minor must take this course before taking any upper division Psychology courses.

*Prerequisite: COGS 001 or PSY 001.*

**PSY 015: Research Methods in Psychology [4]**

Survey of common methodological approaches in psychological research.



*Prerequisite: PSY 010.*

**PSY 090X: Freshman Seminar [1]**

Examination of a topic in psychology.

*May be repeated for credit once.*

**PSY 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**PSY 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PSY 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PSY 105: Advanced Research Methods in Psychology [4]**

Survey of advanced methodological approaches in psychological research.

*Prerequisite: PSY 015. Letter grade only.*

**PSY 110: History of Psychology [4]**

Major schools of psychology, as well as the philosophical and physiological influences that lead to the birth of psychology as an independent discipline. Focus is on integration over these areas with the goal of better understanding the current state of the science of psychology.

*Prerequisite: Junior standing and PSY 001 or consent of instructor.*

**PSY 123: Alcohol, Drugs, and Behavior [4]**

Survey of major drugs of abuse, their mode of action, and their behavioral effects, both acute and chronic; etiology and maintenance of drug abuse and review of prominent strategies for prevention, intervention and treatment.

*Prerequisite: PSY 001.*

**PSY 130: Developmental Psychology [4]**

Covers the stages that children go through as they develop; covers cognitive development, biological development, social development, personality development, emotional development, among others. Focus is on integrating across these different content areas.

*Prerequisite: Junior standing and PSY 001 or consent of instructor.*

**PSY 131: Social Psychology [4]**

Behavior of the individual in social situations, surveying problems of social cognition, social interaction, group tensions, norm development, attitudes, values, public opinion, status.

*Prerequisite: PSY 001. Letter grade only.*

**PSY 135: Language Acquisition [4]**

Covers the stages that children go through as they learn their first language. We also explore the causal mechanisms behind language acquisition as outlined by the major theoretical approaches in the field. Bilingual language acquisition are also covered.

*Prerequisite: Junior standing and PSY 130 or consent of instructor.*

**PSY 136: Cognitive Development [4]**

Covers the major theories and stages of children's cognitive development. Among others, we cover

Piaget, Vygotsky, information processing theories, and connectionist approaches to learning.

*Prerequisite: Junior standing and PSY 130 or consent of instructor.*

**PSY 137: Conceptual Development [4]**

Exploration of how children learn about specific conceptual domains, such as naive biology and theory or mind. The major theoretical approaches in the area are covered. Questions of process, such as radical reorganization vs. enrichment of content areas set the context for the course.

*Prerequisite: Junior standing and PSY 130.*

**PSY 138: The Development of Social Mind [4]**

Considers the emergence of social reasoning and behavior from infancy to adulthood. Special focus on the cognitive processes underlying reasoning about others as intentional agents, as members of social groups such as race and gender.

*Prerequisite: PSY 001.*

**PSY 139: Cognitive Development and Education [4]**

How can developmental psychology inform educational practice? We review current developmental theories as well as attempts to apply them to education, with the aim of building an understanding of both the promise and pitfalls of a developmentally based approach to education.

*Prerequisite: PSY 130.*

**PSY 140: Clinical Psychology [4]**

Major theoretical approaches to clinical psychology, including psychoanalysis, existentialism, humanism, systems theory, and behavioral approaches. A review of what clinical psychologists do, including assessment methods, professional roles, and approaches to treatment.

*Prerequisite: PSY 001.*

**PSY 142: Abnormal Psychology [4]**

Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior.

*Prerequisite: PSY 001.*

**PSY 143: Abnormal Child Psychology [4]**

Approaches to and current scientific knowledge about psychological disorders during childhood are reviewed. Examples are anxiety, attention deficit, autistic, and substance use disorders. Interventions implemented to prevent or treat these disorders are also examined.

*Prerequisite: PSY 001.*

**PSY 144: Clinical Neuropsychology [4]**

The organization of the brain at the gross, cellular and molecular level and how the brain accomplishes vision, hearing, sleep, motor skills, emotions and memory. Brain disease such as agnosias, depression, addictions, stroke, Alzheimer's and Parkinson's are investigated.

*Prerequisite: PSY 001. Letter grade only.*

**PSY 145: Human Sexuality [4]**

Survey of existing knowledge of human sexual behavior; physiological, anatomical, psychological, and cultural components; normative sexual functioning. Such topics as sexual deviation, sexual dysfunctions, and types of treatment are also considered.

*Prerequisite: PSY 001.*

**PSY 147: Health Psychology [4]**

Survey of topics in health psychology, behavioral medicine, and pediatric health psychology.

*Prerequisite: PSY 001.*

**PSY 150: Psychological Perspective on Cultural, Racial Ethnic Diversity [4]**

Issues that bear upon race, ethnicity, and culture, such as the cultural specificity of psychological theories, cultural influences on child development, ethnic identity, psychological issues in immigration, ethnic and racial prejudice, and assessment and interventions with culturally diverse and ethnic minority populations.

*Prerequisite: PSY 001.*

**PSY 151: The Psychology of Stereotyping and Prejudice [4]**

Cognitive processes underlying stereotyping and prejudice are reviewed. Focuses on the relationship between stereotyping and categorization in general, the development of stereotyping and prejudice, and empirical proposals to reduce bias through contact or other forms of intervention.

*Prerequisite: PSY 001 or COGS 001.*

**PSY 158: Positive Psychology [4]**

Survey of research on the strengths and virtues that enable individuals and communities to thrive. Positive Psychology emphasizes positive emotions, positive individual traits, and positive institutions. Note: This course fundamentally addresses the UC Merced guiding principles of scientific literacy, communication, self and society, and development of personal potential.

*Prerequisite: PSY 001.*

**PSY 159: Personality Psychology [4]**

The theories of Freud, Erikson, and other major twentieth-century contemporary approaches to personality.

*Prerequisite: PSY 001.*

**PSY 160: Cognitive Psychology [4]**

Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation.

*Prerequisite: PSY 001 or COGS 001.*

**PSY 161: Perception [4]**

An introduction to key theoretical constructs and experimental procedures in visual and auditory perception. Topics include psychophysics; perception of color, space, shape and motion; pattern recognition; perceptual attention; and brain areas engaged in perception.

*Prerequisite: PSY 001 or COGS 001.*

**PSY 162: Visual Perception [4]**

A survey of central topics in the psychological study of vision: neurophysiological structure and function of the visual system; psychophysical methods for studying visual perception; color, motion, and form perception; three dimensional space perception; visual attention and oculomotor behavior; evolutionary advantages of vision; psychological and philosophical theories of visual consciousness.

*Prerequisite: PSY 001 or COGS 001.*

**PSY 170: Industrial and Organizational Psychology [4]**

How psychology is applied to industrial and organizational problems, including workplace testing, personnel issues, advertising, etc.

*Prerequisite: PSY 001.*

**PSY 171: Psychological Tests and Measurement [4]**

Principles of measuring behavior and developing and selecting psychological tests are explained. Common tests are also surveyed, such as intelligence, achievement, personality, and employment related tests.

*Prerequisite: PSY 001.*

**PSY 172: Forensic Psychology [4]**

Survey of the application of psychology to the criminal justice system, including public policy, sanity, competency, eyewitness testimony and treatment of mentally ill offenders.

*Prerequisite: PSY 001.*

**PSY 180: Physiological Psychology [4]**

Relationship of brain structure and function to behavior, motivation, emotion, language, and learning in humans and other animals. Review of research methods used in physiological psychology and neuroscience.

*Prerequisite: PSY 001.*

**PSY 190: Topics in Psychology [4]**

Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area.

*Prerequisite: Junior standing and PSY 001 or consent of instructor. May be repeated for credit.*

**PSY 191: Fieldwork in Psychology [1 - 4]**

Supervised experience off and on campus, in community and institutional settings.

*Letter grade only. May be repeated for credit once.*

**PSY 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**PSY 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PSY 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PSY 200A: Professional Seminar for First-Year PhD Graduate Students I [4]**

A two semester sequence required of and limited to first-year Ph.D. students in Psychology. Survey of major issues in contemporary psychology with their historical backgrounds.

*Letter grade only.*

**PSY 200B: Professional Seminar for First-Year Graduate Students II [4]**

A two semester sequence required of and limited to first-year Ph.D. students in Psychology. Survey of major issues in contemporary psychology with their historical backgrounds.

*Letter grade only.*

**PSY 202A: Advanced Psychological Statistics I [4]**

The nature of causal inference; experimental and quasi-experimental designs including randomized experiments, nonrandomized control group studies, time series, regression discontinuity; generalizing from experiments; ethical issues and ethical principles of research conduct; practical problems in experiments.

*Letter grade only.*

**PSY 202B: Advanced Psychological Statistics II [4]**

Classical test theory; factor analysis; generalizability theory; item-response theory; inter-rater reliability; fundamental measurement theory.

*Letter grade only.*

**PSY 202C: Multivariate Analysis [4]**

Introduction to analysis of data having multiple dependent variables. Topics include continuous multivariate distributions, multiple regression, multivariate analysis of variance, discriminant analysis, classification, canonical correlation, principal component analysis. Applications from clinical, cognitive, physiological, and social psychology. Computer methods.

*Letter grade only.*

**PSY 204: Research Design and Methodology [4]**

The nature of causal inference; experimental and quasi-experimental designs including randomized experiments, nonrandomized control groups studies, time series, regression discontinuity; generalizing from experiments; ethical issues and ethical principles of research conduct; practical problems in experiments.

*Letter grade only.*

**PSY 205: Measurement Theory and Psychometrics [4]**

Classical test theory, factor analysis, generalizability theory, item response theory, interrater reliability, fundamental measurement theory.

*Letter grade only.*

**PSY 206: Quantitative Methods for Reviewing Research [4]**

Quantitative procedures (meta-analysis) for reviewing research findings; techniques for locating and coding research studies, calculating effect sizes, and analyzing study findings.

*Letter grade only.*

**PSY 207: Linear Structural Modeling [4]**

Path models, path analysis, cross-lagged panel studies, confirmatory factor analysis, and complete latent variable causal models, applications to experimental and nonexperimental data.

*Letter grade only.*

**PSY 208A: Methods for Program Evaluation [4]**

Introduction to program evaluation. Survey of the many methods used in program evaluation, including needs assessment, surveys, experiments, and qualitative methods. Discussion of policy and strategy issues, and of utilization of findings.

*Letter grade only.*

**PSY 208B: Theory of Program Evaluation [4]**

History and nature of program evaluation, review of different approaches taken to evaluation by variety of major theorists in the field; practice in evaluation.

*Letter grade only.*

**PSY 211: Computer Programming for Social Sciences [4]**

An introduction to specialty computer programs that are useful in the social sciences, such as MATLAB, GAUSS, specialty programs in meta-analysis, and basic languages.

*Letter grade only.*

**PSY 212: Special Problems in Psychological Statistics [4]**

Special problems in psychological statistics and data analysis.

*Letter grade only.*

**PSY 214: History of Psychology [4]**

Covers the major schools of psychology, including Wundtian psychology, structuralism, functionalism, behaviorism, gestalt psychology, cognitive psychology, etc., as well as the philosophical and physiological influences that lead to the birth of psychology as an independent discipline. Focus is on integration over these areas with the goal of better understanding the current state of the science of psychology. Major recurring themes within these schools include the mind/body problem, the nature/nurture debate, and the criteria for practicing a science.

*Letter grade only.*

**PSY 220: Health Psychology [4]**

A review of theory and research on how behavior affects health and disease as well as how disease affects behavior (e.g., cognitions, emotions, relationships) in humans. Research into behavioral interventions to improve, ameliorate, or prevent disease are also reviewed. Focus is placed on the role of behavior for the major diseases and threats to health in children, adolescents, and adults.

*Letter grade only.*

**PSY 230: Developmental Psychology [4]**

The stages that children go through as they develop. Covers cognitive development, biological development, social development, personality development, emotional development, among others. Focus is on integrating across these different content areas.

*Letter grade only.*

**PSY 234: The Nativism Empiricism Debate [4]**

A major debate in developmental psychology concerns the relative contribution of innate versus learned knowledge and skills. We focus on theoretical and empirical contributions to this debate, and try to place them within a broader framework of contemporary cognitive development.

*Letter grade only.*

**PSY 235: Language Acquisition [4]**

The stages that children go through as they learn their first language. Course also explores the causal mechanisms behind language acquisition as outlined by the major theoretical approaches in the field. Bilingual language acquisition are also covered.

*Letter grade only.*

**PSY 236: Cognitive Development [4]**

The major theories and stages of children's cognitive development. Among others, we cover Piaget, Vygotsky, information processing theories, and connectionist approaches to learning.

*Letter grade only.*

**PSY 237: Conceptual Development [4]**

Explores how children learn about specific conceptual domains, such as naive biology and theory of mind. The major theoretical approaches in the area are covered. Questions of process, such as radical reorganization vs. enrichment of content areas set the context for the course.

*Letter grade only.*

**PSY 238: The Development of Social Mind [4]**

Considers the emergence of social reasoning and behavior from infancy to adulthood. Special focus on the cognitive processes underlying reasoning about others as intentional agents, as members of social groups such as race and gender.

*Letter grade only.*

**PSY 239: Cognitive Development and Education [4]**

How can developmental psychology inform educational practice? We review current developmental theories as well as attempts to apply them to education, with the aim of building an understanding of both the promise and pitfalls of a developmentally based approach to education.

*Letter grade only.*

**PSY 250: Social Psychology [4]**

Designed for graduate psychology students. Intensive consideration of concepts, theories, and major problems in social psychology.

*Letter grade only.*

**PSY 251: The Psychology of Prejudice and Stereotyping [4]**

Cognitive processes underlying prejudice and stereotyping are reviewed. We focus on the relationship between stereotyping and categorization in general, the development of stereotyping and prejudice, and empirical proposals to reduce bias through contact or other forms of intervention.

*Letter grade only.*

**PSY 261: Neural Networks [4]**

Overview of classical neural network architectures, algorithms, and applications to psychology are followed by the development of a student project.

*Prerequisite: Some ability in computer programming. Letter grade only.*

**PSY 262: Cognitive Modeling [4]**

Projects-based seminar in cognitive modeling. Students are required to complete a project applying some form of computer model (neural network, symbolic, statistical, genetic algorithm) to the study of cognitive phenomena.

*Letter grade only.*

**PSY 263: Language and Communication in Everyday Life [4]**

Conversational language, metaphor, idioms, ambiguity, spatial language, gesture, sign language, propaganda, dialects, cross-cultural variation, semantic change.

*Letter grade only.*

**PSY 264: Language, Mind and Brain [4]**

Language and linguistic representation from various angles and disciplines, including psychology, linguistics, philosophy, and neuroscience. Possible topics: sentence processing, word meaning, neurolinguistic deficits, language learning, artificial intelligence (natural language processing), and the interaction of language with other cognitive processes.

*Prerequisite: Letter grade only.*

**PSY 265: Foundations of Cognitive Science [4]**

Consideration of foundational questions in cognitive science, including: What is a representational system? How do representations interact? What kind of formal structure, if any, is appropriate in characterizing human mental processing? What constitute valid means of testing for intelligence?

*Prerequisite: Letter grade only.*

**PSY 269: Seminar in Cognitive Science [4]**

Seminar on a specific topic in cognitive science. *May be repeated for credit on a different topic.*

**PSY 286: Presentation of Psychological Materials [4]**

Supervised practicum in undergraduate teaching. Students serve as discussion section leaders in selected undergraduate courses, and give guest lectures in courses where appropriate.

*Satisfactory/Unsatisfactory grading only.*

**PSY 288: Psychological Research Practicum [1 - 4]**

Faculty and graduate students who share interests discuss current literature, new ideas, methodological issues, and preliminary findings. Meetings include research presentations and opportunities for feedback on current and proposed research activity to encourage, support, and facilitate student research expertise. Assigned reading including.

*Satisfactory/Unsatisfactory grading only.*

**PSY 289: Psychology Colloquium [1]**

One and one-half hours of colloquium per week. Reports and discussions of original research in psychology. Not all participants must report in any given semester, but all are expected to attend and to enter into the discussion.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**PSY 290: Special Topics Study Course [1 - 4]**

Under faculty supervision, group of students meets each week for a semester in a student-led study group to pursue a specific topic of their choice that is not covered in other department courses.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**PSY 294: Individual Studies [2 - 12]**

Designed primarily as preparation for qualifying examinations. May be required by some area committees as a requisite for taking examinations.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**PSY 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**PSY 296: Research Topics in Psychology [1]**

Research group meeting, one hour. Limited to graduate students. Discussion of current literature, new ideas, methodological issues, and preliminary findings. Research presentations and opportunities for feedback on current and proposed research activity to encourage, support, and facilitate student research expertise. Assigned readings included.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**PSY 297: Research for Ph.D. Dissertation [2 - 12]**

At least one 297 course is required during each year following completion of qualifying examinations.

*Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**PSY 298: Directed Group Study [1 - 12]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**PSY 299: Directed Individual Research and Study in Psychology [2 - 12]**

One 299 course is required during second semester of the first year of graduate study, and both semesters of the second year of graduate study.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## PUBLIC POLICY

**PUBP 001: Introduction to Public Policy [4]**

Interdisciplinary introduction to public policy and policy issues facing the American voter. Emphasis is on how difficult it is to arrive at an informed decision—not on determining what that decision ought to be. Examines a diverse set of policy topics, including environment, health, education, and social policy, among others.

*Letter grade only.*

**PUBP 090X: Freshman Seminar [1]**

Examination of a topic in public policy.

*Pass/No Pass grading only. May be repeated for credit.*

**PUBP 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**PUBP 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PUBP 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**PUBP 100: Political Process and Institutions [4]**

Political and governmental context of policy, form agenda setting to evaluation. Course examines

the context for setting constitutional, federal and local policy, as well as processes by which governmental institutions make decisions. We also examine interactions between institutions and approaches that further policy decision making.

*Prerequisite:* PUBP 001 or POLI 001. Letter grade only.

#### **PUBP 110: Poverty and Social Policy [4]**

Overview of poverty and social policy in the United States in a historical context from the nineteenth century until the present. Discusses current policy issues and policy debates surrounding poverty and inequality.

*Prerequisite:* (PUBP 001, PUBP 100, ECON 100 and PSY 105) or ECON 130. Letter grade only.

#### **PUBP 120: Health Care Policy [4]**

Examines current health policy issues and policy approaches, as a way of exploring problems in the design and implementation of policy. It concentrates on issues of access to care, quality of care, health care costs, health insurance, health behavior, and the cultural and linguistic issues facing immigrants' access to care.

*Prerequisite:* (PUBP 001, PUBP 100, ECON 100 and PSY 105) or ECON 130. Letter grade only.

#### **PUBP 130: Environmental Policy [4]**

Examines current environmental policy as a way of exploring problems in the design and implementation of policy. Provides an overview of basic concepts and methods of environmental policy analysis and implementation looking at a range of local and global environmental policy issues, such as environmental justice, air quality, and urbanization.

*Prerequisite:* (PUBP 001, PUBP 100, ECON 100 and PSY 105) or ECON 130. Letter grade only.

#### **PUBP 140: Immigration and Public Policy [4]**

Examines the origins, consequences, and characteristics of immigrants to the United States, from the nineteenth century to the present. We look at social and economic forces behind immigration; the impact of immigrants; and their process of integration. We also examine various debates on immigrant and immigration policy.

*Prerequisite:* (PUBP 001, PUBP 100, ECON 100 and PSY 105) or ECON 130. Letter grade only.

#### **PUBP 150: Race, Ethnicity and Public Policy [4]**

Examines the ways in which policies are shaped by and respond to issues of race, ethnicity and culture. Among others, we explore issues of inequality in the labor market, segregation, discrimination, environmental justice, health care access, and social and political inequality.

*Prerequisite:* (PUBP 001, PUBP 100, ECON 100 and PSY 105) or ECON 130. Letter grade only.

#### **PUBP 195: Upper Division Undergraduate Research [1 - 4]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **PUBP 196: Individual Internship [1 - 4]**

Involves an internship in the public policy field. For example, a 10-week internship, usually completed during the summer between junior and senior year at a governmental or non-profit organization, a research center, or UC Centers in

Sacramento or Washington, D.C. Public Policy majors are required to write an original research paper based on the internship.

*Prerequisite:* PUBP 100, ECON 100 and (PSY 105 or ECON 130) or consent of instructor.

#### **PUBP 198: Upper Division Directed Group Study [1 - 5]**

Group directed study.

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **PUBP 199: Upper Division Individual Study [1 - 4]**

Course involves an independent research project under the supervision of a Public Policy faculty member. Public Policy majors are required to take the course for 4 units and are required to write a major research paper. To be taken in the senior year.

*Prerequisite:* PUBP 100, ECON 100 and (PSY 105 or ECON 130). *Permission of instructor required. May be repeated for credit.*

## QUANTITATIVE AND SYSTEMS BIOLOGY

#### **QSB 200: Molecular Cell Biology [3]**

A graduate-level course focusing on molecular aspects of cellular processes, including signal transduction, cell division, differentiation, protein synthesis and degradation, and regulation of gene expression. Each topic is accompanied by critical evaluation of classic papers and recent publications. Upper division undergraduate courses in cell and molecular biology should have been completed as course requisites for this course.

*Letter grade only.*

#### **QSB 201: Teaching and Learning in the Sciences [1]**

Students are introduced to 'scientific teaching'—an approach to teaching science that uses many of the same skills applied in research. Topics include how people learn, active learning, designing, organizing and facilitating teachable units, classroom management, diversity in the classroom and assessment design.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. Discussion and seminar included.*

#### **QSB 207: Physical Biochemistry [3]**

Physical Biochemistry is the study of properties such as macromolecular folding, multimerization, structure, and ligand binding. This course will instruct students on these, and on the experimental techniques that can quantitatively probe these properties, including hands-on work with multidimensional NMR data. Also included is in-depth discussion of recent biophysical literature.

*Letter grade only.*

#### **QSB 212: Advanced Signal Transduction and Growth Control [4]**

Signal transduction in mammalian cells with emphasis on molecular and genetic regulation of these processes and their role in cell function. Graduate requirement includes an advanced discussion section involving research methodology and data interpretation led by the instructor.

*Prerequisite:* An undergraduate biochemistry course or consent of instructor.

#### **QSB 214: Tissue Engineering Design [3]**

Fundamental topics include: issues related to the cell source (including stem cells, plasticity, transdifferentiation, therapeutic cloning vs. reproductive cloning, bone marrow transplants, and cell differentiation and purification), cell culture and tissue organization, gene therapy delivery methods, cell adhesion and migration, issues in construct design, tissue preservation, and immunoisolation and/or modulation. Current case studies and issues for FDA approval of tissue engineered products are also covered.

*Prerequisite:* MATH 021, PHYS 008 and BIO 100 or equivalent.

#### **QSB 215: Principles of Biological Technologies [3]**

The principles underlying commonly used and cutting-edge technical procedures in biological research. Lectures and primary literature critiques on biochemical, molecular, cellular, bioengineering and computational techniques.

*Prerequisite:* QSB 290 or consent of instructor.

#### **QSB 217: Lab on a Chip: Developing 3rd World Diagnostics for Global Health [3]**

This is the first-ever four campus course between UC San Francisco, UC Berkeley, UC Santa Cruz, and UC Merced which aims to 1) raise awareness and knowledge about global health issues 2) teach students critical engineering skills such as nano/micro-fabrication 3) enable students to design, build, and test their own diagnostics and 4) develop entrepreneurial skills. Students learn about tuberculosis from leading experts at UCSF and then address the dearth of sensitive diagnostics by designing and testing their own nano/micro-systems. Taught at UC Merced with teleconferencing to the other campuses and two field trips. Funded in part by QB3.

*Letter grade only. Laboratory included.*

#### **QSB 220: Cellular Microbiology [3]**

Emphasizes the molecular basis of interaction between microbial pathogens (bacteria, viruses and protozoan parasites) and host cells. We also include discussion of the immune response to infection. Student-led presentations and discussion of reading assignments from the current scientific literature.

*Letter grade only.*

#### **QSB 227: Virology [3]**

Overview of viruses, focusing on structure, infecting cycle, interactions with host, transmission and methods of detection and control.

*Prerequisite:* QSB 290 or consent of instructor.

#### **QSB 241: Advanced Genomic Biology [4]**

Comprehensive introduction to the language of genes and genomes, including genotype to phenotype relationships, gene regulation of development and disease, sources of phenotypic variation, and organization of genomes across the domains of life. Graduate requirements include advanced discussion section led by instructor and genome informatics project.

#### **QSB 242: Genome Biology [5]**

Introduction to the concepts behind genome biology and a detailed overview of the many tools used in comparative genomics. Specific topics include genome assembly, gene modeling

and comparative genomics, transcriptomics, and proteomics of prokaryotic and eukaryotic organisms. Students carry out real scientific projects in collaboration with course faculty and produce new genomic data of publishable quality. Mandatory weekly three hour lab is part of this course.

*Prerequisite: BIO 141. Letter grade only. Laboratory and discussion included.*

### **QSB 244: Phylogenetics: Speciation and Macroevolution [3]**

Theory underlying reconstruction of evolutionary relationships and introduces the comparative methods and tools of phylogenetics. Topics include morphological, molecular, and fossil data in distance, parsimony, likelihood, and Bayesian frameworks for investigating geographic patterns and rates of speciation, phenotypic evolution, diversification, extinction, and biogeography.

*Letter grade only. Discussion included.*

### **QSB 244L: Phylogenetics Laboratory: Speciation and Macroevolution [1]**

Practice in reconstruction of evolutionary relationships and introduces the comparative methods and tools of phylogenetics. Topics include morphological, molecular, and fossil data in distance, parsimony, likelihood, and Bayesian frameworks for investigating geographic patterns and rates of speciation, phenotypic evolution, diversification, extinction, and biogeography. QSB 244 must be taken concurrently.

*Letter grade only.*

### **QSB 250: Embryos, Genes and Development [3]**

Principles of developmental biology as revealed through analysis of invertebrate and vertebrate system. Animal models are used to examine the molecular and cellular mechanisms that influence cell fate. Cell signaling is studied in the context of embryonic pattern formation and the development of body plans and organ systems. Graduate level students read discuss and critique current research papers relevant for the field.

*Prerequisite: QSB 290 and BIO 110 or consent of instructor. Letter grade only. Discussion included.*

### **QSB 252: Cancer Genetics and Tumor Biology [3]**

Topics include viral and hormonal carcinogenesis, molecular aberrations in cancer, tumor development, epigenetic and cancer, tumor immunology, oncogenes.

*Letter grade only.*

### **QSB 261: Human Physiology [3]**

Understanding the mechanisms underlying function of major human organs. Emphasis includes neural transmission and action potential, cardiovascular, renal and gastrointestinal physiology, metabolism, and endocrinology. Laboratory experiments demonstrating and reinforcing topics covered in lecture with an emphasis on scientific method. Discussion section critically reads and evaluates papers in physiology and provide an opportunity for the students to practice presenting scientific data to an audience.

*Permission of instructor required. Letter grade only. Laboratory and discussion included.*

### **QSB 280: Advanced Mathematical Biology [3]**

Graduate level mathematical modeling and data analysis skills for life science researchers taught through hands-on computational laboratories.

Topics include population models, predator-prey and competition systems, epidemic models with applications to sexually transmitted diseases, dynamic diseases, enzyme kinetics, biological oscillators, and switches.

*Letter grade only. Discussion included.*

### **QSB 281: Advanced Computational Biology [4]**

Introduction to the principles and application of computational simulations and modeling in biology, ranging from bioinformatics to computational cell biology. Topics to be covered include genome sequence analysis and annotation, phylogenetic analysis, protein structure prediction, molecular modeling, and docking and simulations of metabolic and regulatory networks. Graduate requirements include advanced discussion section led by instructor and computational biology project.

### **QSB 282: Bioinformatics [5]**

Graduate level introduction to tools, algorithms, statistics, and databases used in bioinformatics, emphasizing an open-source, command-line toolbox approach. Topics covered as in BIO 182, plus critical assessment of bioinformatics literature, introduction to Perl, and an independent research project. Mandatory computer laboratory, for which prior programming experience helpful but not assumed.

*Laboratory and Discussion included.*

### **QSB 283: Population Genetics [3]**

The various factors that affect gene flow and frequency within a population. Theories of selection, neutrality, drift, hitchhiking, recombination, mutation, isolation, in-breeding, and selfish genetic elements are taught along with statistical tests and experimental methods for detecting these forces.

*Letter grade only. Discussion included.*

### **QSB 290: Current Topics in Quantitative and Systems Biology [3]**

Discussion, reading, and study that exposes students to current research directions in the field; student-led presentation, analysis, and discussion of reading assignments from the scientific literature.

*Letter grade only.*

### **QSB 291: Quantitative and Systems Biology Seminar [1]**

Seminar series covering various topics in quantitative and systems biology presented by QSB Graduate Group faculty and visiting speakers.

*Letter grade only. May be repeated for credit.*

### **QSB 292: Quantitative and Systems Biology Group Meeting [1]**

Meetings to describe current progress and research plans lead by individual QSBGG faculty.

*Letter grade only. May be repeated for credit.*

### **QSB 293: Quantitative and Systems Biology Journal Club [1]**

Student-led presentation, analysis, and discussion of reading assignments from the scientific literature.

*Letter grade only. May be repeated for credit.*

### **QSB 294: Responsible Conduct of Research [1]**

Seminar covering responsibilities and expectations for researchers as well as advice for success in graduate school and science careers, required for NIH-funded graduate students.

*Satisfactory/Unsatisfactory grading only.*

### **QSB 295: Graduate Research [1 - 12]**

*Supervised research.*

*Permission of instructor required. May be repeated for credit.*

### **QSB 296: Professional Skills Development [1]**

*This course is limited to graduate students only.*

The course will expose graduate students to some of the more critical skill sets to enhance their professional development. Topics to be covered will consist of (but not limited to): 1) Writing abstracts, 2) Writing a manuscript, 3) writing grants, 4) research presentations (oral and poster), 5) lecture presentation, 6) critical scientific evaluation, 7) manuscript review, and 8) developing a CV.

*Satisfactory/Unsatisfactory grading only.*

### **QSB 298: Directed Group Study [1 - 12]**

*Group project under faculty supervision.*

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

### **QSB 299: Directed Independent Study [1 - 12]**

*Independent project under faculty supervision.*

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

### **QSB 399: University Teaching [1]**

Centered on a student's classroom experiences as a Teaching Assistant in an undergraduate Biological Sciences course. Provides a faculty-directed opportunity to implement teaching practices presented in the course Teaching and Learning in the Sciences. Involves video-taping of teaching, peer review, and weekly meetings with faculty.

*Prerequisite: must hold at least a 25%-time appointment as a Teaching Assistant for an undergraduate course in Biological Sciences. QSB 201 or MATH 201 or (Teaching and Learning in the Sciences) are co-requisites. Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit once. Laboratory and discussion included.*

## **SOCIAL AND COGNITIVE SCIENCES**

### **SCS 090X: Freshman Seminar [1]**

*Examination of a topic in the social, behavioral and cognitive sciences.*

*May be repeated for credit once.*

### **SCS 095: Lower Division Undergraduate Research [1 - 5]**

*Supervised research.*

*Permission of instructor required. May be repeated for credit.*

**SCS 098: Lower Division Directed Group Study [1 - 5]**

Instructor directed study for groups of lower division status.

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SCS 099: Lower Division Individual Study [1 - 5]**

Instructor directed study for groups of lower division status.

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SCS 140: Psychology and Economics [4]**

A review of psychological and economic research on departures from perfect rationality, self-interest, and other classical assumptions of economics. The implications of these new findings for classical economics are explored.

*Prerequisite: PSY 001 and ECON 001. Discussion included.*

**SCS 145: Second Language Learning and Bilingualism [4]**

Issues in second language acquisition, including processing of linguistic information by bilinguals (perception, recall, translation), structure of bilingual discourse, child bilingualism, language maintenance or shift, with particular focus on the North American Context.

*Prerequisite: PSY 001. Discussion included.*

**SCS 192: Integrative Topics [4]**

Special topics that integrate theory or research from more than one discipline in the social and behavioral sciences.

*Prerequisite: PSY 001, ECON 001, SOC 001 or POLI 001 or consent of instructor. May be repeated for credit once.*

**SCS 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**SCS 198: Upper Division Directed Group Study [1 - 5]**

Group study for upper division students.

*Prerequisite: Junior standing. Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SCS 199: Upper Division Individual Study [1 - 5]**

Individual directed study for upper division students.

*Prerequisite: Junior standing. Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SCS 210: Philosophy of Cognitive Science [4]**

Consideration of philosophical and foundational issues in cognitive science, such as: behaviorism, functionalism, the Turing Test, the Chinese Room argument, the nature of cognitive architecture, animal cognition, connectionism vs. symbolic artificial intelligence, consciousness, the self, free will, embodiment, and ethics.

*Letter grade only. Discussion included.*

**SCS 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**SCS 298: Directed Group Study [1 - 12]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**SCS 299: Directed Independent Study [1 - 12]**

Independent project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## SOCIOLOGY

**SOC 001: Introduction to Sociology [4]**

The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality.

*Discussion included.*

**SOC 009: Community Mobilization and Politics [4]**

Examination of political and social mobilization at the local level, including strategies for organization and advocacy.

*Discussion included.*

**SOC 010: Statistics for Sociology [4]**

This course will introduce students to the logic and use of statistical techniques in sociological research. By the end of the course, students will have the tools to appreciate and evaluate social research, and a foundation for conducting statistical social research themselves.

*Prerequisite: MATH 005 or equivalent score on the Math Placement Exam. Letter grade only. Laboratory included.*

**SOC 015: Sociological Research Methods [4]**

This course provides students with a basic understanding of how to conduct social science research. Topics will include the logic of research design, issues of conceptualization and measurement, the range of data collection methods available to social scientists, and what social scientists do with data once they have collected it.

*Letter grade only. Discussion included.*

**SOC 020: Social Problems [4]**

Social problems examines the perceptions, theories, arguments, and proposed solutions to the most vexing social issues. Explanations of these problems can be grouped into micro, meso, and macro levels of analysis. In addition, for the last 100 years researchers have examined the overlap between different social problems.

*Discussion included.*

**SOC 030: Social Inequality [4]**

The course will examine the main classical and modern explanations of the causes of social, economic and political inequality. Issues include: power; processes that create/maintain inequality, the central axes of inequality in society (race/class/gender); consequences of inequality for individuals and groups; how policy can mitigate or exacerbate inequality.

*Discussion included.*

**SOC 035: Introduction to Political Sociology [4]**

The most pressing issues of our time are addressed via the political system. This course considers the many processes that influence the political system and political outcomes. By drawing on the insights of sociology, we will better understand these processes and how the political system works.

*Discussion included.*

**SOC 055: Sociology of the Family [4]**

This course will introduce basic sociological theories, concepts and issues regarding marriage and the family in a larger societal context. The course will investigate the diversity that marriages and families have in society, and examine how theoretical paradigms influence the way sociology perceives and studies marriages and families.

*Discussion included.*

**SOC 070: Introduction to Crime and Deviance [4]**

Examines the process of criminal justice in the US and address major theories of crime and deviance. In addition: how individuals and social groups are processed through the criminal court system; historical changes in correctional philosophy and organizational structure; inmate socialization, and social environment changes in U.S. prisons.

*Discussion included.*

**SOC 090X: Freshman Seminar [1]**

Examination of a topic in sociology.

*May be repeated for credit once.*

**SOC 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**SOC 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SOC 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SOC 100: Sociological Theory [4]**

Sociological theory explores many big questions that people have pondered for centuries, including inequality and why it is tolerated, social change and how it occurs, and social order and how it is maintained. This course provides an introduction to sociological theory, examining both classic and contemporary schools of sociological thought.

*Prerequisite: Junior standing and SOC 001 and any additional lower-division SOC course. Letter grade only.*

**SOC 110: Social Movements, Protest and Collective Action [4]**

Introduction to the social scientific study of social protest (meaning all forms of non-routine, or contentious politics) and collective action. Examines organized collective efforts to promote or resist change in society that rely, in some part, on non-institutionalized forms of political action.

*Prerequisite: POLI 001, SOC 001 or PUBP 001 or consent of instructor.*

**SOC 115: Political Sociology [4]**

Sociological analysis of types of political organization and action and their relations to elements of social life. Topics include: Social movements, voting, interest group politics, protest behavior, revolutions, human rights, global political diffusion, and other elements of the interaction between the political structure and everyday life.

*Prerequisite:* SOC 001, POLI 001 or PUBP 001. Letter grade only.

**SOC 130: Advanced Social Stratification [4]**

The course will examine in depth the main classical and modern explanations of the causes of social, economic and political inequality. Issues include: Power; processes that create/maintain inequality, the central axes of inequality in society (race/class/gender); consequences of inequality for individuals and groups; how policy can mitigate or exacerbate inequality.

*Prerequisite:* SOC 001, ECON 001, POLI 001 or ANTH 001. Letter grade only.

**SOC 131: Urban Inequality [4]**

The goal of this course is to examine a small selection of the work on urban poverty in the United States in a seminar setting. We examine in depth theories behind the evolution of the urban poor, as well as the impact of poverty upon individuals.

*Prerequisite:* SOC 001, SOC 003, SOC 008, POLI 001 or PUBP 001 or consent of instructor. Letter grade only.

**SOC 132: Sociology of Education [4]**

Focuses on how social forces (such as politics, economics, demographics and institutional context) create variation in school practices, and how variation in school practices affects individual student achievement and behavior. Students also become familiar with presenting, interpreting, and discussing public education data.

*Prerequisite:* SOC 001, POLI 001 or ANTH 001 or consent of instructor.

**SOC 134: Sports and Society [4]**

Sports are often dismissed as unimportant to society's working. However, some of society's most important moments, racial integration (Jackie Robinson), gender equality (Title IX), and recognition of new nations (Olympics) have been through sports. We examine the dynamics sports play in society, focusing on issues of race, gender and nationality.

*Prerequisite:* SOC 001, ANTH 001 or POLI 001 or consent of instructor.

**SOC 140: Organizational Behavior [4]**

This course examines the evolution of the modern organization, focusing on approaches to corporate strategy and to managing employees. We read social scientific analyses and case studies to trace the history of management, and study social science perspectives that question the efficiency and the equity of current organizational practices.

*Prerequisite:* SOC 001, ECON 001 or POLI 001. Letter grade only. Discussion included.

**SOC 150: Self and Society [4]**

This course presents an overview of one fundamental topic in the sociological approach to social-psychology, the shaping of consciousness by interaction. Beginning with classical texts, we will then examine a set of contemporary

works, arranged in order of the degree to which psychology is made fundamentally social.

*Prerequisite:* SOC 001 or PSY 001. Letter grade only.

**SOC 160: Advanced Topics in Sociology and Gender [4]**

The role gender plays in structuring social lives. We begin by discussing sociological theories of gender, gender socialization/parenting, gender identity and intersections of gender and sexuality. We then examine gender on an institutional and systemic level-focusing on how organizations, such as work, education, the law, and politics are gendered.

*Prerequisite:* SOC 001, POLI 001, ANTH 001 or SOC 060 or consent of instructor. Letter grade only. May be repeated for credit.

**SOC 161: Sociology of Sexuality [4]**

Since its inception in the 1960s, the sociological study of sexuality has developed along two lines, one focusing on the social construction of sexuality and the other on sexual behavior and demographic trends. Although we cover both perspectives in the class, our primary focus is on work within the social constructionist tradition.

*Prerequisite:* SOC 001, POLI 001, ANTH 001 or SOC 060 or consent of instructor. Letter grade only.

**SOC 170: Qualitative Research Methods [4]**

This course introduces techniques of, and approaches to, qualitative research. We will explore research design issues including developing research questions, selecting methods, and the ethics of research. We will then examine the collection, analysis, and presentation of qualitative data.

*Prerequisite:* SOC 001, ANTH 001 or POLI 001. Letter grade only.

**SOC 180: Advanced Issues in Race and Ethnicity [4]**

Examines in depth the main classical and modern explanations of the issues surrounding Race and Ethnicity. Issues include: Power; processes that create/maintain inequality, biological vs. social constructions of race, race and ethnicity in the age of conquest, race and ethnicity in modern society.

*Prerequisite:* SOC 001, PUBP 001, POLI 001 or ANTH 001. Letter grade only.

**SOC 185: Topics in Sociology [4]**

Intensive treatment of a special topic or problem in sociology. May be repeated for credit in different subject area.

*Prerequisite:* SOC 001. May be repeated for credit.

**SOC 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**SOC 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SOC 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SPANISH**

No credit is allowed for completing a less advanced course after successful completion (C- or better) of a more advanced course in the foreign languages. This applies only to lower division foreign language courses, not upper division courses.

**SPAN 001: Elementary Spanish I [4]**

Introduction to speaking, reading, writing, and understanding Spanish. Classes conducted in Spanish.

*Letter grade only.*

**SPAN 002: Elementary Spanish II [4]**

Introduction to speaking, reading, writing, and understanding Spanish. Classes conducted in Spanish.

*Prerequisite:* SPAN 001 or equivalent score on the Spanish Placement Exam. Letter grade only.

**SPAN 003: Intermediate Spanish I [4]**

Review of Spanish grammar with emphasis on building speaking and writing skills and on readings to build cultural understanding. Classes conducted in Spanish.

*Prerequisite:* SPAN 002. Letter grade only.

**SPAN 004: Intermediate Spanish II [4]**

Review of Spanish grammar with emphasis on building speaking and writing skills and on readings to build cultural understanding. Classes conducted in Spanish.

*Prerequisite:* SPAN 003. Letter grade only.

**SPAN 010: Spanish for Heritage Speakers I [4]**

For native speakers with limited experience in grammar and composition. Emphasis on formal language study and writing. Classes and discussion conducted in Spanish.

*Prerequisite:* Passing score on the Spanish Placement Exam

**SPAN 011: Spanish for Heritage Speakers II [4]**

For native speakers with limited experience in grammar and composition. Emphasis on formal language study and writing. Classes conducted in Spanish.

*Prerequisite:* SPAN 010.

**SPAN 090X: Freshman Seminar [1]**

Examination of a topic in Spanish.

*May be repeated for credit.*

**SPAN 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**SPAN 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SPAN 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**SPAN 103: Spanish Composition and Conversation [4]**

To develop a student's abilities to communicate in spoken and written Spanish, we emphasize

the importance of the interaction between writer, reader, purpose and message. We focus on the four major modes of writing: description, narration, exposition and argumentation. Oral practice is also a major component in this course.

*Prerequisite:* SPAN 004 or SPAN 011. Letter grade only.

#### **SPAN 105: Hispanic Cultures I [4]**

The cultures of the Hispanic world from an interdisciplinary perspective. Covers the period ending in the nineteenth century, emphasizing conversation and composition.

*Prerequisite:* SPAN 103 or consent of instructor.

#### **SPAN 106: Hispanic Cultures II [4]**

Hispanic cultural manifestations from an interdisciplinary perspective. Covers from the nineteenth century to the present, emphasizing conversation and composition.

*Prerequisite:* SPAN 103 or consent of instructor.

#### **SPAN 110: Spanish Linguistics [4]**

Introduction to the study of key areas of Spanish Linguistics such as the sound system, word form, syntactic patterns, the development of language, and regional and social variations.

*Prerequisite:* SPAN 103 or consent of instructor. Letter grade only.

#### **SPAN 141: Spanish for Health Professionals [4]**

Specialized Spanish vocabulary and expressions that health-care professionals need to communicate with Hispanic patients and to carry out research in that language. Includes the reading of medical essays and composition.

*Prerequisite:* SPAN 004 or SPAN 011 or equivalent score on the Spanish Placement Exam.

#### **SPAN 142: Spanish for Business and Management [4]**

Specialized Spanish vocabulary and expressions used to carry out business with Hispanic individuals or companies. Addresses cultural awareness and includes the reading of essays that deal with the course's topics. In addition, students learn how to write professional letters and other documents in Spanish.

*Prerequisite:* SPAN 004 or SPAN 011 or equivalent score on the Spanish Placement Exam.

#### **SPAN 180: Topics in Hispanic Languages and Cultures [4]**

In-depth study of Spanish Languages and/or Hispanic Culture. Possible topics include Latin American and Spanish Film, the Mexican Corrido, Gender and Latin American Popular Music. With Permission of the instructor, can be repeated for credit as topics change.

*Prerequisite:* SPAN 103 or equivalent score on the Spanish Placement Exam. Permission of instructor required. Letter grade only. May be repeated for credit twice with different topics.

#### **SPAN 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **SPAN 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

#### **SPAN 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## UNDERGRADUATE STUDIES

#### **USTU 010: Introduction to Undergraduate Studies [1]**

Combining weekly, large-group, interactive lectures and small-group discussion sessions, we focus on topics related to navigating campus life and strategies for effective learning at UC Merced. Reflective writings and engagement in activities on campus that promote self-empowerment and academic success play key roles in this course.

*Pass/No Pass grading only. May be repeated for credit twice. Fieldwork and Discussion included.*

## WORLD CULTURES AND HISTORY

#### **WCH 100: Topics in Area Studies [4]**

In-depth study of the history and cultural, political, and economic systems of a region.

*May be repeated for credit.*

#### **WCH 190: World Cultures and History Proseminar: Research [4]**

Capstone course for majors. Students conduct research under faculty supervision to culminate in a senior thesis. Required of all World Cultures and History majors.

*Prerequisite:* Senior standing. Pass/No Pass grading only.

#### **WCH 191: World Cultures and History Proseminar: Senior Thesis [4]**

Capstone course for majors. Completion of a senior thesis; extensive writing required. Required of all World Cultures and History majors.

*Prerequisite:* Senior standing and WCH 190. Letter grade only.

#### **WCH 192: Public Research Project in World Cultures and History [1 - 4]**

Directed individual or group project designed around need of an external agency for research and public communication on an issue of vital public interest. End product may be in the form of a written report, interpretive text for the public, web site, etc. Extensive writing is required.

*Letter grade only.*

#### **WCH 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

#### **WCH 198: Upper Division Directed Group Study [1 - 5]**

Directed group study and research, under the direction of WCH faculty.

*Permission of instructor required. Letter grade only. May be repeated for credit.*

#### **WCH 199: Upper Division Individual Study [1 - 5]**

Directed individual study and research, under the direction of WCH faculty, in area not normally covered in the WCH curriculum.

*Permission of instructor required. Letter grade only. May be repeated for credit.*

#### **WCH 200: The University as an Institution [4]**

Provides students with the capacity to critically analyze the university as an institution embedded in American society. Students address issues such as the corporate funding of university research, the relationship between academia and foreign policy, and what happens when professors write controversial books.

*Letter grade only.*

#### **WCH 201: Research Proseminar [4]**

Introduces graduate students to the different methods of research employed in the disciplines represented in World Cultures and History. Students work on specific topics pertaining to their research, and they approach them using a variety of those methods covered in class.

*Letter grade only.*

#### **WCH 202: Theories and Methods in the Study of Cultures [4]**

Seminar introduces graduate students to the wide variety of theories and methods employed in the disciplines represented in World Cultures and History. It also serves to prepare students for their Comprehensive Examination. Students work with members of the Examination Committee to compose reading lists tailored to their research interests.

*Letter grade only. May be repeated for credit once.*

#### **WCH 203: The Historian's Craft [4]**

Various techniques of research and writing used by historians, from Thucydides to the so-called revisionists of today's "culture wars," and the changing audience of the historian.

*Letter grade only.*

#### **WCH 210: Topics in California Studies: Constructing California [4]**

Major texts that have helped to construct our understanding of and attitude toward California's environment, with an interdisciplinary emphasis that includes publications in environmental policy and law, conservation, quality assessment, landmark legal and historical cases, as well as fiction, poetry and non-fiction.

*Letter grade only.*

#### **WCH 220: Chicano/a Literature [4]**

Multidisciplinary analysis of Chicano/a literature. Main aspects covered include: Chicano/a literary history (including issues of canonicity and reception), bilingualism and literature (including both stylistic and sociolinguistic approaches), ethnicity and race, gender parameters, the aesthetics of the borderlands, class and regional variations, migration and diaspora, film and folklore, and the journalistic tradition.

*Letter grade only. May be repeated for credit twice.*

#### **WCH 221: U.S. Latino/a Literature [4]**

In-depth study of U.S. Latino/a literature and its history. Through the analysis of works from different genres, the student is exposed to the main themes, techniques, styles, etc. used by Latino/a authors. Students will present orally on selected topics and secondary bibliography, and they will write an original research paper.

*Letter grade only.*



**WCH 225: Philosophy and Theory [4]**

Seminar explores the interdisciplinary common ground between philosophy and literary theory. Authors studied may include Husserl, Heidegger, Gadamer, Iser, Jauss, Fish, Deleuze, Sartre, Wittgenstein, Kant, and Aristotle, among others. Course is complemented by a practical application of these theories to selected literary texts.

*Letter grade only.*

**WCH 230: Topics in Humanities and New Media [4]**

How emerging technologies are used to record, analyze and communicate information about history and culture; read critical theory in order to understand the characteristics of text, image, and interactive media; and survey the future challenges and prospects for new media in the humanities.

*Letter grade only. May be repeated for credit.*

**WCH 231: The Great Depression in History and Literature [4]**

Focusing on the turbulent decade of the 1930s, we use the lens of history and literature to explore how events from 1929-1941 helped shape modern America. Particular attention is paid to the impact of these years upon California and the West.

*Letter grade only.*

**WCH 240: Topics in United States Social and Cultural History [4]**

Selected topics in U.S. social and cultural history through a reading of both classic and newer studies in areas such as race, ethnicity, class, and gender. Students are exposed to both theoretical approaches to these issues as well as monograph case studies.

*Letter grade only.*

**WCH 245: China and World History [4]**

Topics concerning the middle period of imperial China, the world's most durable and successful agrarian empire. Second, course locates China in world history, raising historiographical questions about the study of a regional history in both a national and a global tradition.

**WCH 248: Race, Empire, and US Foreign Policy [4]**

U.S. foreign policy from the 1890s through the present using the lenses of empire and race. Students are introduced to theories and methods within the study of U.S. foreign policy in the course of studying events ranging from the Spanish American War of 1898 to the Iraq war.

*Letter grade only.*

**WCH 250: The Cold War, 1941 - 1991 [4]**

The political, cultural, and intellectual history of America's confrontation with Communist at home and abroad, from U.S. entry into the second World War to the collapse of the Soviet Union and its aftermath.

*Letter grade only.*

**WCH 258: Hispanic and Anglo-American Modernisms [4]**

Study through novel of principal characteristics of Hispanic Modernismo and Anglo-American Modernism. We examine the representation of the city in literature through the works of Pio Baroja, Valle Inclin, James Joyce and John Dos Passos, among others. Texts are analyzed through key urban literature historians/critics such as Lewis Mumford, Walter Benjamin, Raymond

Williams, Burton Pike and Richard Lehan. Seminar is taught in English.

*Letter grade only.*

**WCH 260: Social Memory [4]**

Theoretical exploration of the practices, sites, and functions of social memory. Topics include the social construction of the past; how societies remember; the relationship between history and memory; collective identity; oral history; tradition and modernity; public memory; nostalgia; amnesia; and the politics of memory.

*Letter grade only.*

**WCH 262: Material Culture [4]**

Multidisciplinary examination of material objects and the role artifacts play in human social relations, identity, and representation in both the past and present. Explores the range of production and use of material objects, including theories of material culture, technology, identity, class, gender, value, style, meaning, memory, agency, commodification, collecting, and museums.

*Letter grade only.*

**WCH 270: Transatlantic Utopias in Literature and Culture [4]**

Comparative and trans spatial approach to examining Utopian constructions in literature. Using both primary sources such as novels, and secondary readings in theory and criticism, course seeks to examine the role such constructions play in historical and contemporary understandings of society.

*Letter grade only. May be repeated for credit once.*

**WCH 280: American Nature Writing and Literature of the Environment [4]**

Seeks to understand American attitudes toward natural and constructed landscapes by examining various modes of literary responses to the American environment, including poetry, non fiction, and fiction. Attention is given to historical and political movements and texts.

*Letter grade only.*

**WCH 290: Teaching Pedagogy and Practice [4]**

Designed for graduate student teaching assistants. Discussion focuses on pedagogical issues such as grading, syllabus design and assignments, as well as on classroom practices. Students meet at frequent intervals, and they have the chance to meet with professors in their areas of expertise and to meet as a group.

**WCH 291: Themes in Cultural Studies [4]**

Exploration of various themes in cultural studies. Course reading list is drawn from foundational texts as well as contemporary writings drawn from feminist theory, gender studies, and critical theory.

*Letter grade only.*

**WCH 295: Graduate Research [1 - 12]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**WCH 296: Research MA Thesis [1 - 6]**

Research and writing of M.A. thesis.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only.*

**WCH 297: Research for PhD Dissertation [2 - 12]**

Research and writing of Ph.D. dissertation. At least one 297 course is required during each year following completion of qualifying examinations.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**WCH 298: Directed Group Study [1 - 12]**

Group project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

**WCH 299: Directed Independent Study [1 - 12]**

Independent project under faculty supervision.

*Permission of instructor required. Satisfactory/Unsatisfactory grading only. May be repeated for credit.*

## WORLD HERITAGE

**WH 001: Introduction to World Heritage [4]**

Introduction to the concept of cultural and natural World Heritage. Topics include international policy in heritage management, the role of governments and organizations in identifying and protecting heritage, methods for documenting and interpreting heritage sites, and cultural and intellectual property ethics.

*Discussion included.*

**WH 002: Cyber Heritage [4]**

An examination of the new forms of communication and interpretation provided by internet 2.0, viewed in the context of the creation of virtual heritage on the web. Second Life will be used to explore the social and technological dimensions and to experiment with a cyber-anthropological approach.

*Letter grade only. Laboratory included.*

**WH 003: International Heritage [4]**

Cultural heritage is studied in relation to legal and management issues, cultural heritage protection, and its principal organizations and institutions. Students will analyze the key principles and policies through the examination of international heritage institutions, conventions and charters.

*Letter grade only. Discussion included.*

**WH 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**WH 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**WH 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**WH 100: Virtual Heritage and World Heritage [4]**

Introduction to virtual heritage and world heritage, definitions and methods. Students learn how to describe, analyze, contextualize, preserve,

and communicate information derived from heritage resources.

*Prerequisite: WH 001 or consent of instructor.*

### **WH 110: Reconstructing Ancient Worlds [4]**

Methodological issues concerning the reconstruction and depiction of the ancient world; study of validation processes for virtual reconstruction; epistemological and anthropological issues. Techniques include documentation, reconstruction, 3D modeling, computer graphics, virtual reality.

Laboratory included.

### **WH 140: Cultural Heritage Policy and Practice [4]**

Critical examination of the legal, practical, and ethical aspects of cultural heritage management in the United States and abroad. Topics include cultural resource management in public and private contexts, participation of stakeholders, the application of anthropological knowledge, and public outreach.

*Prerequisite: ANTH 003, WH 001 or junior standing or consent of instructor.*

### **WH 195: Upper Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### **WH 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **WH 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

## WRITING

### **WRI 001: Academic Writing [4]**

Development of critical reading, thinking, and academic writing ability. Intensive practice in analysis of college-level texts and in expository writing and revision. Section placement based on the student's UC Entry Level Writing Requirement Exam score. Completion with a grade of C or better meets University of California Entry Level Writing Requirement.

*Letter grade only.*

### **WRI 001A: Intensive Academic Writing [2]**

For students who are repeating WRI 1, or students entering with AWPE scores of 4 or lower, we provide an intensive focus on academic language, including grammar, vocabulary, and editing practices.

*Not available for academic credit. Letter grade only.*

### **WRI 010: College Reading and Composition [4]**

Development of college-level skills in effective use of language, analysis and argumentation, organization and strategies for creation, revision and editing.

*Prerequisite: WRI 001 or passing score on the entry level analytical Writing Placement Exam or equivalent. Letter grade only.*

### **WRI 025: Introduction to Creative Writing [4]**

Introduction to the craft of writing poetry, fiction, and creative non-fiction. Students study literary devices and style by considering a variety of texts by published authors. In addition, we provide an opportunity to explore their own imaginative participation in the world around them. They also compose poems, short stories, and literary essays.

*Prerequisite: WRI 010. Letter grade only.*

### **WRI 030: Introduction to Professional Writing [4]**

Students develop proficiency in forms of written communication typical in academic and professional settings. In addition, students perform critical analyses of texts within a variety of rhetorical modes. Assignments emphasize responsible and ethical practices in writing to communicate in the professional world.

*Prerequisite: WRI 010. Letter grade only.*

### **WRI 095: Lower Division Undergraduate Research [1 - 5]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

### **WRI 098: Lower Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **WRI 099: Lower Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

### **WRI 100: Advanced Writing [4]**

Follows WRI 10 and continues to have an interdisciplinary emphasis. However, the emphasis is on the development of style, voice and syntax within writing projects. This could be considered a pre-professional writing course, and it includes readings and writing in creative non-fiction as well as writing for popular and academic periodicals.

*Prerequisite: WRI 025 or WRI 030. Letter grade only.*

### **WRI 101: Writing in the Disciplines: Psychology [4]**

Intended for psychology majors and majors in closely related disciplines, this course refines a student's ability to analyze, synthesize, and explain complex information by producing professional written texts and oral reports for appropriate audiences. Using APA style, each student will also collaborate on a research project.

*Prerequisite: WRI 010 or consent of instructor. Letter grade only.*

### **WRI 105: Grammar and Style [4]**

Basic principles of language study, including the key distinction between classifying and explaining linguistic forms and functions. Building on these principles of language study, students analyze texts of various genres and formats, ranging from literary to conversational to disciplinary discourse. No prior knowledge of grammar or linguistics is required.

*Prerequisite: Junior standing and WRI 010. Letter grade only.*

### **WRI 110: Tutor Training [4]**

Students develop, understand and practice professional ethics as they gain experience in the

tutoring process. The theoretical and practical parameters of how students learn to write, and pedagogies for working with second language students, and a diverse student population, including students with learning disabilities are addressed through readings, reflective journals, research, writing projects and a practicum.

*Prerequisite: WRI 100. Letter grade only.*

### **WRI 115: Topics in Science Writing [4]**

To better understand the difficult process of explaining technical information in clear, accessible, non-technical language, students read widely in the scientific literature, including works by established science journalists and by prominent scientists who have written for the general public. Oral presentations and group projects complement various writing tasks.

*Prerequisite: WRI 100. Letter grade only. May be repeated for credit twice with different topics.*

### **WRI 116: Science Writing in Natural Sciences [4]**

To improve their command of scientific discourse, students in the School of Natural Sciences read widely in scientific literature, including research published in established scientific journals and articles or books by prominent scientists who have written for the general public. Oral presentations and group projects complement various writing tasks.

*Prerequisite: WRI 010. Permission of instructor required for non-science majors. Letter grade only.*

### **WRI 117: Writing for the Social Sciences and Humanities [4]**

Analysis and practice of various research methods and forms of writing in the social sciences and humanities including qualitative/ethnographic, quantitative, interpretive and theoretical. Writing projects such as literature reviews, proposals, case studies, scientific reports, interviews. Attention to disciplinary resources, formal conventions, graphics and style.

*Prerequisite: (WRI 025 or WRI 030) and WRI 100. Letter grade only.*

### **WRI 118: Management Communication Theory and Practice [4]**

Students analyze and demonstrate effective managerial communication skills, with an emphasis on public speaking, presentations, and writing. Topics include business ethics, media relations, intercultural communication, interviewing, persuasion, and the visual representation of data. Extensive work in impromptu oral and written communication in various managerial, organizational, interpersonal situations.

*Prerequisite: WRI 010 and ECON 001. Letter grade only.*

### **WRI 119: Writing for Engineering [4]**

Intensive practice in the presentation of technical subject matter. Students survey the range of audiences to which engineering communities respond, and explore variations in the style and logic of written discourse within the profession. Assignments may include technical reports, design projects, project proposals, press releases, oral presentations, and collaborative projects.

*Prerequisite: WRI 010. Letter grade only.*

### **WRI 120: Rhetorical Theory [4]**

Intensive study in classical and contemporary theories of written rhetoric. The course will enable students to analyze, criticize and deploy

rhetorical strategies via readings in rhetorical theory, application of theory to the criticism of texts, and the imitation and production of arguments.

*Prerequisite: WRI 100 or consent of instructor. Letter grade only.*

**WRI 125: Topics in Creative Writing [4]**

Provides an opportunity to pursue advanced work in creative writing. Each section focuses on one genre: poetry, fiction, drama, or creative nonfiction. Workshop format with a focus on student writing. With Permission of the instructor, this course can be repeated for credit as topics change.

*Prerequisite: WRI 100. Letter grade only. May be repeated for credit twice with different topics.*

**WRI 130: Topics in Professional Writing [4]**

Specialized instruction in one aspect of Professional writing. Topics include, but are not limited to, Journalism, Technical Writing, Copy-Editing, Writing for the Internet, and Research for Writers. Class provides practical instruction in “real-world” writing scenarios, considering important factors such as clarity, tone, audience, ethics, and context. With Permission of the instructor, can be repeated for credit as topics change.

*Prerequisite: WRI 100. Letter grade only. May be repeated for credit twice with different topics.*

**WRI 131: Journal Production [1 - 2]**

Intended for students working on the Undergraduate Research Journal, we examine issues of journal production in print and electronic forms, including editorial analysis of texts and principles of revision. Course work is adjusted to match each student's experience in publication.

*Prerequisite: WRI 100 recommended. May be repeated for credit.*

**WRI 150: Seminar in Creative Writing [4]**

In this advanced workshop students will produce creative and critical work in one of the following genres: fiction, playwriting, poetry, or creative nonfiction.

*Prerequisite: Junior standing, WRI 100 and (WRI 125 or WRI 130). Letter grade only. May be repeated for credit once.*

**WRI 155: Seminar in Professional Writing [4]**

This seminar is based on case studies representing different contexts of professional writing. Specific attention will be devoted to technical writing for the representation of complex information in a form that is accessible to general readers. Elements of translation theory will also be reviewed.

*Prerequisite: WRI 100 and WRI 130. Letter grade only.*

**WRI 160: Seminar in Editing [4]**

This workshop course on editing examines grammar and style, documentation, manuscript solicitation, selection and review, as well as generating manuscripts. Concerns fundamental to editing, such as consistency of voice, integrity of the author's concepts, and use of multiple languages, will be included as part of the editorial process.

*Prerequisite: WRI 100 and WRI 130 or consent of instructor. Letter grade only.*

**WRI 195: Upper Division Undergraduate Research [1 - 4]**

Supervised research.

*Permission of instructor required. May be repeated for credit.*

**WRI 198: Upper Division Directed Group Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

**WRI 199: Upper Division Individual Study [1 - 5]**

*Permission of instructor required. Pass/No Pass grading only. May be repeated for credit.*

AS AN UNDERGRADUATE AT UC MERCED, I WAS ABLE TO BUILD A STRONG RELATIONSHIP WITH SOME OF THE FACULTY MEMBERS, WHICH ENABLED TO ME TO BEGIN GRADUATE RESEARCH DURING THAT TIME. GETTING A HEAD START ON MY GRADUATE WORK LED ME TO COMPLETE MY MASTER'S DEGREE IN ONE YEAR.

—Nabora S. Reyes de Rogers, Quantitative and Systems Biology



# University Administrative Officers

## REGENTS OF THE UNIVERSITY OF CALIFORNIA

### Ex Officio Regents

Arnold Schwarzenegger  
*Governor of California*

John Garamendi  
*Lieutenant Governor*

Karen Bass  
*Speaker of the Assembly*

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*State Superintendent of Public Instruction*

David Shewmake  
*President of the Alumni Associations of the University of California*

Debbie Cole  
*Vice President, Alumni Associations of the University of California*

Mark G. Yudof  
*President, University of California*

### Alumni Regents

Ronald Stovitz  
*Regent - Designate*  
*Secretary, Alumni Associations of the University of California*

Yolanda Nunn Gorman  
*Regent - Designate*  
*Treasurer, Alumni Associations of the University of California*

### Staff Advisors to The Regents

Bill Johansen

### Appointed Regents

Richard C. Blum – Chairman (2014)  
William De La Pena (2018)  
Russell Gould – Vice Chairman (2017)  
Eddie Island (2017)  
Odessa P. Johnson (2012)  
Joanne C. Kozberg (2010)  
Sherry L. Lansing (2010)  
Monica C. Lozano (2013)  
George M. Marcus (2012)  
Hadi Makarechian (2020)  
Norman J. Pattiz (2015)  
Bonnie Reiss (2020)  
Frederick Ruiz (2016)  
Leslie Tan Schilling (2013)  
Bruce D. Varner (2018)  
Paul D. Wachter (2016)

### Student Regent

Jesse Bernal (June 30, 2010)

## Faculty Representatives to the Regents

Mary Croughan  
*Chair, Academic Council*

Henry Powell  
*Vice Chair, Academic Council*

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*Acting Treasurer of The Regents and Vice President for Investments and Chief Investments Officer*

Charles F. Robinson  
*General Counsel of The Regents and Vice President for Legal Affairs*

Diane Griffiths  
*Secretary and Chief of Staff to The Regents*

## ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

Mark G. Yudof  
*President*

Lawrence Pitts  
*Interim Provost*

Steven V.W. Beckwith  
*Vice President for Research and Graduate Studies*

Marie N. Berggren  
*Vice President for Investments and Chief Investments Officer*

Anne C. Broome  
*Vice President - Financial Management*

Bruce B. Darling  
*Executive Vice President - University Affairs and Laboratory Management*

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*Senior Vice President for External Relations and Vice President for Agriculture and Natural Resources*

Katherine N. Lapp  
*Executive Vice President - Business Operations*

Patrick J. Lenz  
*Vice President for Budget*

John D. Stobo  
*Senior Vice President for Health Sciences and Services*

Judy Sakaki  
*Vice President, Student Affairs*

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*Vice President for Legal Affairs and General Counsel of The Regents*

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*Chief Financial Officer and Executive Vice President*

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*Senior Vice President – Chief Compliance and Audit Officer*

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Linda Katehi  
*Davis*

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Timothy P. White  
*Riverside*

Marye Anne Fox  
*San Diego*

Susan Desmond-Hellman  
*San Francisco*

Henry T. Y. Yang  
*Santa Barbara*

George Blumenthal  
*Santa Cruz*

## UC MERCED

### Chancellor and Vice Chancellors

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*Chancellor*

Keith E. Alley  
*Executive Vice Chancellor and Provost*

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*Vice Chancellor, University Relations*

Jane Fiori Lawrence  
*Vice Chancellor, Student Affairs*

Mary E. Miller  
*Vice Chancellor, Administration*

Samuel Traina  
*Vice Chancellor, Research and Dean of Graduate Studies*

Janet E. Young  
*Associate Chancellor and Chief of Staff*

**Deans, Associate, Assistant Deans  
and Institute Directors**

Maria Pallavicini  
*Dean, School of Natural Sciences*

Samuel Traina  
*Dean, Graduate Studies*

Jeff R. Wright  
*Dean, School of Engineering*

De Acker  
*Assistant Dean, School of Natural Sciences*

Callale Cierra  
*Assistant Dean, Graduate Division*

Germán Gavilan  
*Assistant Dean, School of Engineering*

James R. Ortez  
*Assistant Dean, School of Social Sciences,  
Humanities and Arts*

Roger Bales  
*Director, Sierra Nevada Research Institute*

**Associate and Assistant Vice  
Chancellors**

Jorge A. Aguilar  
*Associate Vice Chancellor, Educational and  
Community Partnerships*

Monir Ahmed  
*Assistant Vice Chancellor, Business and  
Financial Services*

Thomas Atkins  
*Assistant Vice Chancellor, Facilities*

Kevin M. Browne  
*Assistant Vice Chancellor, Enrollment  
Management*

James Fuji Collins  
*Assistant Vice Chancellor, Student Health  
and Wellness*

Freya Foley  
*Assistant Vice Chancellor, Human Resources*

Richard M. Kogut  
*Associate Vice Chancellor and Chief  
Information Officer*

Thomas Lollini  
*Associate Vice Chancellor and Campus  
Architect, Physical Planning, Design and  
Construction*

Jan Mendenhall  
*Associate Vice Chancellor, Development*

Richard Miller  
*Interim Associate Vice Chancellor, Research*

Deborah Motton  
*Assistant Vice Chancellor, Research*

Charles Nies  
*Associate Vice Chancellor, Student Affairs*

Larry Salinas  
*Assistant Vice Chancellor, Government  
Relations*

Nancy Tanaka  
*Assistant Vice Chancellor, Academic Affairs*

**Library**

R. Bruce Miller  
*University Librarian*

Donald Barclay  
*Assistant University Librarian*

**Counsel**

Elisabeth Gunther  
*University Counsel, University of California*

**Vice Provosts**

Hans Björnsson  
*Vice Provost, Academic Planning*

David Ojcius  
*Vice Provost, Academic Personnel*

Christopher Viney  
*Vice Provost, Undergraduate Education*

**Executive Directors/Directors**

Elizabeth Boretz  
*Director, Student Advising and Learning  
Center*

Eric Berlow  
*Director, Wawona Research Station, SNRI*

Nancy Clarke  
*Executive Director, Academic Senate*

R. Kevin Creed  
*Director, Environmental Health and Safety*

Le'Trice Curl  
*Director, Student Life and Judicial Affairs*

Cindi Deegan  
*Director, Campus Purchasing*

David Dunham  
*Director, Recreation and Athletics*

Laurie Herbrand  
*University Registrar*

Roy Hogle  
*Director, Animal Resources Services*

Patti Waid Istas  
*Executive Director, Communications*

Kathleen Jefferds  
*Director, Budget*

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*Director, Construction Services*

Sonia Johnston  
*Director, Administrative Operations*

Debra L. Kotler  
*Director, Counseling Services*

Orquidea Largo  
*Interim Director, Center for Educational  
Partnerships*

Oliver Nandkishore  
*Director, Student Business Services*

Brandy Ramos Nikaido  
*Director, UC Merced Centers*

Patricia O'Connor  
*Executive Director, Advancement Services*

Nancy Ochsner  
*Director, Institutional Planning and Analysis*

Diana M. Ralls  
*Director, Financial Aid and Scholarships*

Encarnación Ruíz  
*Director, Admissions*

Leslie Santos  
*Director, Housing and Residence Life*

Pauline Sahakian  
*Director, UC Merced Writing Project*

Brad Samuelson  
*Director, Environmental Affairs*

Rita Spaur  
*Chief of Police*

Stephanie Vasilovich  
*Executive Director, Development*

Thea Vicari  
*Director, Sponsored Projects*

Danielle Waite  
*Director, Early Childhood Education Center*

John O. White  
*Director, Capital Planning & Space  
Management*

Autumn Zindel  
*Director, Contract and Grant Accounting*

# University Faculty

## **VIRGINIA ADAN-LIFANTE**

*Lecturer SOE, Coordinator of Spanish Language Instruction, School of Social Sciences, Humanities and Arts*

Licenciatura, Universidad de Sevilla; Ph.D., University of California, Santa Barbara

Second language acquisition, Hispanic women's literature, Hispanic culture, Puerto Rican literature and culture

## **ANDRES AGUILAR**

*Assistant Professor, School of Natural Sciences*

B.S., Humboldt State University; Ph.D., University of California, Los Angeles

Molecular evolutionary/population genetics and conservation genetics

## **KEITH E. ALLEY**

*Executive Vice Chancellor and Provost, Professor, School of Natural Sciences*

B.S., D.D.S., M.S., Ph.D., University of Illinois

Developmental neuroscience focusing on cellular mechanisms that assure scaling of neuronal populations with the targets they innervate, neuromuscular maturation and plasticity

## **SUSAN AMUSSEN**

*Professor, School of Social Sciences, Humanities and Arts*

A.B., Princeton University; A.M., Ph.D., Brown University

Early Modern England, Women's History, especially early modern European Atlantic History

## **DAVID ARDELL**

*Assistant Professor, School of Natural Sciences*

A.B., Harvard College; Ph.D., Stanford University

Computational biology of gene expression systems: their structure, function, evolution, and coevolution with genomes, functional and evolutionary bioinformatics of RNA and proteins, evolutionary genomics of prokaryotes

## **ROGER C. BALES**

*Professor, School of Engineering, and Director, Sierra Nevada Research Institute*

B.S., Purdue University; M.S., University of California, Berkeley; M.S., Ph.D., California Institute of Technology

Hydrology, snow and ice, hydrochemistry, climate impacts on water resources, climate changes over polar ice sheets

## **MIRIAM BARLOW**

*Assistant Professor, School of Natural Sciences*

B.S., University of Utah; M.S., Ph.D., University of Rochester

Evolution of bacteria, predicting the evolution of antibiotic resistance, testing evolutionary theory

## **IRENEE R. BEATTIE**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., Tufts University; M.A., Ph.D., University of Arizona

Education, racial/ethnic and gender inequality, adolescent transitions to adulthood, law/policy

## **J. MICHAEL BEMAN**

*Assistant Professor, School of Natural Sciences*

B.S., Yale University; Ph.D., Stanford University

Linking microbial ecological patterns to biogeochemical processes with a specific focus on the nitrogen cycle in coastal systems

## **ASMERET BERHE**

*Assistant Professor, School of Natural Sciences*

B.Sc., University of Asmara; M.Sc., Michigan State University; Ph.D., University of California, Berkeley

Biogeochemistry, soil science, effect of changing environmental conditions on vital soil processes, especially the cycling and fate of essential elements in the critical zone

## **HARISH BHAT**

*Assistant Professor, School of Natural Sciences*

A.B., Harvard University; Ph.D., California Institute of Technology

Applied mathematics, dynamical systems and applied analysis, waves in discrete/inhomogeneous/dispersive media, numerical analysis, and scientific computing

## **HANS BJÖRNSSON**

*Vice Provost for Academic Planning*

M.Sc., Ph.D., Chalmers University of Technology; M.A., University of Illinois at Urbana-Champaign

Analyzing risk in construction projects, researching the use of information technology in construction, understanding decisions on investments in information technology

## **FRANCOIS BLANCHETTE**

*Assistant Professor, School of Natural Sciences*

B.Sc., Université de Montréal; Ph.D., Massachusetts Institute of Technology

Fluid mechanics and related numerical methods, focusing on sedimentation and multiphase flows

## **GREGG CAMFIELD**

*Professor, School of Social Sciences, Humanities and Arts*

A.B., Brown University; Ph.D., University of California, Berkeley

Nineteenth-century American literature and culture, Mark Twain, American literary sentimentalism

## **ELLIOTT CAMPBELL**

*Assistant Professor, School of Engineering*

B.S., M.S., Stanford University; Ph.D., University of Iowa

Sustainable energy, ecological design, bioenergy

## **STEFANO CARPIN**

*Assistant Professor, School of Engineering*

Laurea in Ingegneria Informatica, Ph.D., University of Padova, Italy

Robot algorithms, robot motion planning, randomized and distributed algorithms, cooperative multi robot systems, rescue robotics, Internet based simulations

## **MIGUEL CARREIRA-PERPINAN**

*Assistant Professor, School of Engineering*

B.Sc., M.Sc., Technical University of Madrid Spain; B.Sc., U.N.E.D. University, Spain; Ph.D., University of Sheffield, UK

Artificial intelligence, machine learning

## **ALBERTO E. CERPA**

*Assistant Professor, School of Engineering*

Engineer Degree, Buenos Aires Institute of Technology; M.S. (2), University of Southern California; Ph.D., University of California, Los Angeles

Computer networking and distributed systems, wireless sensor networks, topology control, wireless radio channel measurement and characterization, programming models, development of wireless test beds, Internet protocols, operating systems issues

## **YIHSU CHEN**

*Assistant Professor, Schools of Engineering and Social Sciences, Humanities and Arts*

B.S., Tunghai University; M.S., Harvard University; Ph.D., Johns Hopkins University

Energy and environmental modeling, policy and health effect analyses

## **RAYMOND Y. CHIAO**

*Professor, Schools of Natural Sciences and Engineering*

B.A., Princeton University; Ph.D., Massachusetts Institute of Technology

Experimental and theoretical studies of nonlinear and quantum optics, gravitational radiation, nonlinear parametric effects, general relativity, the interaction of matter waves with gravity waves

## **WEI-CHUN CHIN**

*Assistant Professor, School of Engineering*

B.S., M.S., National Tsing-Hua University, Taiwan; M.S.E., Ph.D., University of Washington

Cellular signaling, cellular engineering, polymer gel assembly, biopolymer gels

**JINAH CHOI***Assistant Professor, School of Natural Sciences*

B.S., University of California, Los Angeles; Ph.D., University of Southern California  
Hepatitis C virus (HCV) and the mechanism of synthesis and functions of novel HCV proteins that are produced by programmed translational frame shifting, as well as how HCV replication might be regulated by endogenous and exogenous agents

**MICHELLE M. CHOUINARD***Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California, Berkeley; M.A., Ph.D., Stanford University

Mechanisms of conceptual change in the context of conversational interaction, the role of children's questions in conceptual development, development of biological knowledge, language acquisition, word learning

**MICHAEL CLEARY***Assistant Professor, School of Natural Sciences*

B.S., University of California, Davis; Ph.D., Stanford University

Stem cell biology

**CARLOS COIMBRA***Associate Professor, School of Engineering*

B.S. (2), University of Brasilia; M.S., Instituto Superior Tecnico de Lisbon; Ph.D., University of California, Irvine

Particle dynamics, stability of fluids, variable order modeling, turbulent multi-phase mixing layer, computational fluid dynamics, combustion

**MICHAEL E. COLVIN***Professor, School of Natural Sciences*

S.B. (2), Massachusetts Institute of Technology; Ph.D., University of California, Berkeley

Computational and systems biology, biotechnology, computational chemistry

**MARTHA H. CONKLIN***Professor, School of Engineering*

B.A., Mount Holyoke College; M.S., Ph.D., California Institute of Technology

Biogeochemistry, metal cycling, surface water/shallow groundwater interactions, organic chemical distribution in soil and groundwater, chemical processes in snow, K-12 environmental education

**LILIAN DAVILA***Assistant Professor, School of Engineering*

B.S., M.S., Ph.D., University of California, Davis  
Materials structure and simulations, nanoscale materials, environmental materials

**MICHAEL DAWSON***Assistant Professor, School of Natural Sciences*

B.Sc., University of Newcastle-Upon-Tyne, England; M.Sc., University of York, England; Ph.D., University of California, Los Angeles

Assembly of evolution of communities, population dynamics in relation to climate change, evolution of morphology and behavior at micro-and macro-evolutionary scales

**BENOIT DAYRAT***Assistant Professor, School of Natural Sciences*

M.S., Ecole Normale Supérieure, Paris; Ph.D., University of Paris VII and National Museum of Natural History

Understanding strategies for macroevolutionary transitions between aquatic and terrestrial habitats, taxonomy approaches that integrate phylogeography, genomics, and paleontology to examine lineages of species

**ROBIN DELUGAN***Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., M.A., Ph.D., University of California, Berkeley

Nation-state identity, globalization, immigration, transnationalism

**GERARDO C. DIAZ***Assistant Professor, School of Engineering*

B.S., Universidad de Santiago de Chile; M.S., Ph.D., University of Notre Dame

Energy conversion systems, dynamic simulation and control of thermal systems, absorption chillers and heat pumps, vapor compression systems with alternate refrigerants

**YARROW DUNHAM***Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California, Santa Barbara; M.S., Ph.D., Harvard University

Child representation in social group concepts, automatic social judgment, social cognition, cognitive development

**ARIEL ESCOBAR***Professor, School of Engineering*

Bachelor's degree, ENET 28 "Republica Francesa", CONET; Electronic Engineer, Universidad Tecnologica Nacional, Argentina; Ph.D., University of the Republic (PEDECIBA) R.O.U.

Cardiac signaling, development of new optical and spectroscopic techniques for studying the subcellular dynamics of second messengers using fluorescent probes

**KEVIN FELLEZS***Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., M.A., San Francisco State University; Ph.D., University of California, Santa Cruz

U.S. national popular culture, African American music cultures (primarily jazz), Asian American popular culture, Pacific Island/Hawaiian studies

**HENRY JAY FORMAN***Professor, School of Natural Sciences*

B.A., Queens College; Ph.D., Columbia University

Signal transduction, antioxidants and redox signaling, lung disease

**MAURIZIO FORTE***Professor, School of Social Sciences, Humanities and Arts*

Bachelor's degree, University of Bologna, Italy; Ph.D., University of Rome "La Sapienza", Italy

Digital and landscape archaeology and spatial technologies

**CAROLIN FRANK***Assistant Professor, School of Natural Sciences*

M.Sc., Uppsala University School of Engineering; Ph.D., Uppsala University

Evolutionary genomics of prokaryotes and fungi, evolution of host-parasite interactions, marine genomics and metagenomics

**MARCOS GARCIA-OJEDA***Assistant Professor, School of Natural Sciences*

B.S., University of Illinois; M.A., University of California, Santa Cruz; Ph.D., Stanford University

Stem cell research, cell biology, immunology, biotechniques, virology

**TEAMRAT GHEZZEHEI***Assistant Professor, School of Natural Sciences*

B.S., University of Asmara; Ph.D., Utah State University

Soil and environmental physics, multiphase flow and mechanics of porous media

**SAYANTANI GHOSH***Assistant Professor, School of Natural Sciences*

B.Sc., St. Stephen's College, India; B.A., University of Cambridge; M.S., Ph.D., University of Chicago

Nanodevices, solid state materials, quantum information, optical science

**JAN GOGGANS***Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., M.A., California State University, Sacramento; Ph.D., University of California, Davis

American literature, American nature writing and literature of the environment, California literature and culture, literature of the Central Valley, literature and culture of the Great Depression, literature and photography

**AJAY GOPINATHAN**

*Assistant Professor, School of Natural Sciences*  
M.Sc., Indian Institute of Technology, Kanpur;  
Ph.D., University of Chicago  
Cell motility, actin bundle dynamics

**QINGHUA GUO**

*Assistant Professor, School of Engineering*  
B.S., M.S., Peking University, China; Ph.D.,  
University of California, Berkeley  
Methodological and applied aspects of  
geographical information science

**THOMAS HANSFORD**

*Associate Professor, School of Social Sciences,  
Humanities and Arts*  
B.A., Saint Mary's College of Maryland; Ph.D.,  
University of California, Davis  
Politics of the federal judiciary, campaigns and  
elections

**THOMAS C. HARMON**

*Professor, School of Engineering*  
B.S., Johns Hopkins University; M.S., Ph.D.,  
Stanford University  
Contaminant transport in aquatic systems, soil  
and groundwater remediation, development  
and use of environmental sensors

**STEPHEN HART**

*Professor, School of Natural Sciences*  
B.S., University of California, Berkeley; M.S.,  
Duke University; Ph.D., University of California,  
Berkeley  
Soil microbial ecology, global change,  
terrestrial biogeochemistry, ecosystem ecology,  
natural resources

**EVAN HEIT**

*Professor, School of Social Sciences, Humanities  
and Arts*  
B.S.E., B.A., University of Pennsylvania; Ph.D.,  
Stanford University  
Categorization, inductive reasoning,  
recognition memory, computer simulation and  
mathematical modeling, intuitive statistical  
judgment

**GREGG HERKEN**

*Professor, School of Social Sciences, Humanities  
and Arts*  
B.A., University of California, Santa Cruz;  
Ph.D., Princeton University  
History, American diplomatic history, nuclear  
history, history of Cold War

**LINDA HIRST**

*Assistant Professor, School of Natural Sciences*  
B.Sc., Ph.D., Manchester University, UK  
Experimental biophysics, soft condensed mater  
physics, molecular self-assembly and structure-  
function relationships

**KATHLEEN HULL**

*Assistant Professor, School of Social Sciences,  
Humanities and Arts*  
M.A., University of Calgary; B.A., Ph.D.,  
University of California, Berkeley  
Cultural impact of colonial encounters of the  
native people in North America, interplay  
of demography and culture, ethnicity and  
ethnogenesis in pre-literate societies

**BOAZ ILAN**

*Assistant Professor, School of Natural Sciences*  
B.Sc., Ph.D., Tel Aviv University  
Mathematics involved with real-world  
phenomena, with application to such areas  
as the control of intense laser beams and  
high-precision measurements of frequency and  
time, numerical computation

**ROBERT INNES**

*Professor, School of Social Sciences, Humanities  
and Arts and holder of the Tony Coelho Endowed  
Chair in Public Policy*  
B.A., M.B.A., Ph.D., University of California,  
Berkeley  
Environmental economics, law and economics,  
industrial organization, agricultural policy and  
markets, finance

**MARCELO KALLMANN**

*Assistant Professor, School of Engineering*  
B.S., State University of Rio de Janeiro; M.S.,  
Federal University of Rio de Janeiro; Ph.D.,  
Swiss Federal Institute of Technology  
Geometric modeling, computer graphics,  
computer animation, autonomous agents,  
robotics, artificial intelligence

**SUNG-MO "STEVE" KANG**

*Chancellor, Professor of Engineering*  
B.S., Fairleigh Dickinson University; M.S.,  
State University of New York, Buffalo; Ph.D.,  
University of California, Berkeley  
Low power VLSI design, modeling and  
simulation of semiconductor devices and  
circuits, high-speed optoelectronic circuits and  
fully optical network systems, nanoelectronics

**SHAWN E. KANTOR**

*Professor, School of Social Sciences, Humanities  
and Arts and holder of the County Bank Endowed  
Chair in Economics*  
B.A., University of Rochester; M.S., Ph.D.,  
California Institute of Technology  
Political economy, law and economics, U.S.  
economic history, economic development,  
public economics

**ANNE MYERS KELLEY**

*Professor, School of Natural Sciences*  
B.S., University of California, Riverside; Ph.D.,  
University of California, Berkeley  
Resonance Raman spectroscopy and  
microscopy, molecular photochemistry and  
photophysics, organic materials for nonlinear  
optics, modeling of spectroscopic data

**DAVID F. KELLEY**

*Professor, School of Natural Sciences*  
B.S., Whitworth College; Ph.D., University of  
Washington  
Spectroscopy and dynamics of semiconductor  
nanoparticles, ultrafast spectroscopy of excited  
states and reactive intermediates, solvation  
effects on proton and electron transfer  
reactions, vibrational dynamics of gas phase  
molecules

**CHRISTOPHER KELLO**

*Associate Professor, School of Social Sciences,  
Humanities and Arts*  
B.A., University of Rochester; Ph.D., University  
of California, Santa Cruz  
Speech and reading processes, coordinative  
bases of cognitive systems

**MICHELLE KHINE**

*Assistant Professor, School of Engineering*  
B.S., M.S., Ph.D., University of California,  
Berkeley  
Micro-Electro-Mechanical System design,  
cellular biology, electroporation, impedance  
spectroscopy, cell mechanics, automation

**ARNOLD D. KIM**

*Associate Professor, School of Natural Sciences*  
B.S., Northwestern University; M.S., Ph.D.,  
University of Washington  
Wave propagation in random media,  
light propagation in tissues, wireless  
communications, scientific computing,  
asymptotic and perturbation methods

**LARA KUEPPERS**

*Assistant Professor, School of Natural Sciences*  
B.S., M.S., Stanford University; Ph.D.,  
University of California, Berkeley  
Ecosystem feedbacks to climate change,  
species composition and ecosystem function,  
regional climate models, climate change policy

**VALERIE J. LEPPERT**

*Associate Professor, School of Engineering*  
B.A. (2), California State University, Sonoma;  
Ph.D., Northwestern University  
Electron microscopy, nanomaterials for  
application in technology and the environment

**ANDY LIWANG**

*Associate Professor, School of Natural Sciences*  
B.A., University of California, Berkeley; Ph.D.,  
University of Washington  
Structure and function of circadian clock  
proteins

**PATRICIA LIWANG**

*Professor, School of Natural Sciences*  
B.S., Massachusetts Institute of Technology;  
Ph.D., Harvard University  
Structure and function of anti-HIV Chemokines



**IGNACIO LOPEZ-CALVO**

*Professor, School of Social Sciences, Humanities and Arts*

B.A., Universidad Complutense, Madrid, Spain; M.A., California State University Los Angeles; M.A., Ph.D., University of Georgia

Nineteenth- and twentieth-century Latin American narratives with an emphasis on the cultural production of the Caribbean and the Southern Cone, Chicano literature and culture

**JENNIFER LU**

*Assistant Professor, School of Engineering*

B.S., Shanghai University; M.S., Drexel University; M.S., Ph.D., University of Michigan  
Nanotechnology, nanofabrication

**YANBAO MA**

*Assistant Professor, School of Engineering*

B.S., University of Science and Technology of China, Hefei; M.S., Institute of Mechanics, Chinese Academy of Sciences, Beijing; Ph.D., University of California, Los Angeles

Fluid mechanics with emphasis on multi-scale, multi-physics flows ranging from microfluidic systems to macro-scale aerodynamics and hydrodynamics

**SEAN MALLOY**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California, Berkeley; M.A., Ph.D., Stanford University

War and morality, American political history, utopian and extremist movements in the 1930s, the domestic sources of U.S. foreign policy, the ways in which economics, religion and culture shape Americans' interactions with the rest of the world.

**JENNIFER MANILAY**

*Assistant Professor, School of Natural Sciences*

B.A., University of California, Berkeley; Ph.D., Harvard University

Mechanisms that control cell fate decisions in the immune system, the development of T lymphocytes, important components of immune defense against pathogens

**ROUMMEL MARCIA**

*Assistant Professor, School of Natural Sciences*

B.S., Columbia University, New York; Ph.D., University of California, San Diego

Scientific computation, large-scale optimization, interior-point methods, numerical analysis, global optimization, mathematical biology, compressed sensing, signal processing

**MANUEL M. MARTIN-RODRIGUEZ**

*Professor, School of Social Sciences, Humanities and Arts*

Licenciatura, Universidad de Sevilla; M.A., University of Houston; Ph.D., University of California, Santa Barbara

Cross-disciplinary perspectives from cultural, ethnic and film studies, border studies, textual recovery, intra-cultural difference, the Hispanic context of Chicano/Chicana literature, popular culture and the mass media.

**TEENIE MATLOCK**

*Associate Professor, School of Social Sciences, Humanities and Arts*

B.A., M.A., California State University, Fresno; Ph.D., University of California, Santa Cruz

Cognitive science, psycholinguistics, spatial cognition, metaphor, semantics, gesture

**KARA E. MCCLOSKEY**

*Assistant Professor, School of Engineering*

B.S., M.S., Ph.D., Ohio State University

Engineering principles, such as analysis and design, as they apply to the advancements being made in stem cells and tissue engineering, cardiovascular cell lineage

**MONICA MEDINA**

*Assistant Professor, School of Natural Sciences*

B.S., Universidad de Los Andes, Bogota, Columbia; Ph.D., University of Miami

Phylogenetics and organelle genome evolution of marine invertebrate animals, genomics of coral-zooxanthellae symbioses in Caribbean reefs

**ERIK MENKE**

*Assistant Professor, School of Natural Sciences*

B.S., Colorado State University; Ph.D., University of California, Irvine

Alternative energy including improving solar cells and producing carbon neutral fuel sources

**MATTHEW MEYER**

*Assistant Professor, School of Natural Sciences*

B.S., University of Kansas, M.S., University of Wisconsin, Ph.D., Texas A&M University

Research on using temperature-dependent isotope effects as a probe for enzyme dynamics in soybean lipoxigenase-1

**KEVIN A. MITCHELL**

*Assistant Professor, School of Natural Sciences*

B.S., Carnegie Mellon University; M.A., Ph.D., University of California, Berkeley

Nonlinear dynamics and classical/quantum chaos, semi-classical phase-space techniques, topological and geometric methods for low-dimensional systems, the geometric/Berry phase and gauge theory

**MICHAEL MODEST**

*Professor, School of Engineering and holder of Keith and Elinor Shaffer/Betty Lou George Chair in Engineering*

Dipl.-Ing., Technical University of Munich, Germany; M.S., Ph.D., University of California, Berkeley

Radiative heat transfer and laser machining of ceramics

**NATHAN MONROE**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California, Santa Barbara; M.A., Ph.D., University of California, San Diego

American political institutions, role of political parties and organizational institutions within Congress, legislative politics

**RUTH MOSTERN**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.S., Georgetown University, M.A., Ph.D., University of California, Berkeley

Geography and state power in Middle Period China, georeferencing, the digital mapping of historical and cultural phenomena

**TODD NEUMANN**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.S., M.A., Miami University; Ph.D., University of Arizona

Applied microeconomics, industrial organization, labor economics/program evaluation, economic history

**SHAWN D. NEWSAM**

*Assistant Professor, School of Engineering*

B.S., University of California, Berkeley; M.S., University of California, Davis; Ph.D., University of California, Santa Barbara

Image processing, computer vision, pattern recognition, machine learning, content based information retrieval, digital libraries, data mining

**STEPHEN NICHOLSON**

*Associate Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California, Los Angeles; M.A., Ph.D., University of California, Davis

Political behavior in the United States, Direct democracy on political outcomes, divided partisan control of government on public opinion and political behavior, effects of issues on Latino political behavior, media effects on trust in government

**DAVID NOELLE**

*Assistant Professor, Schools of Engineering and Social Sciences, Humanities and Arts*

B.S., University of California, Los Angeles; M.A., Ph.D., University of California, San Diego

Computational cognitive neurosciences, connectionism, cognitive control, learning, concept formation, working memory, cognitive neuroscience, cognitive psychology, machine learning, artificial intelligence

**ROBERT S. OCHSNER**

*Senior Lecturer SOE, Director of Karen Merritt Writing Program, School of Social Sciences, Humanities and Arts and Director of Center for Research on Teaching Excellence*

B.A., Western Washington University; M.A., Ph.D., University of California, Los Angeles

Social and cultural issues of teaching "white" English, a research focus that joins ESL theory with social constructionist insights about the power relationships between teacher and student or among diverse students in groups

**PEGGY A. O'DAY**

*Professor, School of Natural Sciences*

B.S., University of California, Davis; M.S., Cornell University; Ph.D., Stanford University

Aqueous, surface and environmental geochemistry, biogeochemistry and transport of inorganic contaminants in natural systems, geochemical applications of spectroscopy and microscopy, chemistry in hydrothermal systems

**SONGHWAI OH**

*Assistant Professor, School of Engineering*

B.S., M.S., Ph.D., University of California, Berkeley

Wireless sensor networks, networked embedded systems, machine learning

**DAVID M. OJCIUS**

*Vice Provost for Academic Personnel and Professor, School of Natural Sciences*

B.A., Ph.D., University of California, Berkeley

Infection by intracellular pathogens, particularly chlamydia trachomatis, interaction between infected cells and the immune system mechanisms of cell death, innate immunity

**RUDY MARTIN ORTIZ**

*Assistant Professor, School of Natural Sciences*

B.A., M.Sc., Texas A&M University; Ph.D., University of California, Santa Cruz

Endocrine physiology, physiological adaptations in water and electrolyte homeostasis and fat metabolism during extreme conditions such as prolonged fasting and altered gravitational load

**NÉSTOR OVIEDO**

*Assistant Professor, School of Natural Sciences*

D.V.M., Universidad Centroccidental "Lisandro Alvarado", Venezuela; M.Sc., Venezuelan Institute for Scientific Research (IVIC); Ph.D., IVIC/University of Utah

Tissue regeneration, morphogenesis, role of stem cells in regulating tissue homeostasis and regeneration of missing parts in adults

**MARIA G. PALLAVICINI**

*Dean, School of Natural Sciences, and Professor, School of Natural Sciences*

B.S., University of California, Berkeley; Ph.D., University of Utah

Stem cell biology, genomic and proteomic abnormalities in cancer (particularly leukemia

and breast cancer), relationships between genetic damage induced by chemical exposure and cancer development

**SHOLEH QUINN**

*Associate Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California, Santa Barbara; M.A., Ph.D., University of Chicago

Middle Eastern history, history of Iran, Islamic civilization, women in the Middle East, Central Asian history, Historiography, Early Modern empires

**DUNYA RAMICOVA**

*Professor, School of Social Sciences, Humanities and Arts*

B.F.A., Goodman School of Drama; M.F.A., Yale University School of Drama

Costume design for theatre, opera, ballet, dance, film and television, history of costume design, history of clothing and fashion, drawing, watercolor painting

**JASON RAYMOND**

*Assistant Professor, School of Natural Sciences*

B.S., B.A., Southwestern Oklahoma State University; Ph.D., Arizona State University

Evolution of metabolism, geobiology/microbe-environment interactions, comparative genomics and metagenomics, microbial diversity and taxonomy, origin and evolution of life

**LINDA-ANNE REBHUN**

*Associate Professor, School of Social Sciences, Humanities and Arts*

A.B., Mount Holyoke College; M.A., Ph.D., University of California, Berkeley

Cultural phenomena, women's and gender studies, Latin American studies, Agrarian studies

**CRISTIAN H. RICCI**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., California State University, Los Angeles; M.A., Ph.D., University of California, Santa Barbara

Nineteenth and Twentieth Century Spanish literature, Nineteenth and Twentieth Century Spanish-American literature, Portuguese literature, Golden Age and Colonial literature

**WOLFGANG ROGGE**

*Associate Professor, School of Engineering*

Dipl. Ing., Technical University, Berlin, Germany; M.S., Ph.D., California Institute of Technology

Air pollution science and engineering

**MICHAEL SCHEIBNER**

*Assistant Professor, School of Natural Sciences*

M.S., University of New Mexico; Diplom Physiker, Dr. Rer. Nat., University of Würzburg, Germany

Light-matter interactions on a nanometer scale with a focus on coupling phenomena of nanostructures and resulting applications

**WILLIAM R. SHADISH**

*Professor, School of Social Sciences, Humanities and Arts*

B.A., Santa Clara University; M.S., Ph.D., Purdue University

Clinical psychology, experimental and quasi experimental design, meta-analysis, program evaluation, psychology of science

**JAY SHARPING**

*Assistant Professor, School of Natural Sciences*

B.S., University of Wisconsin, Whitewater; M.A., Rose-Hulman Institute of Technology; Ph.D., Northwestern University

Non linear fiber optics, atomic and molecular optics, quantum optics, carbon nanotubes

**ANNA SONG**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of Michigan, Ann Arbor; Ph.D., University of California, Davis

Adolescent decision making relating to their health and well-being

**MICHAEL SPIVEY**

*Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California, Santa Cruz; Ph.D., University of Rochester

Language/vision interaction, sentence processing, spoken word recognition, visual memory, visual attention, visual imagery, problem solving, eye movements, neural networks and dynamical systems

**MICHAEL A. SPRAGUE**

*Assistant Professor, School of Natural Sciences*

B.S., University of Wisconsin, Madison; M.S., Ph.D., University of Colorado, Boulder

Development and use of mathematical models and numerical methods for studying time-dependent problems of practical importance; physical problems including fluid-structure interaction, rotating convection, geophysical fluid dynamics, turbulent flow, and structural dynamics; numerical methods including finite and spectral-element methods, global spectral methods, and parallel computing

**JIAN-QIAO SUN**

*Professor, School of Engineering*

B.S., Huazhong University of Science and Technology; M.S., Ph.D., University of California, Berkeley

Bio-mechanics, bio-medical engineering

**LIN TIAN**

*Assistant Professor, School of Natural Sciences*

B.S., Tsinghua University; M.S., Beijing University; Ph.D., Massachusetts Institute of Technology

Theoretical studies of quantum information and quantum computation

### **MAYYA TOKMAN**

*Assistant Professor, School of Natural Sciences*

B.S., University of California, Los Angeles; Ph.D., California Institute of Technology

Mathematical modeling of nonlinear phenomena, numerical analysis, scientific computing

### **CAROL TOMLINSON-KEASEY**

*Chancellor Emerita, and Professor Emerita, School of Social Sciences, Humanities and Arts*

B.A., Pennsylvania State University; M.S., Iowa State University; Ph.D., University of California, Berkeley

Developmental psychology, development of cognitive potential

### **SAMUEL J. TRAINA**

*Vice Chancellor for Research, Dean of the Graduate Division, Professor, Schools of Natural Sciences and Engineering and holder of the Ted and Jan Falasco Chair in Earth Sciences and Geology*

B.S., Ph.D., University of California, Berkeley  
Surface, colloidal and complexation chemistry in soils, sediments and natural waters, remediation of contaminated soils and sediments

### **JESSICA TROUNSTINE**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California, Berkeley; M.A., Ph.D., University of California, San Diego

Political institutions, elite political behavior, elections, representation

### **MENG-LIN TSAO**

*Assistant Professor, School of Natural Sciences*

B.S., M.S., National Taiwan University; Ph.D., Ohio State University

Organic chemistry, chemical biology

### **NELLA VAN DYKE**

*Associate Professor, School of Social Sciences, Humanities and Arts*

B.A., University of Michigan; M.A., Ph.D., University of Arizona

Political sociology, social movements, sexuality, gender, hate crime

### **PETER VANDERSCHRAAF**

*Associate Professor, School of Social Sciences, Humanities and Arts*

B.S., Loyola Marymount University; M.S., Ph.D., University of California, Irvine

Political philosophy, game theory, ethics

### **JACK VEVEA**

*Associate Professor, School of Social Sciences, Humanities and Arts*

B.A., M.S., San Francisco State University; A.B., University of California, Berkeley; Ph.D., University of Chicago

Innovation of statistical methods to address problems that cannot be solved by conventional techniques

### **CHRISTOPHER VINEY**

*Vice Provost for Undergraduate Education and Professor, School of Engineering*

B.A., Ph.D., Cambridge University

Biomolecular materials (design of materials synthesis, assembly, processing and physical optimization strategies based on examples from nature), physical science and engineering of polymers and liquid crystals (structure-property-processing relationships)

### **JAN WALLANDER**

*Professor, School of Social Sciences, Humanities and Arts*

B.A., Ashland College; M.S., Ph.D., Purdue University

Health psychology, pediatric psychology

### **SHI-PU WANG**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., M.A., Indiana University, Bloomington; Ph.D., University of California, Santa Barbara

History and theory of 20th century American Art with concentration on American artists of Asian origin, study of the role that national, cultural, and/or ethnic identity plays in the work of artists, the impact that US Cold War cultural programs played in the development of new art trends in Asia Since World War II

### **SIMON WEFFER-ELIZONDO**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of Chicago; M.A., Ph.D., Stanford University

Understanding the linkages between collective action and urban inequality, the effect of collective action rates on voting rates, examining the spatial dynamics and issues in neighborhood mobilization

### **ANTHONY WESTERLING**

*Assistant Professor, Schools of Engineering and Social Sciences, Humanities and Arts*

B.A., University of California, Los Angeles; Ph.D., University of California, San Diego

Research efforts to model climatic influences on wildfire and on water and energy resources, working with policy makers to explore alternatives for building sustainable resource management structures

### **ALEXANDER WHALLEY**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of Western Ontario; M.A., University of British Columbia; Ph.D.,

University of Maryland, College Park  
Labor economics, macroeconomics, applied econometrics

### **KATIE L. WINDER**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., Lewis and Clark College; Ph.D., Johns Hopkins University

Applied microeconomics, labor economics, economics of gender and discrimination, economics of welfare and poverty

### **ROLAND WINSTON**

*Professor, Schools of Engineering and Natural Sciences*

B.S., M.S., Ph.D., University of Chicago

Solar power and renewable energy, elementary particle physics, non-imaging optics

### **J. ARTHUR WOODWARD**

*Professor Emeritus, School of Social Sciences, Humanities and Arts*

B.S., Wake Forest University; M.A., Ph.D., Texas Christian University

Experimental design, statistical genetics, applied statistics and psychometrics

### **JEFF R. WRIGHT**

*Dean, School of Engineering, and Professor, School of Engineering*

B.A., B.S.E., M.S.E., University of Washington; Ph.D., Johns Hopkins University

Water resources and environmental management, design and implementation of computer-based spatial decision support systems for civil infrastructure, transportation, water resources, land resources engineering and management

### **MING-HSUAN YANG**

*Assistant Professor, School of Engineering*

B.S., National Tsing-Hua University, Taiwan; M.S., University of Southern California and University of Texas at Austin; Ph.D., University of Illinois at Urbana-Champaign

Computer vision, pattern recognition, machine learning, artificial intelligence, robotics, image processing, cognitive science

### **TAO YE**

*Assistant Professor, School of Natural Sciences*

B.S., Peking University; M.S., Ph.D., University of Pittsburgh

Nanoscale science, bioanalysis

### **JEFFREY YOSHIMI**

*Assistant Professor, School of Social Sciences, Humanities and Arts*

B.A., University of California Berkeley; M.A., Ph.D., University of California, Irvine

Philosophy of mind, philosophy of cognitive science, phenomenology (especially Husserl), neural networks

## ■ ADJUNCT PROFESSORS

### DARIO BOFFELLI

*Assistant Adjunct Professor, School of Natural Sciences*

B.S., University of Rome 'La Sapienza'; Ph.D., Swiss Federal Institute of Technology (ETH)

Primate comparative genomics, role of gene regulatory sequences

### M. PILAR FRANCINO

*Assistant Adjunct Professor, School of Natural Sciences*

B.S., National Autonomous University of Mexico; M.S., Ph.D., University of Rochester

Bacterial genomes

### GABRIELA LOOTS

*Assistant Adjunct Professor, School of Natural Sciences*

B.S., University of California, Irvine; Ph.D., University of California, Berkeley

Developmental genomics with emphasis on skeletal and limb development

### ALEKSANDR NOY

*Associate Adjunct Professor, School of Natural Sciences*

B.A., Moscow State University; M.S., Ph.D., Harvard University

Nanosynthesis, single-molecule imaging and measurements

### WILLEM J.M. Van BREUGEL

*Adjunct Professor, School of Natural Sciences*

Ingenieur degree, Eindhoven University; Ph.D., Leiden University

Distant massive galaxies, the effects of their central super-massive black holes on the galaxy-formation process, the formation and evolution of the largest structures known in the Universe: clusters of galaxies

## University Endowed Chairs

Endowed chairs and professorships are critical to the successful development of the University of California, Merced. Endowments are pivotal in attracting educators and researchers of the highest quality, not only today, but in the future. Hiring the finest scholars ensures that UC Merced will continue the University of California's tradition of excellence in teaching and research.

At the time of publication, UC Merced is fortunate to have received commitments for 18 chairs in disciplines ranging from the sciences to the arts.

### ENDOWED CHAIRS AND PROFESSORSHIPS AT UC MERCED

E.W. Bizzini  
*Endowed Chair in Biological Sciences*

Bizzini Family  
*Endowed Chair in Systems Biology*

Coats Family  
*Endowed Chair in the Arts*

Tony Coelho  
*Endowed Chair in Public Policy*

County Bank  
*Chair in Economics*

Edward A. Dickson  
*Emeriti Professorship*

Emmett, Bernice and Carlston Cunningham  
*Chair in Cognitive Development*

Ted and Jane Falasco  
*Chair in Earth Sciences and Geology*

Reno Ferrero Family  
*Chair in Electrical Engineering*

Vincent Hillyer  
*Chair in Early Literature*

Joe and Margaret Josephine  
*Endowed Chair in Biological Sciences*

Art and Fafa Kamangar Family  
*Endowed Chair in Biological Sciences*

McClatchy  
*Chair in Communications*

John and Lucia Myers  
*Chair for the Sierra Nevada Research Institute  
Presidential Chair for Inter-disciplinary Program  
Development*

Ruiz Family  
*Chair in Entrepreneurship*

Keith and Elinor Shaffer and Betty Lou George  
*Chair in Engineering*

Thondapu Family  
*Endowed Chair in Bioengineering*

UC MERCED PREPARED ME BOTH INTELLECTUALLY AND EMOTIONALLY FOR MY CAREER GOALS OF BECOMING A PHYSICIAN. MOST NOTABLY, UC MERCED HELPED ME APPRECIATE THE IMPORTANCE OF WORKING WITHIN AN INTERDISCIPLINARY GROUP, THE VALUE OF EFFICIENT TEAMWORK AND THE ABILITY TO DEVELOP MY INTEREST IN BIOMEDICAL RESEARCH.

—Albert Shih, Bioengineering

# Appendix

## ACCREDITATION

The University of California, Merced was granted full candidacy status from the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges. Final status is expected to be received in 2011.

## CLERY ACT AND CRIME STATISTICS

“Safety Matters” is UC Merced’s annual security report. This publication offers information about our police department, campus crime statistics and a wealth of information about safety and security. Check it out at <http://police.ucmerced.edu/docs/sm.pdf> or learn more about UC Merced’s annual crime statistics at <http://ope.ed.gov/security/>.

## UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, STUDENT RECORDS AND PRIVACY

### Nondiscrimination

The University of California, in accordance with applicable federal and state laws and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, disability, age, medical condition (cancer- related), ancestry, marital status, citizenship, sexual orientation or status as a Vietnam-era veteran or special disabled veteran. The University also prohibits sexual harassment. This nondiscrimination policy covers admission, access and treatment in University programs and activities.

Inquiries regarding the University’s student related nondiscrimination policies may be directed to Student Judicial Affairs.

### Sexual Harassment

Sexual harassment of all persons who participate in University programs and activities is prohibited by law and by University regulation (Policy 380-12). Sexual harassment is unacceptable and will not be condoned on the UC Merced campus.

### Disclosures from Student Records

The Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

In accordance with the Federal Family Educational Rights and Privacy Act of 1974 and campus procedures implementing the University of California Policies Applying to the Disclosure of Information from Student Records, students at the UC Merced campus of the University have the following rights:

1. The right to inspect and review their own student records within 45 days of the date the University receives a written request for access. Students should submit their requests in writing to the University registrar, dean, or other appropriate campus official for the office having custody of the requested records. The request must identify the record(s) they wish to inspect and review. The campus official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the official receiving the request, that official shall advise the student of the correct official and redirect the request.

2. The right to request the amendment of their own student records if a student believes the records are inaccurate or misleading. Students should submit a written request to amend a record that they believe is inaccurate or misleading to the campus official responsible for the record, clearly identifying the portion of the record they want changed, and specifying why it is believed to be inaccurate or misleading. If the University determines that the record should not be amended as requested by the student, the University will notify the student of the decision and advise him/her of the right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

3. The right to consent to disclosures of personally identifiable information contained in their student records, except to the extent that law and policy authorize disclosure without consent.

One exception permitting disclosure without consent is disclosure to campus officials having a legitimate educational interest in the records. A campus official is any individual designated by the campus to perform an assigned function on behalf of the campus. Legitimate educational interest means a demonstrated need to know by officials who act in a student’s educational interest. A campus official has a “legitimate

educational interest” in a record if the official is performing a task

- (a) specified in his or her job description;
- (b) specifically related to the official’s participation in the student’s education;
- (c) specifically related to the discipline of a student; or
- (d) specifically related to providing a service or benefit associated with a student or student’s family, such as health care, counseling, job placement or financial aid.

Another exception permitting disclosure without consent is Directory (or public) Information, defined as information contained in a student record that would not generally be considered harmful or an invasion of privacy if disclosed, unless the student has notified the Office of the Registrar that such information is to be treated as confidential with respect to him/herself. UC Merced has designated as public the following categories of information regarding students: the student’s name, local address(es) and telephone number(s); UC Merced e-mail address; major field of study; dates of attendance; enrollment status (full-time, part-time); degrees and awards received; participation in officially recognized activities; and photographs. Parental/guardian information is confidential. It is used by the University only for notification of events, ceremonies, awards and development or in case of an emergency involving the student.

4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by UC Merced to comply with the requirements of the Federal Educational Rights and Privacy Act, addressed to the Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW., Washington, D.C. 20202-4605.

Questions about these rights should be referred to the Registrar at UC Merced.

Students who desire to withhold all information (including address, phone number and UC Merced e-mail address) from the category of public information must file a form in the Office of the Registrar by the tenth day of instruction. If a student does not choose this option, this information may be released and the student’s local address, phone number and UC Merced e-mail address will be included in the campus student directory.

Students availing themselves of this right should understand what the consequences of such action might be. For example, if all information is designated nonpublic information, the campus cannot make public any Honors received by the student and cannot include the student's name and degree earned in the campus commencement program without the student's written consent. Similarly, if all information is designated non-public information, the student's status as a student or any degrees earned cannot be verified for potential employers without the student's written consent.

### Privacy Act

A student's Social Security number is used to verify personal identity in the UC Merced Student Records System. In accordance with the Federal Privacy Act of 1974, students are hereby notified that disclosure of their social security number is mandatory. This record keeping system was established prior to January 1, 1975 pursuant to the authority of The Regents of the University of California under Art. IX, Sec. 9, of the California Constitution.

### REGISTER TO VOTE

The 1998 reauthorization of the federal Higher Education Act includes a requirement that higher education institutions make a "good faith effort" to make mail voter registration forms available to all enrolled students. This federal legislation supports the campus' longstanding goals of engendering leadership and citizenship among the student body.

UC Merced provides students with several options for registering to vote. Voter registration forms are available at the Students First Center.

### CALIFORNIA RESIDENCY AND NONRESIDENT TUITION FEE

(Updated information on California Residency requirements can be found via the UC Merced Office of the Registrar web site at registrar.ucmerced.edu.)

#### Tuition Fee for Nonresident Students

If you have not been living in California with intent to make it your permanent home for more than one year immediately before the residence determination date for each semester in which you propose to attend the University, you must pay a non-resident tuition fee in addition to all other fees. The residence determination date is the day instruction begins at the University of California, Merced.

### Law Governing Residence

The rules regarding residence for tuition purposes at the University of California are governed by the California Education Code and implemented by the Standing Orders of The Regents of the University of California. Under these rules, adult citizens and certain classes of aliens can establish residence for tuition purposes. There are also particular rules that apply to the residence classification of minors (see below).

### Who is a California Resident?

If you are an adult student (over 18 years of age) you may establish residence for tuition purposes in California if: (1) you are a U.S. citizen, (2) you are a permanent resident or other immigrant; or (3) you are a nonimmigrant who is not precluded from establishing a domicile in the U.S. Nonimmigrants who are not precluded from establishing domicile in the U.S. include those who hold valid visas of the following types: A, E, G, H-1, H-4, I, K, L, N, NATO, O-1, O-3, R, or V. To establish residence you must be physically present in California for more than one year and you must have come here with the intent to make California your home as opposed to coming to this state to go to school. Physical presence within the state solely for educational purposes does not constitute the establishment of California residence, regardless of the length of your stay. You must demonstrate your intention to make California your home by severing your residential ties with your former state of residence and establishing those ties with California. Evidence of intent must be dated one year before the term for which you seek resident classification. If these steps are delayed, the one-year durational period will be extended until you have demonstrated both presence and intent for one full year. Effective Fall 1993, if your parents are not residents of California or you were not previously enrolled as a UC student, you will be required to be financially independent in order to be a resident for tuition purposes. (See Financial Independence Requirements below). Your residence cannot be derived from your spouse or your parents.

### Establishing Intent to Become a California Resident

Indications of your intent to make California your permanent residence can include registering to vote and voting in California elections; designating California as your permanent address on all school and employment records, including military records if you are in the military service; obtaining a California driver's

license or, if you do not drive, a California Identification Card; obtaining California vehicle registration; paying California income taxes as a resident, including taxes on income earned outside California from the date you establish residence; establishing a California residence in which you keep your permanent belongings; licensing for professional practice in California. The absence of these indicia in other states during any period for which you claim California residence can also serve as an indication of your intent.

Documentary evidence is required and all relevant indications will be considered in determining your classification. Your intent will be questioned if you return to your prior state of residence when the University is not in session. A student who is in the state solely for educational purposes will NOT be classified as a resident for tuition purposes regardless of the length of his or her stay.

### Financial Independence Requirement

You will be considered "financially independent" if one or more of the following applies: (1) you are at least 24 years of age by December 31 of the calendar year for which you are requesting residence classification; (2) you are a veteran of the U.S. Armed Forces; (3) you are a ward of the court or both parents are deceased; (4) you have legal dependents other than a spouse; (5) you are married, or a graduate student or a professional student, and you were not claimed as an income tax deduction by your parents or any other individual for the tax year immediately preceding the term for which you are requesting resident classification; (6) you are a single undergraduate student and you were not claimed as an income tax deduction by your parents or any other individual for the two tax years immediately preceding the term for which you are requesting resident classification, and you can demonstrate self-sufficiency for those years and the current year; (7) you are a graduate student instructor, graduate student teaching assistant, research assistant, junior specialist, post-graduate researcher, graduate student researcher, or teaching assistant who is employed 49% or more of full-time in the term for which classification is sought.

### General Rules Applying to Minors

If you are an unmarried minor (under age 18), the residence of the parent with whom you live is considered to be your residence. If you have a parent living, you cannot change your residence by your own act, by the appointment of a legal guardian, or by the relinquishment of a parent's right

of control. If you live with neither parent, your residence is that of the parent with whom you last lived. Unless you are a minor alien present in the U.S. under the terms of a nonimmigrant status that precludes you from establishing domicile in the U.S., you may establish your own residence when both your parents are deceased and a legal guardian has not been appointed. If you derive California residence from a parent, that parent must satisfy the one-year durational residence requirement.

## Specific Rules Applying to Minors

### 1. Deceased Parents

Even though you are a minor, you may establish your own residence if both of your parents are deceased and a legal guardian has not been appointed for you.

### 2. Divorced/Separated Parents

You may be able to derive California resident status from a California resident parent, if you move to California to live with that parent on or before your 18th birthday and establish the requisite intent and remain in California until school begins. If you begin residing with your California parent after your 18th birthday, you will be treated like any other adult student coming to California to establish residence.

### 3. Parent of Minor Moves from California

If you are a minor U.S. citizen or eligible alien whose parent was a resident of California but who left the state within one year of the residence determination date, you are entitled to resident classification if you remain in California after your parent departs, enroll in a California public postsecondary institution within one year of your parent's departure, and, once enrolled, maintain continuous attendance in that institution.

### 4. Self-Support

If you are a U.S. citizen or eligible alien and are either a minor or age 18 and can prove that you lived in California for the entire year immediately before the residence determination date, that you have been self supporting for that year, and that you intend to make California your permanent home, you may be eligible for resident status.

### 5. Two-Year Care and Control

You may be entitled to resident status if you are a U.S. citizen or eligible alien and you have lived continuously with an adult who is not your parent for at least two years prior to the residence determination date. The adult with whom you are living must have been responsible for your care and control for the entire two-year period and must have been residing in California during

the one year immediately preceding the residence determination date.

## Exemptions from Nonresident Tuition (Proof of Eligibility is Required)

### 1. Member of the Military

If you are a member of the U.S. military stationed in California on active duty, unless you are assigned for educational purposes to a state-supported institution of higher education, you may be exempt from the nonresident tuition fee until you have lived in California long enough to become a resident. You must provide the residence deputy on campus with a statement from your commanding or personnel officer stating that your assignment to active duty in California is not for educational purposes. The letter must include the date of your assignment to the state.

### 2. Spouse, Registered Domestic Partner or Other Dependents of Military Personnel

You are exempt from payment of the nonresident tuition fee if you are a spouse, Registered Domestic Partner, or a natural or adopted child or stepchild who is a dependent of a member of the U.S. military stationed in California on active duty. If you are enrolled at the University of California and the member of armed forces is transferred on military orders to a place outside California where he or she continues to serve in the armed forces, or the member of the military retires from active duty immediately after having served in California on active duty, you will not lose your eligibility until you have resided in the state the minimum time necessary to become a resident.

### 3. Spouse, Registered Domestic Partner or Unmarried Child of a Faculty Member

To the extent funds are available, if you are an unmarried dependent child under age 21, the spouse, or registered domestic partner of a member of the University faculty who is a member of the Academic Senate, you may be eligible for a waiver of the nonresident tuition fee. Confirmation of the faculty member's membership on the Academic Senate must be secured each semester before this waiver is granted.

### 4. University Employment Outside of California

If you are an unmarried dependent child, spouse, or registered domestic partner of a full-time University employee whose assignment is outside California (e.g., Los Alamos National Laboratory or the University of California Washington, DC, Center), you may be eligible for a waiver of the nonresident tuition.

### 5. Spouse, Registered Domestic Partner or Child of Deceased Public Law Enforcement or Fire Suppression and Prevention Employee

If you are the spouse, registered domestic partner or child of a deceased public law enforcement or fire suppression employee who was a California resident at the time of his or her death and who was killed in the course of fire suppression or law enforcement duties, you may be entitled to a waiver of the nonresident tuition fee.

### 6. Dependent Child of a California Resident

If you have not been an adult resident of California for more than one year and you are a dependent child of a California resident parent who has been a resident for more than one year immediately before the residence determination date, you may be entitled to a resident classification until you have resided in California for the minimum time necessary to become a resident so long as you maintain continuous attendance at an educational institution.

### 7. Native American Graduates of a BIA School

If you are a graduate of a California high school operated by the Federal Bureau of Indian Affairs, you may be eligible for an exemption from the nonresident fee.

### 8. Employee of a California Public School District

If you are a student holding a valid credential authorizing service in California public schools and an employee of a school district in a full-time certificate position, you may be exempt from nonresident tuition.

### 9. Student Athlete in Training at U.S. Olympic Training Center, Chula Vista

An amateur student athlete in training at the United States Olympic Training Center in Chula Vista may be exempt from nonresident tuition until he or she has resided in California the minimum time necessary to become a resident.

### 10. Graduate of a California High School

You may be entitled to an exemption from nonresident tuition if you attended high school in California for three (3) or more years and graduated from a California high school (or attained the equivalent).

### 11. Surviving Spouse, Registered Domestic Partner or Dependent of a California Resident Killed in the September 11, 2001 Terrorist Attacks

An undergraduate student, who is the surviving spouse, registered domestic

partner, or dependent of a California resident killed in the September 11, 2001 terrorist attacks on the World Trade Center, the Pentagon Building, or the crash of United Airlines Flight 93, may be exempt from nonresident tuition and mandatory student fees.

### **12. Recipient of a Congressional Medal of Honor or the Child of a Recipient of a Congressional Medal of Honor**

An undergraduate student who is a recipient of a Congressional Medal of Honor or who is the dependent child of a recipient of a Congressional Medal of Honor may be exempt from nonresident tuition and mandatory system wide fees.

### **Temporary Absences**

If you are a student who has been classified as a resident for tuition purposes and you leave the state temporarily, your absence could result in the loss of your California residence. The burden will be on you (or your parents if you are a minor) to verify that you did nothing inconsistent with your claim of a continuing California residence during your absence. Steps that you (or your parents) should take to retain a California residence include:

1. Continue to use a California permanent address on all records—educational, employment, military, etc.
2. Satisfy California resident income tax obligations.
3. Retain your California voter's registration and vote by absentee ballot.
4. Maintain a California driver's license and vehicle registration. If it is necessary to change your driver's license and/or vehicle registration while you are temporarily residing in another state, you must change them back to California within the time prescribed by law.
5. Maintaining active bank accounts.

### **Petitioning for Resident Classification (Continuing Students)**

If you are a continuing student who is classified as a nonresident for tuition purposes and you wish to be classified as a resident for tuition purposes, you should file a petition with the University Registrar. The deadline to file your petition is three weeks in advance of the fee payment deadline for the semester for which you seek resident status.

### **Time Limitation on Providing Documentation**

If additional documentation is required for a residence classification but is not readily

accessible, you will be allowed until the end of the applicable semester to provide it. You are liable for payment of fees when they are due. Petitioning for a change of status does not alter the fee payment deadline.

### **Incorrect Classification**

If you were incorrectly classified as a resident, you are subject to reclassification and to payment of all nonresident tuition fees not paid. If you concealed information or furnished false information and were classified incorrectly as a result, you are also subject to University discipline. Resident students who become nonresidents must immediately notify the campus residence deputy.

### **Inquiries and Appeals**

Inquiries regarding residence requirements, determination and/or recognized exceptions should be directed to the Residence Deputy, Office of the Registrar, at UC Merced (209-228-2734) or the Legal Analyst-Residence Matters, 1111 Franklin Street, 8th Floor, Oakland, CA 94607-5200. No other University personnel are authorized to supply information relative to residence requirements for tuition purposes. Any student, following a final decision on residence classification by the residence deputy, may appeal in writing to the legal analyst within 45 days of notification of the residence deputy's final decision.

### **Privacy Notice**

All information requested on the Statement of Legal Residence form is required by the authority of Standing Order 110.2 (a)-(d) of the Regents of the University of California for determining whether you are a legal resident for tuition purposes. Registration cannot be processed without this information. The Office of the Registrar maintains the requested information. You have the right to inspect university records containing the residence information requested on the form.



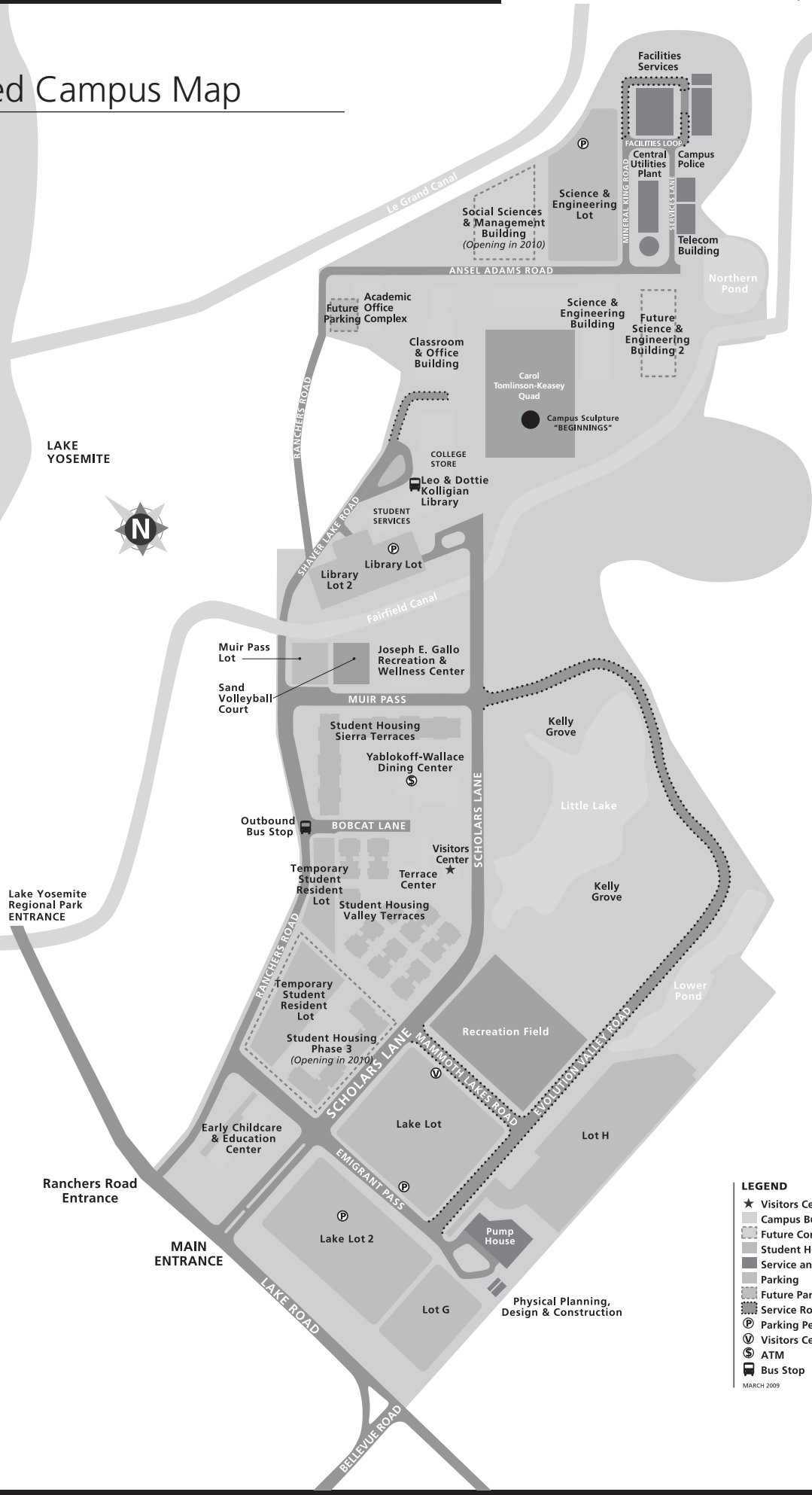
## Index

- A**
- Academic Calendar . . . . . 4
  - Academic Policies . . . . . 44
  - Academic Support Services . . . . . 19
  - Accreditation . . . . . 205
  - Adding Courses . . . . . 44
  - Address, Change of . . . . . 54
  - Administrative Officers . . . . . 196
  - Admission (undergraduate) . . . . . 29
    - freshman . . . . . 32
    - international student . . . . . 36
    - transfer student . . . . . 34
  - Admission Criteria (undergraduate) . . . . . 31
  - Admission Procedures (undergraduate) . . . . . 30
    - application and filing fees . . . . . 30
    - deadlines . . . . . 30
    - notification . . . . . 30
    - readmission . . . . . 53
  - Admissions
    - graduate . . . . . 132
    - second baccalaureate . . . . . 31
  - Advanced Placement Examinations . . . . . 37
  - Alliance for Graduate Education and the Professoriate . . . . . 47
  - Analytical Writing Placement Exam . . . . . 31
  - Anthropology
    - courses . . . . . 146
    - major . . . . . 105
  - Appeals, grade . . . . . 50
  - Applied Mathematics
    - major (UG) . . . . . 76
    - program (GR) . . . . . 198
  - Arts courses . . . . . 148
- B**
- Bachelor's Degree Requirements
    - general education requirement . . . . . 56
    - engineering . . . . . 61
    - natural sciences . . . . . 75
    - social sciences, humanities and arts . . . . . 104
    - university requirements . . . . . 58
  - Bicycles . . . . . 24
  - Bioengineering
    - major . . . . . 63
    - courses . . . . . 153
  - Biological Engineering and Small-Scale Technologies
    - courses . . . . . 150
    - program (GR) . . . . . 134
  - Biological Sciences
    - major . . . . . 83
    - courses . . . . . 150
  - Biomedical and Systems Biology Research Institute . . . . . 145
  - Bobcat College Store . . . . . 18
- C**
- Cal Grants . . . . . 41
  - Calendar (academic) . . . . . 4
  - Career Services Center . . . . . 20
  - Catalog Year . . . . . 2
  - Centers
    - Bakersfield . . . . . 6
    - Fresno . . . . . 6
  - Center for Nonimaging Optics . . . . . 137
  - Chancellor, Message from . . . . . 1
  - Chancellor's Honors List . . . . . 53
  - Chemical Sciences
    - major . . . . . 89
    - courses . . . . . 154
  - Chinese courses . . . . . 156
  - Clery Act (Crime Statistics) . . . . . 205
  - Cognitive Science
    - courses . . . . . 156
    - major . . . . . 107
  - College One
    - description of . . . . . 56
    - courses . . . . . 158
  - Commencement . . . . . 55
  - Computer Science and Engineering
    - major . . . . . 65
    - courses . . . . . 158
  - Computer Support . . . . . 15
  - Concurrent Enrollment . . . . . 49
  - Contact Directory . . . . . 6
  - Counseling and Psychological Services Courses
    - adding and dropping . . . . . 44
    - classification and numbering . . . . . 146
    - descriptions . . . . . 146
    - enrolling in . . . . . 44
    - grading . . . . . 50
    - prerequisites . . . . . 146
    - repeating . . . . . 45
    - substitutions . . . . . 45
  - Credit by Examination . . . . . 50
- D**
- Dean's Honor List . . . . . 52
  - Deferred Payment Plan . . . . . 26
  - Degree Requirements (bachelor's)
    - engineering . . . . . 61
    - natural sciences . . . . . 75
    - social sciences, humanities arts . . . . . 104
  - Degree Requirements (graduate) . . . . . 133
  - Degrees Offered by UC Merced . . . . . 5
  - Diplomas . . . . . 55
  - Disability Services . . . . . 21
  - Discrimination, University Policy Prohibiting . . . . . 205
  - Dismissal . . . . . 53
  - Disqualification . . . . . 52
  - Dorms . . . . . 18
  - Dropping Courses . . . . . 45
- E**
- Earth Systems Science
    - major . . . . . 94
    - courses . . . . . 166
  - Early Childhood Education Center . . . . . 15
  - Economics
    - major . . . . . 110
    - courses . . . . . 160
  - Education Abroad Program (EAP) . . . . . 22
  - Education courses . . . . . 161
  - Electrical Engineering and Computer Science program
    - courses . . . . . 161
  - Employment, Student . . . . . 20
  - Endowed Chairs . . . . . 204
  - Engineering courses . . . . . 162
  - Engineering, School of . . . . . 60
  - Environmental Engineering
    - major . . . . . 67
    - courses . . . . . 164
  - Environmental Stewardship . . . . . 10
  - Environmental Systems
    - program . . . . . 136
    - courses . . . . . 165
  - Examination in English as a Second Language . . . . . 36
  - Examination Requirement (ACT and SAT) . . . . . 33
  - Examinations
    - advanced placement . . . . . 37
    - credit by . . . . . 50
    - final . . . . . 49
    - International Baccalaureate . . . . . 37
    - TOEFL (Test of English as a Foreign Language) . . . . . 36
  - Expenses and Fees . . . . . 25
- F**
- Faculty . . . . . 198
  - Family Educational Rights and Privacy Act . . . . . 205
  - Fees and Expenses . . . . . 25
    - costs for a year at UC Merced . . . . . 25
    - course materials fees . . . . . 25
    - methods of payment . . . . . 26
    - UC employee-student fees . . . . . 25
  - Fellowships . . . . . 142
  - FERPA . . . . . 205
  - Financial Aid
    - undergraduate . . . . . 39
    - graduate . . . . . 142
  - French courses . . . . . 168
- G**
- General Education Principles . . . . . 56
  - Geography courses . . . . . 169
  - Global Arts Studies Program courses . . . . . 168
  - Grade Point Average . . . . . 50
  - Grades
    - appeals . . . . . 50
    - changes of . . . . . 50
    - final . . . . . 52
    - in progress . . . . . 51
    - incomplete . . . . . 51
    - midterm . . . . . 52
    - repeated course . . . . . 45
  - Graduate Education . . . . . 131
  - Graduation . . . . . 55
  - Grants . . . . . 41

- H**
- Health Insurance . . . . . 19
  - Health Services . . . . . 19
  - History
    - major . . . . . 111
    - courses . . . . . 170
  - Honors
    - chancellors . . . . . 52
    - dean's . . . . . 52
    - graduation . . . . . 55
  - Housing
    - on-campus . . . . . 18
    - off-campus . . . . . 18
  - Human Biology courses . . . . . 169
- I**
- IGETC . . . . . 34
  - Incomplete Grades . . . . . 51
  - Information Technology . . . . . 15
  - In-Progress Grading . . . . . 51
  - Institutes . . . . . 144
  - Institutional responsibility . . . . . 2
  - Integrated Calculus and Physics
    - courses . . . . . 172
  - Intercampus Exchange Program . . . . . 48
  - Intercampus transfer . . . . . 47
  - Intercampus Visitors . . . . . 48
  - International Baccalaureate . . . . . 37
  - International Student
    - admission (undergraduate) . . . . . 36
    - admission (graduate) . . . . . 132
  - Intersegmental General Education
    - Transfer Curriculum (IGETC) . . . . . 34
- J**
- Japanese courses . . . . . 172
- L**
- Leadership Excellence Through Advanced
    - Degrees (UCLEADS) . . . . . 46
  - Learning Disabilities . . . . . 21
  - Library, University . . . . . 14
  - Literatures and Cultures
    - major . . . . . 114
    - courses . . . . . 172
  - Loans
    - undergraduate . . . . . 41
    - graduate . . . . . 142
- M**
- Majors, list of . . . . . 5
  - Management
    - major . . . . . 117
    - courses . . . . . 178
  - Materials Science and Engineering
    - major . . . . . 70
    - courses . . . . . 179
  - Mathematics courses . . . . . 175
  - McNair Scholars Program . . . . . 47
  - Mechanical Engineering
    - major . . . . . 72
    - courses . . . . . 177
  - Mechanical Engineering and Applied
    - Mechanics
      - courses . . . . . 177
      - program . . . . . 137
  - Midterm Grades . . . . . 52
  - Minimum Progress . . . . . 53
  - Minors, list of . . . . . 5
  - Mission Statement . . . . . 12
- N**
- Name, Change of . . . . . 54
  - National Parks Partnership . . . . . 144
  - Natural Sciences, School of . . . . . 74
  - Natural Sciences Education
    - courses . . . . . 180
  - Nondiscrimination . . . . . 205
  - Nonresident Admission . . . . . 31
- P**
- Parking Permits . . . . . 24
  - Part-time Status . . . . . 45
  - Passed/Not Passed grading . . . . . 51
  - Pell Grants . . . . . 40
  - Philosophy courses . . . . . 181
  - Physics
    - major . . . . . 96
    - courses . . . . . 181
  - Physics and Chemistry Program . . . . . 137
  - Planned Educational Leave Program . . . . . 45
  - Political Science courses
    - major . . . . . 118
    - courses . . . . . 183
  - Principles of Community . . . . . 11
  - Privacy Act . . . . . 206
  - Probation . . . . . 53
  - Psychology
    - courses . . . . . 184
    - major . . . . . 120
  - Public Policy courses . . . . . 187
- Q**
- Quantitative and Systems Biology
    - program . . . . . 138
    - courses . . . . . 188
- R**
- Readmission . . . . . 53
  - Recreation . . . . . 15
  - Refunds, fee . . . . . 27
  - Regents . . . . . 196
  - Registration
    - cancellation of . . . . . 54
    - late . . . . . 44
    - procedures . . . . . 44
  - Reinstate . . . . . 53
  - Repeating Courses . . . . . 45
  - Research . . . . . 144
  - Residence Life . . . . . 18
  - Residence for Tuition Purposes . . . . . 206
  - Residency Requirement . . . . . 55
- S**
- Satisfactory/Unsatisfactory Grading . . . . . 52
  - Satisfactory Academic Progress . . . . . 42
  - Schedule of Refunds . . . . . 28
  - Scholarship Requirement . . . . . 32
  - Scholarships . . . . . 39
  - Scholastic Assessment Test (SAT) . . . . . 33
  - Semester . . . . . 44
  - Service Learning . . . . . 61
  - Sierra Nevada Research Institute
    - (SNRI) . . . . . 144
  - Simultaneous Enrollment . . . . . 48
  - Social and Cognitive Sciences
    - courses . . . . . 189
    - program . . . . . 139
  - Social Sciences Humanities and Arts,
    - School of . . . . . 103
  - Sociology
    - courses . . . . . 190
    - program . . . . . 139
  - Spanish courses . . . . . 191
  - Statement of Intent to Register . . . . . 31
  - Statement of Legal Residence . . . . . 205
  - Student Advising and Learning
    - Center . . . . . 21
  - Student conduct and discipline . . . . . 17
  - Student Employment . . . . . 20
  - Students First Center . . . . . 20
  - Student Government . . . . . 17
  - Student Housing . . . . . 18
  - Student Life . . . . . 17
  - Student records, disclosures of . . . . . 200
  - Summer Session . . . . . 44
- T**
- Test of English as a Foreign Language
    - (TOEFL) . . . . . 36
  - Transcripts . . . . . 54
  - Transfer . . . . . 34
  - Transportation and Parking . . . . . 24
- U**
- UC Center Sacramento . . . . . 47
  - UCDC . . . . . 47
  - Undeclared . . . . . 21
  - Undergraduate Studies courses . . . . . 192
  - Units semester to quarter . . . . . 44
  - University of California
    - University of California Washington Center
      - (UCDC) . . . . . 47
    - University Officers . . . . . 196
    - University Requirements for Bachelor's
      - Degree . . . . . 55
- V**
- Veteran Services . . . . . 22
- W**
- Withdrawals . . . . . 54
  - World Cultures
    - courses . . . . . 192
    - program . . . . . 141
  - World Cultures Institute . . . . . 137
  - World Heritage courses . . . . . 193
  - Work Study . . . . . 42
  - Writing courses . . . . . 194

# UC Merced Campus Map

LAKE YOSEMITE



- LEGEND**
- ★ Visitors Center
  - Campus Buildings
  - Future Construction
  - Student Housing
  - Service and Support
  - Parking
  - Future Parking
  - Service Roads
  - Ⓟ Parking Permit Dispenser
  - Ⓟ Visitors Center Parking
  - Ⓜ ATM
  - 🚌 Bus Stop
- MARCH 2009

UC MERCED CAMPUS MAP