SCHOOL OF ENGINEERING

THE MAJORS

COMPUTER SCIENCE AND ENGINEERING PROGRAM

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 will prepare 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, to informatics and personal computation, careers in computer science and engineering are among the most satisfying and rewarding of any.

Computer Science and Engineering students at UC Merced will 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 will empower 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 region and the nation, offering a broad spectrum of career opportunities. Education at UC Merced will provide 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 will gain insights that will 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 will 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 science, 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 are:

Computer Science and Engineering Core (30 units): The computer science and engineering core consists of 8 courses (2 lower division and 6 upper division) designed to provide students a common foundation of core knowledge specific to the discipline.

Lower Division Courses

- Introduction to Computer Science and Engineering I and II

  (CSE 30 and CSE 31) . . . . . .6 units

Upper Division 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
- Introduction to Operating Systems (CSE 150) . . .4 units
- Networking (CSE 160) . . . . . .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. These courses should be selected from the computer science upper division technical electives, or with approval, include other upper division courses outside your major.

SAMPLE PLAN OF STUDY FOR COMPUTER SCIENCE & ENGINEERING DEGREE

SEMESTER 1

CORE 1 The World at Home 4

CSE 20 Introduction to Computing 1 2

Service Learning: Engineering Projects in Community Service . .1

ICP 1 Integrated Calculus and Physics 8

Semester Units 15

SEMESTER 2

MATH 22 Calculus II 4

CSE 21 Introduction to Computing 2 2

BIS 1 Contemporary Biology 4

PHYS 9 Physics II 4

ENGR 90x Engineering Freshman Seminar 1

Semester Units 15

SEMESTER 3

MATH 32 Probability and Statistics 3

CHEM 2 General Chemistry 4

MATH 23 Multi-Variable Calculus 4

CSE 30 Introduction to Computer Science and Engineering I . .3

Service Learning: Engineering Projects in Community Service . .1

Semester Units 15

SEMESTER 4

MATH 24 Introduction to Linear Algebra and Differential Equations .4

Engineering Fundamentals 3

CSE 31 Introduction to Computer Science and Engineering II .3

WRI 10 College Reading and Composition 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 15

SEMESTER 5

Engineering Fundamentals 4

Engineering Fundamentals 3

CSE 100 Algorithm Design and Analysis 3

General Education Elective 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 15

SEMESTER 6

CSE 140 Computer Architecture 4

CSE 120 Software Engineering 4

CORE 100 The World at Home 4

Engineering Fundamentals 3

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 7

CSE 150 Introductions to Operating Systems 4

ENGR 155 Engineering Economics Analysis 3

Technical Elective 4

General Education Elective 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 8

CSE 111 Database Systems 4

CSE 160 Networking 4

Technical Elective 4

Technical Elective 3

ENGR 191 Professional Seminar 1

Semester Units 16

Total Program Units 123

ENVIRONMENTAL ENGINEERING PROGRAM

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 under- standing 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, air pollution and energy sustainability.

Hydrology: focuses 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: focuses on the measurement, sources, fate, effects and engineering solutions to air quality problems, both regionally and in a broader national and global context. Both the physical and chemical aspects of atmospheric pollution are included.

Energy sustainability: focuses on society's demand for and use of energy, and on the planning and design of renewable energy systems, with particular emphasis on solar energy.

The program includes service learning components designed to engage students in the solution of real-world problems in their community. The team projects will 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 science, business, humanities and arts are an important part of the curriculum. The result is a curriculum 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: **Environmental Engineering Core (16 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 20) . .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 **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. These courses should be selected from the following list of approved technical electives or, with approval, include other upper division courses outside your major:
- Subsurface Hydrology (ENVE 112) . . . . . .4 units

- Mountain Hydrology of the Western States (ENVE 114) . ..4 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) . . . . . .3 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
- 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: Recommended courses to choose from for emphasis tracks.

Hydrology

Subsurface Hydrology (ENVE 112) . . . . . .4 units

Mountain Hydrology of the Western U.S. (ENVE 114) . . . . . .4 units

Remote Sensing of the Environment (ENVE 152) . . . . . .3 units

Watershed Biogeochemistry (ESS 105) . . . . . .3 units

Water Resources and Management (ENVE 140) . . . . . .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

Water quality

Subsurface Hydrology (ENVE 112) . . . . . .4 units

Environmental Microbiology (ENVE 121) . . . . . .4 units

Water Resources and Management (ENVE 140) . . . . . .3 units

Contaminant Fate and Transport (ENVE 170) . . . . . .3 units

Water and Wastewater Treatment (ENVE 176) . . . . . .3 units

Field Methods in Subsurface Hydrology (ENVE 183) . . . . . .1-3 units

Field Methods in Environmental Chemistry (ENVE 184) . . .1-3 units

Air pollution

Global Change (ENVE 118) . . . . . .4 units

Water Resources and Management (ENVE 140) . . . . . .3 units

Remote Sensing of the Environment (ENVE 152) . . . . . .3 units

Air Pollution Control (ENVE 132) . . . . . .3 units

Watershed Biogeochemistry (ESS 105) . . . . . .3 units

Sustainable Energy (ENVE 160) . . . . . .4 units

Sustainable energy

Global Change (ENVE 118) . . . . . .4 units

Water Resources and Management (ENVE 140) . . . . . .3 units

Sustainable Energy (ENVE 160) . . . . . .4 units

Modeling and Design of Energy Systems (ENVE 162) . . . . . .3 units

Heat Transfer (ENGR 135) . . . . . .3 units

Air Pollution Control (ENVE 132)) . . . . . .3 units

Additional degree requirements (5-7 units):

- Principles of Organic Chemistry (CHEM 8) . . . . . .4 units
- At least one Field Methods course . . . . . .1-3 units

SAMPLE PLAN OF STUDY FOR ENVIRONMENTAL ENGINEERING DEGREE

SEMESTER 1

CORE 1 The World at Home 4

CSE 20 Introduction to Computing 1 2

Service Learning: Engineering Projects in Community Service . .1

ICP 1 Integrated Calculus and Physics 8

Semester Units 15

SEMESTER 2

MATH 22 Calculus II 4

CSE 21 Introduction to Computing 2 2

BIS 1 Contemporary Biology 4

PHYS 9 Physics II 4

ENGR 90X Freshman Seminar or Service Learning 1

Semester Units 15

SEMESTER 3

MATH 32 Probability and Statistics 3

CHEM 2 General Chemistry 4

MATH 23 Multi-Variable Calculus 4

ENVE 20 Introduction to Environmental Science and Technology . . .4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 4

MATH 24 Introduction to Linear Algebra and Differential Equations .4

CHEM 8 Principles of Organic Chemistry 4

Engineering Fundamentals 2

WRI 10 College Reading and Composition 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 15

SEMESTER 5

Engineering Fundamentals 4

Engineering Fundamentals 3

Engineering Fundamentals 3

General Education Elective 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 15

SEMESTER 6

ENVE 100 Environmental Chemistry 4

ENVE 130 Meteorology and Air Pollution 4

CORE 100 The World at Home 4

ENGR 155 Engineering Economics Analysis 3

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 7

ENVE 110 Hydrology and Climate 4

Technical Elective with Design 3

Technical Elective with lab 4

General Education Elective 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 8

Technical Elective with lab 4

Technical Elective with Design 3

Free Elective 4

Field Methods 3

ENGR 191 Professional Seminar 1

Semester Units 15

Total Program Units 12

BIOENGINEERING PROGRAM

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. With these practical innovations has come a rapidly increasing need for personnel with the necessary hybrid skills to capitalize on them, so undergraduate bioengineering programs have proliferated alongside the continued growth of bioengineering research.

Most recently, convergence between engineering and biology at the nanoscale level – the level of biological molecules, molecular aggregates and cellular processes – has begun to offer new, rich areas of study and commercialization. Examples of the devices, processes, interactions and materials that are of interest in this interdisciplinary context include:

- Computers inspired by biological analogs that are smaller and/or faster and/or process information more efficiently than today's computers; use of individual molecules as switches and data storage media; and methods for manipulating the molecules from which such "hardware" is produced

- Food-related innovations, for example, smart packaging that can sense the internal and external environment and provide a signal (such as a color change) that alerts users to undesirable storage conditions, product spoiling or product tampering

- Adaptive materials that can change their properties (shape, transparency, strength, flexibility) in response to changes in their environment and self-healing materials

- Interactions between nanoparticles and biological tissue

- Tailored interfaces between biomolecules and artificial substrates

- Self-assembly of materials, structures and devices

- De novo design of proteins and other functional polymers inspired by nature

- Skin-care products and medications containing nanoparticulates that can penetrate into or through skin

- Sensors and "bots" that can replace defective physiological coun terparts 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

- Fine-scale ceramic particles for use as precursors for tough monolithic ceramic artifacts (e.g. ceramic turbine blades and car engines) based on ceramic nanoprecipitates produced by bacteria.

The undergraduate major in Bioengineering is designed to provide students with both breadth and depth in the exciting and rapidly expanding field of nanobioengineering. The nanobioengineering track reflects the fact that synergy is here to stay between the

"nano" and "bio" themes in engineering and science. The name also highlights an initial focus on things molecular, supramolecular, cellular and material, which will allow the program to draw efficiently on the talents of the biologists, chemists, physicists and other UC Merced faculty in basic engineering and science programs.

UC Merced Bioengineering graduates will find employment in diverse fields encompassing healthcare delivery, medical device technology, interdisciplinary research, patent consultancy, materials science, education, food biotechnology, personal care products industries and government agencies. Bioengineers are attractive to employers because, through studying and graduating in this type of especially creative intellectual environment, they have clearly demonstrated an ability to bridge traditional divides between disciplines, communicate flexibly with different intellectual constituencies and thrive in a context where knowledge is being created especially rapidly.

REQUIREMENTS FOR THE BIOENGINEERING (BIOE) MAJOR

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

Bioengineering Core (23 units): The bioengineering core consists of 7 courses (1 lower division and 6 upper division) designed to give all students a common foundation of core knowledge specific to the discipline.

Lower Division Courses

- Introduction to Bioengineering (BIOE 30) . . . . . .4 units

Upper Division Courses

- Physiology for Engineers (BIOE 100) . . . . . .4 units
- Modeling Nanoscale Processes in Biology (BIOE 101) . . . . .3 units
- Biosensors (BIOE 102) . . . . . .4 units
- Molecular Biology (BIS 102) . . . . . .4 units
- Biophysics (BIS 104) . . . . . .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.

For the initial track in Nanobioengineering, these electives should be chosen from among the following:

- Self-Assembling Molecular Systems (BIOE 110) . . . . . .3 units
- Biomembranes (BIOE 111) . . . . . .3 units
- Biomolecule-Substrate Interactions (BIOE 112) . . . . . .3 units
- Bioinstrumentation (BIOE 113) . . . . . .4 units
- Research credit taken during the senior year . . . . . .1-5 units

Additional degree requirements (11-14 units):

- Principles of Organic Chemistry (CHEM 8) . . . . . .4 units
- Service Learning (ENGR 97 or ENGR 197) . . . . . .7-10 units

PLAN OF STUDY FOR BIOENGINEERING DEGREE

SEMESTER 1

CORE 1 The World at Home 4

CSE 20 Introduction to Computing 1 2

Service Learning: Engineering Projects in Community Service . .1

ICP 1 Integrated Calculus and Physics 8

Semester Units 15

SEMESTER 2

MATH 22 Calculus II 4

CSE 21 Introduction to Computing 2 2

BIS 1 Contemporary Biology 4

PHYS 9 Physics II 4

ENGR 90X Freshman Seminar or Service Learning 1

Semester Units 15

SEMESTER 3

MATH 32 Probability and Statistics 3

CHEM 2 General Chemistry 4

MATH 23 Multi-Variable Calculus 4

BIOE 30 Introduction to Bioengineering 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 4

MATH 24 Introduction to Linear Algebra and Differential Equations . .4

CHEM 8 Principles of Organic Chemistry 4

ENGR 45 Introduction to Materials 4

WRI 10 College Reading and Composition 4

Semester Units 16

SEMESTER 5

ENGR 130 Thermodynamics 4

ENGR 52 Computer Modeling & Analysis 3

BIS 100 Molecular Machinery of Life 4

General Education Elective 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 6

BIS 102 Molecular Biology 4

BIS 104 Biophysics 4

CORE 100 The World at Home 4

ENGR 155 Engineering Economics Analysis 3

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 7

BIOE 100 Physiology for Engineers 4

BIOE 101 Modeling Nanoscale Processes in Biology 3

BIOE 102 Biosensors 4

General Education Elective 4

Service Learning: Engineering Projects in Community Service . .1

Semester Units 16

SEMESTER 8

BIOE 110 Self-Assembling Molecular Systems 3

BIOE 111 Biomembranes 3

BIOE 112 Bio-Molecule Substrate Interactions 3

Free Elective 4

ENGR 191 Professional Seminar 1

Semester Units 14

Total Program Units 124

SCHOOL OF NATURAL SCIENCES

THE MOST INCOMPREHENSIBLE THING ABOUT THE WORLD IS THAT IT IS COMPREHENSIBLE.

–Albert Einstein (1879–1955)

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.

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 will 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 if it intends 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 will 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 will be 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 will be at the forefront of state-of-the art research and technology to unravel biological complexity. They will be the world's future scientists, healers and policy makers.

LETTER OF WELCOME FROM THE DEAN

Dear Prospective Science Students,

The entire 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 improving 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 men and women 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 the 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: biological sciences, Earth systems sciences and human biology. In addition, we are planning new degree programs in chemical sciences, mathematical sciences and physics for Fall 2006.

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.

Maria Pallavicini, Dean

School of Natural Sciences

SCHOOL OF NATURAL SCIENCES REQUIREMENTS

All School of Natural Sciences students, regardless of major, are expected to meet the minimum requirements for the BS and BA degrees. The School of Natural Sciences degree requirements are:

At least 120, but not more than 136 semester units to include the following:

- At least 46 general education semester units.
- At least 60 semester units of upper division courses.

General Education Requirements (46-47 units): School of Natural Science students are required to complete the following list of general education courses.

Math/Science Preparatory Curricula:

- Calculus of a Single Variable I (MATH 21)* . . . . . .4 units
- Probability and Statistics (MATH 32) . . . . . .3 units
- Introductory Physics I (PHYS 8)* . . . . . .4 units
- Computer Science Course . . . . . .2-3 units
- General Chemistry (CHEM 2) . . . . . .4 units

*Integrated Calculus/Physics (ICP 1, 8 units) may be taken in place of MATH 21 and PHYS 8

General Education Courses Outside Natural Sciences and Engineering:

- The World at Home (CORE 1 and CORE 100) . . . . . .8 units
- College Reading and Composition (WRI 10) . . . . . .4 units
- Lower Division General Education elective . . . . . .4 units
- Upper Division General Education electives (with one course emphasizing written or oral communication) . . . . . .12 units
- Freshman Seminar . . . . . .1 unit

Students in Natural Sciences will have a freshman year that lays the foundation for further study in the majors. Students will 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. The first course of the Core Course sequence, CORE 1, The World at Home, is common for all UC Merced students. 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 will also take CORE 100, The World at Home, as a junior.

Major area upper division courses and emphasis track requirements are unique to each major. These are presented in the following section on Majors.

THE MAJORS

BIOLOGICAL SCIENCES PROGRAM

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? How can we 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. 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. The core of the Biological Sciences major is a series of six courses that provide a solid foundation in the key areas of modern life sciences: molecular, evolutionary and cellular biology, genetics and genomics, and computational biology. Students majoring in Biological Sciences will then choose an emphasis area that will provide in-depth lecture and laboratory courses on specific biological topics. UC Merced will open with five Biological Sciences emphasis areas: 1) Molecular Biology and Biochemistry; 2) Cell Biology and Development; 3) Bioinformatics and Computational Biology; 4) Microbiology and Immunology; and 5) Ecology and Evolutionary Biology. Biological Sciences majors also have the opportunity to apply for a Master's Degree program requiring an additional year of study.

The major in Biological Sciences will provide 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, medicine, dentistry, veterinary medicine, nursing, pharmacy and other health-related fields. Graduates of this program will also be well prepared for positions in the biotechnology and pharmaceutical industries, health care, conservation management, as well as careers such as law, journalism, policy and business, which increasingly involve the biological sciences. In addition, the breadth and rigor of this pro- gram will be an excellent preparation for graduates to teach science at the elementary or high school levels.

Molecular biology and biochemistry. This emphasis focuses on the molecular processes underlying life, including macromolecular structure and function, enzyme catalysis, metabolism and gene regulation.

Cell biology and development. This emphasis focuses on the molecular interactions that govern cell function, life cycle and specialization, as well as the cellular interactions that mediate the development and function of multicellular organisms.

Bioinformatics and computational biology. This emphasis focuses on the mathematics and information science of modern biology, including DNA sequence analysis, models of metabolism and gene regulation, and the analysis of high-throughput biological data.

Microbiology and immunology. This emphasis focuses on under- standing the biology of yeast, viruses and bacteria, as well as the mechanisms of microbial pathogenesis and host immune response.

Ecology and evolutionary biology: This emphasis focuses on the theory and molecular mechanisms of evolution, as well as the origins and diversity of life on Earth.

In all emphasis areas, strong linkages will be made to the real- world value of this knowledge, such as understanding human disease and prevention, emerging threats from new infectious diseases and bioterrorism, and appreciating the ecological and evolutionary processes that operate at all levels of organization to generate and sustain life on Earth.

Transfer Students. Transfer students who wish to major in Biological Sciences should complete one year of calculus, one year of physics, one year of general chemistry, one to two semesters of organic chemistry, and two to three semesters of general biology. Students should check with the UC Merced Internet site (http://admissions.ucmerced.edu/ and click on “Transfer Admissions”) for more information on how courses will transfer to UC Merced.

REQUIREMENTS FOR THE BIOLOGICAL SCIENCES (BIS) MAJOR

In **addition** to adhering to the UC Merced and School of Natural Sciences requirements, the additional requirements that must be met to receive the B.S. in Biological Sciences at UC Merced are:

Biological Sciences Requirements (59-64 units): The Biological Sciences major consists of 16 courses (5 lower division and 11 upper division) designed to give all students a common foundation of core knowledge specific to the discipline.

Lower Division Major Requirements

- Contemporary Biology (BIS 1) . . . . . .4 units
- Principles of Organic Chemistry (CHEM 8) . . . . . .4 units
- Principles of Physical Chemistry (CHEM 10) . . . . . .4 units
- Mathematical Biology (MATH 30) or

Calculus of a Single Variable II (MATH 22) . . . . . .4 units

- Introductory Physics II (PHYS 9) . . . . . .4 units

Upper Division Major Requirements

- Molecular Machinery of Life (BIS 100) . . . . . .4 units
- The Cell (BIS 110) . . . . . .4 units
- Genetics (BIS 140) . . . . . .4 units
- Evolution (BIS 141) . . . . . .4 units
- Mathematical Modeling for Biologists (BIS 180) . . . . . .4 units

Additional Upper Division Courses

- Research seminar (BIS 190) . . . . . .1 unit
- Research Projects in Biological Sciences (BIS 195) . . . . . .1-6 units
- One non-biology science or engineering course . . . . . .3-4 units

Upper Division - Emphasis Track

- One course with lab from emphasis track . . . . . .5 units
- Two additional courses from emphasis track . . . . . .8 units

Emphasis Track courses should be chosen from the following list

Molecular Biology and Biochemistry:

- Biochemistry (BIS 101) * . . . . . .4 units
- Molecular Biology (BIS 102) * . . . . . .4 units

- Enzymology (BIS 105) * . . . . . .4 units
- Signal Transduction and Growth Control (BIS 112) . . . . .4 units
- Endocrinology* . . . . . .4 units

**One must be taken with lab component*

Cell Biology and Development:

- Cells, Tissues and Organs (BIS 111) . . . . . .4 units
- Signal Transduction and Growth Control (BIS 112) . . . . . .4 units
- Embryos, Genes and Development (BIS 150) . . . . . .4 units
- Human Physiology (BIS 161)* . . . . . .4 units
- Endocrinology (BIS 163)* . . . . . .4 units
- Neurobiology (BIS 170) * . . . . . .4 units

**One must be taken with lab component*

Bioinformatics and Computational Biology:

- Biophysics (BIS 104) * . . . . . .4 units
- Comparative Genomics (BIS 142)* . . . . . .4 units
- Biostatistics (BIS 175) . . . . . .4 units
- Survey of Computational Biology (BIS 181) . . . . . .4 units
- Bioinformatics (BIS 182) . . . . . .4 units
- Algorithm Design & Analysis (CSE 100) . . . . . .4 units
- Database Systems (CSE 111) . . . . . .4 units

** One must be taken with lab component*

Microbiology and Immunology:

- General Microbiology (BIS 120) * . . . . . .4 units
- Microbial Pathogenesis (BIS 122) . . . . . .4 units
- Human Parasitology (BIS 123) . . . . . .4 units
- Emerging Public Health Threats (BIS 125) . . . . . .4 units

- General Virology (BIS 127) . . . . . .4 units
- Molecular Immunology (BIS 151) * . . . . . .4 units
- Cancer Genetics and Tumor Biology (BIS 152) . . . . . .4 units

**One must be taken with lab component*

Ecology and Evolutionary Biology:

- Comparative Genomics (BIS 142)* . . . . . .4 units
- Biodiversity and the Tree of Life (BIS 143) . . . . . .4 units
- Phylogenetics (BIS 144)* . . . . . .4 units
- Introduction to Population and Community Ecology (BIS 145) . .4 units
- Paleobiology (BIS 146) . . . . . .4 units

- Embryos, Genes and Development (BIS 150) . . . . . .4 units
- Evolution and Development (BIS 153) . . . . . .4 units
- Comparative Physiology (BIS 160)* . . . . . .4 units
- Evolutionary Constraints of Physiology (BIS 162) . . . . . .4 units
- Population Genetics (BIS 183) . . . . . .4 units

**One must be taken with lab component*

SAMPLE PLAN OF STUDY FOR BIOLOGICAL SCIENCES DEGREE

SEMESTER 1

BIS 1 Contemporary Biology 4

CHEM 2 General Chemistry 4

CORE 1 The World at Home 4

Semester Units 12

SEMESTER 2

MATH 21 Calculus of a Single Variable I 4

CHEM 8 Principles of Organic Chemistry@ 4

Elective 4

BIS 90x Freshman Seminar 1

Semester Units 13

SEMESTER 3

BIS 100 Molecular Machinery of Life 4

CHEM 10 Principles of Physical Chemistry 4

MATH 22 Calculus of a Single Variable II# 4

WRI 10 College Reading and Composition 4

Semester Units 16

SEMESTER 4

BIS 110 The Cell 4

MATH 32 Probability & Statistics 3

PHYS 8 Introductory Physics I 4

General Education Elective 4

Computer Science Course 2

Semester Units 17

SEMESTER 5

BIS 140 Genetics 4

BIS 180 Mathematical Modeling for Biologists 4

General Education Elective (w/emphasis. on communication) . .4

PHYS 9 Introductory Physics II 4

Semester Units 16

SEMESTER 6

BIS 141 Evolution 4

Bioscience Emphasis 4

General Education Elective 4

CORE 100 The World at Home 4

Semester Units 16

SEMESTER 7

Bioscience Emphasis (with lab) 5

Elective 4

General Education Elective 4

BIS 195 Research Projects in Biological Sciences* 2

Semester Units 15

SEMESTER 8

Bioscience Emphasis 4

Science/Math/Eng. Elective 4

General Education Elective 4

BIS 195 Research Projects in Biological Sciences 2

BIS 190 Research Seminar 1

Semester Units 15

Total Program Units 120

**In the first semester of 'Research Projects in Biological Sciences' we recommend that the students attend presentations of the faculty research and rotate through several labs.*

 # Mathematical Biology (MATH 30) may be substituted for MATH 22

@ Students interested in medical school should take a second semester of organic chemistry

EARTH SYSTEMS SCIENCE PROGRAM

The undergraduate major in Earth Systems Science is designed to provide students with a quantitative understanding of the physical, chemical and biological principles that control the processes, reactions and evolution of the Earth as a support system for life. Emphasis is given to the interactions between biological systems and physical earth processes. Core courses within the major provide students with a firm foundation in the fundamentals of chemistry, biology, hydrology, ecology and Earth sciences, while emphasis areas allow students the flexibility to pursue disciplinary areas in more depth. This major emphasizes a highly interdisciplinary approach to Earth Systems Science, incorporating field studies, laboratory experiments and computations. Complementary 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 pre- pared for either graduate studies or jobs in the areas of environmental conservation, 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 the way 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. A fresh- man seminar is designed to expose students to current topics, research and career opportunities in Earth Systems Science early in the program. Upper division requirements consist of four core courses that provide students with a balance of key physical, chemical and biological concepts in Earth Systems Science, including a field-intensive course that integrates these principles in practical applications and exercises. In the upper division, students select an emphasis area that allows exploration of a particular topical area in more depth. Selection of three courses from within an emphasis area allows each student to tailor their program to their individual interests. An upper division seminar highlights the latest research in interdisciplinary Earth Systems Science topics. General education coursework in communications, economics, ethics and public policy prepares majors to apply their quantitative science skills in the job market or in further studies at the graduate level. Students are encouraged to participate in research, internship and service learning activities with faculty as part of their undergraduate studies.

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, one to two

semesters of organic chemistry and two to three semesters of general biology or Earth or environmental science courses. Students should check with the UC Merced admissions staff for more information on how courses will transfer to UC Merced.

REQUIREMENTS FOR THE EARTH SYSTEMS SCIENCE (ESS) MAJOR

In **addition** to adhering to the UC Merced and School of Natural Sciences requirements, the additional requirements that must be met to receive the B.S. in Earth Systems Science at UC Merced are: **Earth Systems Science Requirements (54-57 units):** The Earth Systems Science program consists of a minimum of 15 courses (8 lower division and 7 upper division) designed to give all students a common foundation of core knowledge specific to the discipline.

Lower Division Major Requirements

- Introduction to Earth Systems Science (ESS 1), Introduction to Biological Earth Systems (ESS 5), or Contemporary Biology (BIS 1) . . . . . .4 units
- Fundamentals of Earth Processes (ESS 20) . . . . . .4 units
- Principles of Organic Chemistry (CHEM 8) . . . . . .4 units

One additional science or engineering course from the following list (other courses by approval):

- Introduction to Ecosystem Science (ESS 25) . . . . . .4 units
- Principles of Physical Chemistry (CHEM 10) . . . . . .4 units
- Introduction to Environmental Science and Technology (ENVE 20) . . .4 units
- Calculus of a Single Variable II (MATH 22) . . . . . .4 units
- Linear Algebra and Differential Equations (MATH 24) . . . .3 units
- Introductory Physics II (PHYS 9) . . . . . .4 units
- Introduction to Computing II (CSE 21) . . . . . .2 units

Upper Division Major Requirements

- Environmental Chemistry (ESS 100) . . . . . .4 units
- Hydrology and Climate (ESS 110) . . . . . .4 units

- Geomicrobiology (ESS 120) . . . . . .4 units
- Field Methods in Earth Systems (ESS 180) . . . . . .4 units

Emphasis Track

- Three courses from emphasis track . . . . . .9-12 units

Atmospheric Sciences

- Atmospheric Chemistry and Physics [ESS 131] . . . . . .4 units
- Climatology [ESS 132] . . . . . .3 units
- Air Pollution and Resources [ESS 134] . . . . . .3 units
- Global Change [ENVE 118] . . . . . .4 units
- Meteorology and Air Pollution [ENVE 130] . . . . . .4 units

Additional Degree Requirements (19-27 units)

- Intermediate Microeconomic Theory (ECON 100) . . . . . .4 units
- Undergraduate Seminar (ESS 190) . . . . . .1 unit
- General Education elective emphasizing

  policy and ethics . . . . . .4 units
- Three upper division electives in Natural Sciences or

  Engineering . . . . . .9-12 units
- Research and/or Service Learning

  (ENGR 97 or ENGR 197) . . . . . .1-6 units

Emphasis Track course should be chosen from the following list (other courses by approval)

Geochemistry and Biogeochemistry

- Chemical Processes in the Soil Environment (ESS 102) . . . .3 units
- Geochemistry of Earth Systems (ESS 103) . . . . . .3 units
- Organic Geochemistry (ESS 104) . . . . . .3 units
- Watershed Biogeochemistry (ESS 105) . . . . . .3 units
- Microbial Ecology (ESS 125) . . . . . .4 units
- Air Pollution and Resources (ESS 134) . . . . . .3 units
- Environmental Microbiology (ENVE 121) . . . . . .4 unit

Hydrologic and Climate Sciences

- Watershed Biogeochemistry (ESS 105) . . . . . .3 units
- Ecology and Ecosystems (ESS 124) . . . . . .4 units
- Subsurface Hydrology (ENVE 112) . . . . . .4 units
- Mountain Hydrology of the Western U.S. (ENVE 114) . . .4 units
- Global Change (ENVE 118) . . . . . .4 units
- Meteorology and Air Pollution (ENVE 130) . . . . . .4 units
- Contaminant Fate and Transport (ENVE 170) . . . . . .3 units

Ecosystem Science

- Watershed Biogeochemistry (ESS 105) . . . . . .3 units
- Ecology and Ecosystems (ESS 124) . . . . . .4 units
- Microbial Ecology (ESS 125) . . . . . .4 units
- Environmental Genomics (ESS 126) . . . . . .4 units
- Theoretical Ecology (ESS 128) . . . . . .4 units
- Environmental Microbiology (ENVE 121) . . . . . .4 units
- Geomorphology and Surface Processes (ESS 150) . . . . . .4 units
- Remote Sensing of the Environment (ENVE 152) . . . . . .3 units

- Evolution (BIS 141) . . . . . .4 units

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 environ- mental education programs for high school students. With the dedication of the Sierra Nevada Research Institute Yosemite Field Station

(picture above), the partnership has kicked off a new phase of research collaboration that will advance scientific and cultural under- standing, meet regional needs and enrich university and public education. An affiliated research station in Sequoia/Kings Canyon is also planned.

SAMPLE PLAN OF STUDY FOR EARTH SYSTEMS SCIENCE DEGREE

SEMESTER 1

*ICP 1 Integrated Calculus and Physics I 8

CORE 1 The World at Home 4

Computer Science Course 2

Semester Units 14

SEMESTER 2

Lower Division Science Course 4

CHEM 2 General Chemistry 4

MATH 22 Calculus of a Single Variable II 4

CSE 21 Introduction to Computing II 2

ESS 90x Freshman Seminar 1

Semester Units 15

SEMESTER 3

PHYS 9 Introductory Physics II 4

CHEM 8 Principles of Organic Chemistry 4

MATH 32 Probability & Statistics 3

WRI 10 College Reading and Composition 4

Semester Units 15

SEMESTER 4

ESS 20 Fundamentals of Earth Processes 4

MATH 24 Linear Algebra and Differential Equations 3

Lower Division Science Course 4

General Education Elective 4

Semester Units 15

SEMESTER 5

ESS 110 Hydrology and Climate 4

ESS 180 Field Methods in Earth Systems 4

General Education Elective (w/emphasis. on communication) . .4

ECON 100 Intermediate Microeconomic Theory 4

Semester Units 16

SEMESTER 6

ESS 120 Geomicrobiology 4

ESS 100 Environmental Chemistry 4

CORE 100 The World at Home 4

Upper Division NS or Engineering Elective 4

Semester Units 16

SEMESTER 7

ESS Emphasis 4

ESS Emphasis 3

General Education (Policy and Ethics) Elective 4

Upper division NS or Engineering Elective 4

ESS 190 Undergraduate Seminar 1

Semester Units 16

SEMESTER 8

ESS Emphasis 4

Free Elective or Research 3

General Education Elective 4

Upper Division NS or Engineering Elective 4

Service Learning 1

Semester Units 16

Total Program Units 123

** Can substitute MATH 21 Calculus of a Single Variable I (4 units) and PHYS 8 Introductory Physics I (4 units)*

HUMAN BIOLOGY PROGRAM

The Human Biology major will provide students with a rich education in the scientific and humanist disciplines 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 major will also provide a strong foundation for careers in science and biomedical research.

The undergraduate Human Biology major is a highly interdisciplinary and broad-based program that integrates biology, social sciences and humanities. This major builds upon the powerful

convergence linking genomics and molecular biology to our understanding and treatment of human health and disease. The breadth of the program gives students interested in health professions a well- rounded appreciation of the cultural and psychological influences on patient health, as well as a strong foundation in the physical and life sciences.

Students considering a Human Biology major will meet with an advisor and choose a curriculum based upon his/her interests and requirements for graduate or professional school goals. The undergraduate major in Human Biology currently offers two emphasis tracks: Economics and Psychology/Cognitive Sciences. The Human Biology major has a strong foundation in biology, including courses required for medical schools and other biomedical professional schools. The emphasis tracks add both lower and upper division economics or psychology/cognitive science courses. Both tracks allow a significant flexibility in choosing courses.

Undergraduate Major in Human Biology Research Requirement. As a capstone to the Human Biology Program and to integrate the background students will have obtained in their first five semesters of separate courses in natural science and social science, all Human Biology majors will participate in a research project that links biology and the social sciences. This will involve having their independent laboratory research courses jointly mentored by biology and social science faculty members. In the Spring Semester of their junior year, students will attend presentations of faculty research. The students will then meet in groups with a biologist and social scientist to plan their senior year research project. The final student research seminar will also be a joint course from the Schools of Natural Sciences and Social Sciences, Humanities and Arts. Examples of research areas would be in epidemiology (sociology and biology) or neurobiology (psychology/cognitive science and biology) or health care policy (economics or public policy and biology).

Transfer Students. Transfer students who wish to major in Human Biology should complete one year of calculus, one year of physics, one year of general chemistry, at least one semester of organic chemistry, two to three semesters of general biology and introductory psychology. Students should check with the UC Merced admissions staff for more information on how courses will transfer to UC Merced.

REQUIREMENTS FOR THE HUMAN BIOLOGY (HBIO) MAJOR

In **addition** to adhering to the UC Merced and School of Natural Science requirements, the additional requirements that must be met to receive the B.A. in Human Biology at UC Merced are:

Human Biology Requirements (54-61 units): The Human Biology major consists of 14 courses (6 lower division and 8 upper division) designed to give all students a common foundation of core knowledge specific to the discipline.

Lower Division Major Requirements

- Contemporary Biology (BIS 1) . . . . . .4 units
- Principles of Organic Chemistry (CHEM 8) . . . . . .4 units
- Principles of Physical Chemistry (CHEM 10) . . . . . .4 units

- Mathematical Biology (MATH 30) or Calculus of a

  Single Variable II (MATH 22) . . . . . .4 units

- Introduction to Psychology (PSY 1) . . . . . .4 units

- Introduction to Economics (ECON 1) or

Introduction to Cognitive Sciences (COGS 1)* . . . . . .4 units

- Introductory Physics II (PHYS 9) . . . . . .4 units

** Human Biology majors in Economics track must take ECON 1; majors in Psychology/Cognitive Sciences track must take COGS 1.*

Upper Division Major Requirements

- Molecular Machinery of Life (BIS 100) . . . . . .4 units
- The Cell (BIS 110) . . . . . .4 units
- Two electives from Biology course list . . . . . .8 units
- Two upper division NS/ENG electives, one of which must

  have a lab (can be additional BIS courses) . . . . . .7-10 units

- Research Seminar (HBIO 190) . . . . . .1 unit
- Research Projects in Human Biology (HBIO 195) . . . . . .2-6 units

Emphasis Track.

There are two emphasis tracks: Economics and Psychology/Cognitive Science.

Psychology/Cognitive Science (16 units):

- Introduction to Cognitive Modeling (COGS 102) . . . . . .4 units
- Three electives from Psychology/Cognitive

  Sciences course list . . . . . .12 units

Economics (16 units):

- Intermediate Microeconomics (ECON 100) . . . . . .4 units
- Econometrics (ECON 130) . . . . . .4 units
- Health Economics (ECON 145) . . . . . .4 units
- Political Economics (ECON 155) . . . . . .4 units

Biology electives (at least 2) should be chosen from the following list:

- Biochemistry (BIS 101) + Biochemistry Lab (BIS 101L) . . . .5 units
- Molecular Biology (BIS 102) . . . . . .4 units
- Biophysics (BIS 104) + Biophysics Laboratory (BIS 104L) . .5 units
- Enzymology (BIS 105) . . . . . .4 units
- Cells, Tissues and Organs (BIS 111) . . . . . .4 units
- Signal Transduction and Growth Control (BIS 112) . . . . . .4 units
- General Microbiology (BIS 120) . . . . . .4 units
- Microbial Pathogenesis (BIS 122) . . . . . .4 units
- Human Parasitology (BIS 123) . . . . . .4 units
- Emerging Public Health Threats (BIS 125) . . . . . .4 units
- General Virology (BIS 127) . . . . . .4 units
- Genetics (BIS 140) . . . . . .4 units
- Evolution (BIS 141) . . . . . .4 units
- Comparative Genomics (BIS 142) +

  Comparative Genomics Lab (BIS 142L) . . . . . .5 units
- Embryos, Genes and Development (BIS 150) . . . . . .4 units
- Molecular Immunology (BIS 151) . . . . . .4 units
- Cancer Genetics and Tumor Biology (BIS 152) . . . . . .4 units
- Comparative Physiology (BIS 160) . . . . . .4 units
- Human Physiology (BIS 161) +

Human Physiology Lab (BIS 161L) . . . . . .4 units

- Endocrinology (BIS 163) + Endocrinology Lab (BIS 163L) . .5 units
- Neurobiology (BIS 170) . . . . . .4 units
- Biostatistics (BIS 175) . . . . . .4 units
- Mathematical Modeling for Biologists (BIS 180) . . . . . .4 units

Psychology and Cognitive Science electives (at least 3 should be chosen from the following list):

- Physiological Psychology (PSY 120) . . . . . .4 units
- Cognitive Psychology (PSY 121) . . . . . .4 units
- Developmental Psychology (PSY 130) . . . . . .4 units
- Personality (PSY 132) . . . . . .4 units
- Abnormal Psychology (PSY 133) . . . . . .4 units
- Clinical Psychology (PSY 140) . . . . . .4 units
- Human Sexuality (PSY 145) . . . . . .4 units
- Alcohol, Drugs and Behavior (PSY 146) . . . . . .4 units
- Mind, Brain and Computation (COGS 101) . . . . . .4 units
- Introduction to Neural Networks in

Cognitive Science (COGS 103) . . . . . .4 units

SAMPLE PLAN OF STUDY FOR HUMAN BIOLOGY DEGREE – PSYCHOLOGY/COGNITIVE SCIENCE EMPHASIS

SEMESTER 1

BIS 1 Contemporary Biology 4

CHEM 2 General Chemistry 4

CORE 1 The World at Home 4

Freshman Seminar 1

Semester Units 16

SEMESTER 2

MATH 21 Calculus of a Single Variable I 4

CHEM 8 Principles of Organic Chemistry* 4

PSY1 Introduction to Psychology 4

General Education Elective 4

Semester Units 13

SEMESTER 3

BIS 100 Molecular Machinery of Life 4

CHEM 10 Principles of Physical Chemistry 4

MATH 30 Mathematical Biology@ 4

WRI 10 College Reading and Composition 4

Semester Units 16

SEMESTER 4

BIS 110 The Cell 4

MATH 32 Probability & Statistics 3

PHYS 8 Introductory Physics I 4

COGS 1 Introduction to Cognitive Science 4

Computer Science Course 2

Semester Units 17

SEMESTER 5

BIS Elective 4

PHYS 9 Introductory Physics II 4

General Education Elective (w/emphasis on communication) . .4

COGS 102 Introduction to Cognitive Modeling 4

Semester Units 16

SEMESTER 6

BIS Elective 4

PSY/COGS Elective 4

CORE 100 The World at Home 4

PSY/COGS Elective 4

HBIO 195 Research Projects in Human Biology# 1

Semester Units 17

SEMESTER 7

NS/ENG Elective 4

PSY/COGS Elective 4

General Education Elective 4

Free Elective 4

Semester Units 16

SEMESTER 8

NS/ENG Elective w/Lab 5

Non-science or engineering course 3

General Education Elective 4

HBIO 195 Research Projects in Human Biology# 1

HBIO 190 Research Seminar 1

Semester Units 14

Total Program Units 125

 # In the first semester of Research Projects in Human Biology we recommend that students attend presentations of the faculties of Natural Sciences and Social Sciences that will participate in HBIO research training

** Students interested in medical school should take a second semester of organic chemistry*

@ Calculus of a Single Variable II (MATH 22) may be substituted for MATH 30

SAMPLE PLAN OF STUDY FOR HUMAN BIOLOGY DEGREE – ECONOMICS EMPHASIS

SEMESTER 1

BIS 1 Contemporary Biology 4

CHEM 2 General Chemistry 4

CORE 1 The World at Home 4

Freshman Seminar 1

Semester Units 13

SEMESTER 2

MATH 21 Calculus of a Single Variable I 4

CHEM 8 Principles of Organic Chemistry* 4

PSY1 Introduction to Psychology 4

General Education Elective 4

Semester Units 16

SEMESTER 3

BIS 100 Molecular Machinery of Life 4

CHEM 10 Principles of Physical Chemistry 4

MATH 30 Mathematical Biology@ 4

WRI 10 College Reading and Composition 4

Semester Units 16

SEMESTER 4

BIS 110 The Cell 4

MATH 32 Probability & Statistics 3

PHYS 8 Introductory Physics I 4

ECON 1 Introduction to Economics 4

Computer Science Course 2

Semester Units 17

SEMESTER 5

BIS Elective 4

ECON 100 Intermediate Microeconomic Theory 4

General Education Elective (w/emphasis. on communication) . .4

PHYS 9 Introductory Physics II 4

Semester Units 16

SEMESTER 6

BIS Elective 4

ECON 145 Health Economics 4

CORE 100 The World at Home 4

ECON 130 Econometrics 4

HBIO 195 Research Projects in Human Biology# 1

Semester Units 17

SEMESTER 7

NS/ENG Elective 4

ECON 155 Political Economics 4

General Education Elective 4

General Education Elective 4

Semester Units 16

SEMESTER 8

NS/ENG Elective w/Lab 5

Non-science or engineering course 3

General Education Elective 4

HBIO 195 Research Projects in Human Biology 1

HBIO 190 Research Seminar 1

Semester Units 14

Total Program Units 125

 # In the first semester of Research Projects in Human Biology we recommend that students attend presentations of the faculties of Natural Sciences and Social Sciences that will participate in HBIO research training

** Students interested in medical school should take a second semester of organic chemistry*

@ Calculus of a Single Variable II (MATH 22) may be substituted for MATH 30

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 known as the social sciences, humanities and the arts. 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. Consider these two examples:

Imagine the question: "What is a metaphor?"

Poets and novelists use metaphor to evoke vivid images in their readers. Scientists rely on metaphor to make leaps in discovery and theory.

Teachers use metaphor to explain logarithmic functions, quasars and other relatively abstract phenomena. Politicians employ metaphor to frame issues and influence public policy. We all use metaphor in our daily conversations and writing, and often we are not even aware of it. Our interdisciplinary programs will allow students to explore the meaning, use and power of metaphors across several disciplines, including psychology, cognitive science, literature, art, history, philosophy and public policy. What does metaphor say about everyday thought? How does it influence society?

Imagine the question: "What is social change?"

Throughout human history, peoples have created new societies, regimes and systems of belief. Social change can be studied at a global scale over thou- sands of years, yet California's Central Valley is also a laboratory for under- standing these issues. Agricultural fields that replaced meadow land only a hundred years ago are being converted to housing and industry. Explosive population growth is fundamentally transforming the local economy, while at the same time pressuring the capacity of public infrastructure and social services. In order to understand changes like these, students need to step away from thinking of economics and business, history, sociology, government, biology and geography as a set of simple, separate disciplines. Instead, students need to learn to integrate key ideas and interdisciplinary tools to understand all the dimensions of a given issue. How can a diverse society use these insights to make better decisions?

The School of Social Sciences, Humanities and Arts offers undergraduate and graduate programs that allow flexible courses of study and opportunities for research at the intersections where the interesting questions lie. Students will have the opportunity to follow personal paths of discovery in interdisciplinary curricula, while at the same time gaining depth and expertise in methodological domains such as social statistics, historiography, GIS, economics, cultural analysis and cognitive science.

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 an interdisciplinary 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 will 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 out 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 discoveries depend 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.

All politics is local. 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. Jobs lost in the Central Valley may be gained in Asia, Latin America or Nevada and vice versa. Central Valley cotton may be shipped to India to be made into fabric, assembled into clothing in Guatemala and then shipped back to local stores for sale. Music and art can cross borders at a rate limited only by the speed of the internet. We envision our community of students as developing a zone of comfort that allows them to act simultaneously as local and global citizens.

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 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 lifeways, institutions and works of the imagination, they will develop perspectives that enable them to be better able to understand and shape our futures.

SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS REQUIREMENTS

All School of Social Sciences, Humanities and Arts students, regard- less of major, are expected to meet the minimum requirements for the BA degree. The School of Social Sciences, Humanities and Arts degree requirements are:

At least 120, but not more than 128 semester units to include the following:

- At least 45 general education semester units.
- At least 60 semester units of upper division courses.

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:

Lower Division General Education Requirements

- College One Core Course sequence,

  The World at Home (CORE 1) . . . . . .4 units
- College Reading and Composition (WRI 10) . . . . . .4 units
- Natural Science/Engineering Introductory course with

  laboratory, field or studio . . . . . .4 units
- Second Natural Science or Engineering

  Introductory Course . . . . . .4 units
- Quantitative Analysis Course . . . . . .4 units
- Introductory World Culture and History or Arts Course . . .4 units
- Introductory SCS Course Outside Emphasis . . . . . .4 units

Upper Division General Education Requirements

- College One Core Course Sequence,

  The World at Home (CORE 100) . . . . . .4 units
- Four Upper Division Courses Outside Area of

  Emphasis or Major . . . . . .16 units

Students in the School of Social Sciences, Humanities and Arts will have a freshman year that lays the foundation for further study in the majors. Students will 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. The first course of the Core Course sequence, CORE 1, The World at Home, is common for all UC Merced students. 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, team- work, aesthetic understanding, creativity and an appreciation of diverse perspectives in both the global and community contexts. All UC Merced students will also take CORE 100, The World at Home, as a junior.

Major area upper division courses and emphasis track requirements are unique to each major. These are presented in the following section on Majors.

THE MAJORS

MANAGEMENT PROGRAM

The Management program will respond to the growing need of California industry, especially in the Central Valley. UC Merced's management education is interdisciplinary and consists of a blend of courses from the fields of economics, management theory and the social sciences. Real life management problems do not fit neatly into subject areas. Today's managers and economists tackle issues that involve a number of management functions - so solutions need to account for all the areas involved. The UC Merced approach is to step away from thinking of management and economics as a set of simple, separate disciplines. Instead, the 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 Management major at UC Merced represents a unique hands-on approach to management development and economics, positioning courses at the leading edge of dynamic business performance. The practical and project-based approach is based on the principle that learning is more rewarding when put into practice. Expertise can be taught, yet skills development demands live employment in the real world of work. 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, are "well-rounded" in sciences and humanities, and who have learned the art of self-directed learning.

Using a multidisciplinary approach, the Management major prepares students for a broad range of management-related careers. The curriculum provides a strong foundation in economics, organization, business, finance, accounting and quantitative methods. UC Merced's Management program also emphasizes the historical and cultural dimensions of economics and management. 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 will develop skills to build quantitative models of complex operations and be able to use those models to facilitate decision-making. The Management degree provides students with the analytical tools to operate successfully in a modern, volatile business environment. The core management courses provide a rigorous foundation in economics, organizations, finance, accounting and psychology.

Students who graduate with a major in Management will be able to:

- Analyze information, solve problems and make decisions from a multidisciplinary perspective
- Apply theories and concepts from management and related fields

  (for example, economics, accounting, statistics and finance) 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.

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 humanities/arts and

psychology; two lower division natural science or engineering courses, at least one of which has a lab, field, or studio component; principles of economics and accounting; and a two-course UC transfer- able sequence in calculus.

REQUIREMENTS FOR THE MANAGEMENT (MGMT) MAJOR

In **addition** to adhering to the UC Merced and School of Social Science, Humanities and Arts requirements, the additional requirements that must be met to receive the B.A. in Management at UC Merced are:

Management Course Requirements. The Management major requires 47 units (some of which simultaneously fill general education requirements). 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 include:

Lower Division Major Requirements:

- Case Study Seminar on Business and

  Management (MGMT 2) . . . . . .1 unit

- Introduction to Finance and Accounting I and II

  (MGMT 25 and 26) . . . . . .6 units

- Introduction to Economics (ECON 1) . . . . . .4 units

- Analysis of Economic Data (ECON 10) * . . . . . .4 units

- Introduction to Psychology or Cognitive Science

  (PSY 1 or COGS 1)* . . . . . .4 units

- Calculus of a Single Variable I (MATH 21) . . . . . .4 units

- Management Information Systems (MIS) or

  Computer Science course# . . . . . .4 units

Upper Division Major Requirements:

- Intermediate Microeconomic Theory (ECON 100) . . . . . .4 units
- Intermediate Macroeconomic Theory (ECON 101) . . . . . .4 units
- Econometrics (ECON 130) . . . . . .4 units
- Financial Economics (ECON 162) . . . . . .4 units
- Industrial and Organizational Psychology (PSY 141) * . . . .4 units

* *Can satisfy general education requirement*

See website for specific course numbers and descriptions

Additional requirements: Students are required to take at least 16 semester units of upper division elective economics or management courses that should be selected to provide depth in a specific management area, such as personnel economics, finance, strategy, industrial organization or regulatory policy.

SAMPLE PLAN OF STUDY FOR MANAGEMENT DEGREE

SEMESTER 1

CORE 1 The World at Home 4

ECON l Introduction to Economics 4

WRI 10 College Reading & Composition 4

MATH 21 Calculus of a Single Variable I 4

Semester Units 16

SEMESTER 2

Elective 4

Introductory WCH or Arts course 4

Nat Sci/Engin w/Lab/Field Work/Studio 4

PSY 1 or COGS 1 Introduction to Psychology or Cognitive Science . .4

Semester Units 16

SEMESTER 3

ECON 100 Intermediate Microeconomic Theory 4

Natural Science/Engineering course 4

MGMT 2 Case Study Seminar on Business and Management .1

MGMT 25 Introduction to Finance and Accounting I 3

Semester Units 12

SEMESTER 4

Elective 4

ECON 10 Analysis of Economic Data# 4

MIS or CSE course$ 4

MGMT 26 Introduction to Finance and Accounting II 3

Semester Units 15

SEMESTER 5

Elective 4

ECON 101 Intermediate Macroeconomic Theory 4

Upper division GE course outside Management 1 4

Upper division Economics or Management elective 1 4

Semester Units 16

SEMESTER 6

Upper division Economics or Management elective 2 4

ECON 162 Financial Economics 4

Upper division GE course outside Management 2 4

CORE 100 The World at Home 4

Semester Units 16

SEMESTER 7

ECON 130 Econometrics 4

PSY 141 Industrial and Organizational Psychology * 4

Upper division Economics or Management elective 3 4

Free elective 4

Semester Units 16

SEMESTER 8

Upper division GE Course outside Management 3 4

Upper division Economics or Management elective 4 4

Free Elective 4

Free Elective 4

Semester Units 16

Total Program Units 123

** Counts toward upper division GE course requirement outside of Management.*

 # Counts toward GE quantitative analysis requirement

$ See Dean's Office for approved list of MIS or CSE courses

SOCIAL AND COGNITIVE SCIENCES PROGRAM

The undergraduate major in Social and Cognitive Sciences will offer broad preparation that cuts across Economics, Psychology, Political Science, Public Policy, Sociology and Anthropology. Introductory coursework will lay the basis for understanding the major questions and methodologies across the Social and Cognitive Sciences, including a common core of statistical and experimental methods courses. Upper division courses and projects will allow students to synthesize their cross-discipline learning and experiences.

Within this broad framework, three emphases will be developed within the initial program: Psychology, Economics and Public Policy. Students will select one of these emphases and will receive a notation on their transcript and diploma. Other emphases will be developed as the faculty and program enrollments grow.

The Psychology emphasis will provide broad preparation in psychology as a field and in the research methodologies of psychology. Special emphases will include human development (biological and cognitive) and social psychology. Cross-school programs will emphasize the intersections of psychology with the biological sciences through programs in Human Biology. Emphases in human development and social psychology will include multicultural perspectives. Psychology emphasis students will have opportunities to work with faculty on research.

Built on a basis of strong theoretical and statistical training, the Economics emphasis will give students a solid grounding in economic theory and quantitative methods. The Economics emphasis will provide students with an understanding of how incentives and institutions shape society. Special emphases will include labor economics, public economics, environmental economics, political economy and quantitative methods. Opportunities to do research with faculty will also be available.

The Public Policy emphasis provides an interdisciplinary education that pre- pares students for leadership positions in analyzing, implementing and managing public policies. The emphasis prepares students to apply the knowledge and tools from various academic disciplines, spanning such diverse fields as economics, political science, psychology, engineering and biology.

Students will choose an area of emphasis within the program from social policy, health policy or environmental policy. The program focuses on the challenging policy issues of today and strives to prepare students to understand and to solve the emerging problems of tomorrow. As one of the best ways to learn is by doing, students will participate in an internship and/or an independent research project.

Depending upon their emphasis within Social and Cognitive Sciences, students will be well prepared for advanced study in law, management, public policy, urban and regional planning and medicine; or for admission into graduate school in one of the social science emphasis fields. Career paths include business; social services agencies; federal, state and local government service; non-governmental organizations and non-profit agencies; community development; and counseling and training programs.

REQUIREMENTS FOR THE SOCIAL AND COGNITIVE SCIENCES (SCS) MAJOR

In **addition** to adhering to the UC Merced and School of Social Science, Humanities and Arts requirements, the additional requirements that must be met to receive the B.A. in Social and Cognitive Sciences at UC Merced are:

Social and Cognitive Sciences Course Requirements.

The Social and Cognitive Sciences major requires 44 units

(some of which simultaneously fill general education requirements). 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 include:

Lower Division Major Requirements [12 units]:

- Introduction to the Social and

  Cognitive Sciences . . . . . .8 units

  Two courses chosen from:

  - Introduction to Cognitive Science (COGS 1)
  - Introduction to Economics (ECON 1)
  - Introduction to Psychology (PSY 1)
  - Introduction to Political Science (POL 1)
  - Introduction to Public Policy (PUBP 1)
  - Introduction to Sociology (SOC 1)

- Quantitative Methods . . . . . .4 units

  One course chosen from:

  - Psychology emphasis – Analysis of Psychological Data (PSY 10)
  - Economics emphasis – Analysis of Economic Data (ECON 10)
  - Public Policy emphasis – students can choose either PSY 10 or ECON 10 (Counts toward the General Education Quantitative Requirement)

Upper Division Major Requirements [32 units]

Economics emphasis:

- Intermediate Microeconomic Theory

  (ECON 100) . . . . . .4 units

- Intermediate Macroeconomic Theory

(ECON 101) . . . . . .4 units

- Econometrics (ECON 130) . . . . . .4 units
- Five additional upper division

Economics courses . . . . . .20 units

Psychology emphasis:

- Research Methods in Psychology (PSY 105) . . . . . .4 units
- Psychological Perspectives on Cultural, Racial and Ethnic Diversity

  (PSY 150) . . . . . .4 units
- One upper division Psychology emphasis course from

  each of the following three groups: . . . . . .12 units
  - Group A (Cognition, Brain and Behavior): PSY 120, 121, or any upper division COGS course
  - Group B (Social-Personality, Development): PSY 130, 131, 132, 133
  - Group C (Applied Psychology): PSY 140, 141, 145, 146, SCS 140, SCS 145
- At least three additional upper division courses in Psychology or

  Cognitive Science . . . . . .12 units

Public Policy emphasis:

- PUBP 1: Introduction to Public Policy . . . . . .4 units
- PUBP 100: Political Process and Institutions . . . . . .4 units
- ECON 100: Intermediate Microeconomic Theory . . . . . .4 units
- Research Methods – choose between Research Methods in

  Psychology (PSY 105) or Econometrics (ECON 130) . . . . . .4 units
- Two courses from one of the three areas of study and one course from another area; at least one of these courses has to be a public policy course: . . . . . .12 units
  - Social Policy – Poverty and Social Policy (PUBP 110), Immigration and Public Policy (PUBP 140), Race, Ethnicity and Public Policy (PUBP 150), Labor Economics (ECON 140), Development Economics (ECON 150), Political Economics (ECON 155), Social Psychology (PSY 131), Developmental Psychology (PSY 130), Psychological Perspectives on Cultural, Racial and Ethnic Diversity (PSY 150), Second Language Learning and Bilingualism (SCS 145).

- Health – Health Care Policy (PUBP 120), Health Economics (ECON 145), Public Finance (ECON 151), Political Economics (ECON 155), Social Psychology (PSY 131), Developmental Psychology (PSY 130), Human Sexuality (PSY 145), Alcohol, Drugs and Behavior (PSY 146), Psychological Perspectives on Cultural, Racial and Ethnic Diversity (PSY 150).

Additional courses in Natural Sciences or Engineering may be taken to meet the **Health Care Policy** area of study with the consent of the instructor and the Public Policy Program. Please consult the SSHA advisor and/or visit SSHA's website for a list of approved courses.

- Environment – Environmental Policy (PUBP 130), Environmental Economics (ECON 120), Law and Economics (ECON 152), Political Economics (ECON 155), Topics in Environmental History (HIST 135).

Additional courses in Natural Science or Engineering may be taken to meet the **Environmental Policy** area of study with the consent of the instructor and the Public Policy Program. Please consult the SSHA advisor and/or visit SSHA's website for a list of approved courses.

- Directed Research in Public Policy

(Internship and/or Independent Study) . . . . . .4 units Students must enroll in Individual Internship (PUBP 196) or Upper Division Individual Study (PUBP 199) and complete an original policy research paper. Students must have a faculty advisor in order to enroll in either course. Once the required units are satisfied, Public Policy students can take either course as an elective without a major research paper.

Transfer Students. Transfer students who wish to major in Social and Cognitive Sciences 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 psychology and economics, and two lower division natural science or engineering courses, at least one of which has a lab, field or studio component. Students interested in the Economics or Public Policy emphasis should also take a two-course UC transferable sequence in calculus.

SAMPLE PLAN OF STUDY FOR SCS DEGREE – ECONOMICS EMPHASIS

SEMESTER 1

CORE 1 The World at Home 4

ECON 1 Introduction to Economics 4

WRI 10 College Reading & Composition 4

Elective 4

Semester Units 16

SEMESTER 2

Elective 4

MATH 21 Calculus of a Single Variable I 4

Nat Sci/Engin w/Lab/Field Work/Studio 4

Elective 4

Semester Units 16

SEMESTER 3

Introductory SCS course outside Economics 4

Natural Science/Engineering course 4

ECON 10 Analysis of Economic Data 4

Elective 4

Semester Units 16

SEMESTER 4

Introductory WCH or Arts course 4

General Education Elective 4

Elective 4

Elective 4

Semester Units 16

SEMESTER 5

ECON100 Intermediate Microeconomic Theory 4

Upper Division ECON course 4

Upper Division course outside Economics 4

Elective 4

Semester Units 16

SEMESTER 6

ECON 101 Intermediate Macroeconomic Theory 4

Upper Division ECON course 4

Upper Division course outside Economics 4

CORE 100 The World at Home 4

Semester Units 16

SEMESTER 7

Upper Division ECON course 4

Upper Division course outside Economics 4

ECON 130 Econometrics 4

Elective 4

Semester Units 16

SEMESTER 8

Upper Division ECON course 4

Upper Division ECON course 4

Upper Division course outside Economics 4

Elective 4

Semester Units 16

Total Program Units 128

SAMPLE PLAN OF STUDY FOR SCS DEGREE – PSYCHOLOGY EMPHASIS

SEMESTER 1

CORE 1 The World at Home 4

PSY 1 Introduction to Psychology 4

WRI 10 College Reading & Composition 4

Elective 4

Semester Units 16

SEMESTER 2

PSY 10 Analysis of Psychological Data 4

Elective 4

Nat Sci/Engin w/Lab/Field Work/Studio 4

Elective 4

Semester Units 16

SEMESTER 3

Introductory SCS course outside emphasis 4

Natural Science/Engineering course 4

PSY 150 Psychological Perspectives on

Cultural, Racial and Ethnic Diversity 4

Elective 4

Semester Units 16

SEMESTER 4

Introductory WCH or Arts course 4

PSY 105 Research Methods in Psychology 4

Elective 4

Elective 4

Semester Units 16

SEMESTER 5

PSY Group A course 4

Upper Division course in PSY/COGS 4

Upper Division course outside PSY/COGS 4

Elective 4

Semester Units 16

SEMESTER 6

CORE 100 The World at Home 4

Upper Division PSY/COGS course 4

Upper division course outside PSY/COGS 4

PSY Group B course 4

Semester Units 16

SEMESTER 7

PSY Group C course 4

Upper Division course outside PSY/COGS 4

Elective 4

Elective 4

Semester Units 16

SEMESTER 8

Upper Division PSY/COGS course 4

Upper Division course outside PSY/COGS 4

Elective 4

Elective 4

Semester Units 16

Total Program Units 128

SAMPLE PLAN OF STUDY FOR SCS DEGREE – PUBLIC POLICY EMPHASIS

SEMESTER 1

CORE 1 The World at Home 4

ECON 1 Introduction to Economics 4

WRI 10 College Reading & Composition 4

Elective 4

Semester Units 16

SEMESTER 2

PUBP 1 Introduction to Public Policy 4

MATH 21 Calculus of a Single Variable I 4

Nat Sci/Engin w/Lab/Field Work/Studio 4

Elective 4

Semester Units 16

SEMESTER 3

Introductory WCH or Arts course 4

Natural Science/Engineering course 4

ECON 100 Intermediate Microeconomic Theory 4

Elective 4

Semester Units 16

SEMESTER 4

Introductory SCS course outside emphasis 4

ECON 10 Analysis of Economic Data or PSY 10

Analysis of Psychological Data 4

POL 1 Introduction to Political Science 4

Elective 4

Semester Units 16

SEMESTER 5

PUPB 100 Political Process and Institutions 4

Upper Division course outside Public Policy 4

ECON 130 Econometrics or PSY 105

Research Methods in Psychology 4

Elective 4

Semester Units 16

SEMESTER 6

CORE 100 The World at Home 4

Upper Division PUBP course 4

Upper Division course outside Public Policy 4

Elective 4

Semester Units 16

SEMESTER 7

Upper Division PUBP course 4

Upper Division course outside Public Policy 4

Directed Research in Public Policy* 4

Elective 4

Semester Units 16

SEMESTER 8

Upper Division PUBP course 4

Upper Division course outside Public Policy 4

Elective 4

Elective 4

Semester Units 16

Total Program Units 128

**This can be satisfied by either PUBP 196 or PUBP 199.*

WORLD CULTURES AND HISTORY PROGRAM

The undergraduate major in World Cultures and History will invite students to study questions of society and culture in a comparative context. It will address such questions as: What constitutes a society and a culture, and how are they formed? How and why do societies and cultures sometimes come into conflict? What happens at the crossroads of culture—for example, California and the San Joaquin Valley—when people from many different back- grounds come into contact?

These questions can best be understood through the prism of the humanities and arts, assisted by the natural and social sciences. Thus, this major will bring together a variety of disciplines previously thought of as dissimilar— including anthropology, history and political science, language and literature, music and performance studies, philosophy and religious studies and area and ethnic studies.

In UC Merced's opening years, the World Cultures and History major will particularly examine the interaction of nations and cultures from both a literary and an historical perspective. Within both these fields, lively scholarly debates on the subject of culture abound. This major will appeal to students who are interested in learning the methods and tools of history, literature and allied fields to understand how societies and cultures have developed and continue to evolve. A special feature of this major will give students the opportunity to apply their classroom learning to relevant and contemporary research problems outside the classroom, where students may contribute to expanding public knowledge and awareness of cultural issues.

Two emphases will be developed within the initial program: history or literature. Students will select one of these emphases and receive a notation to that effect on their transcript and diploma. Other emphases will be developed as the faculty and program enrollments grow.

The History emphasis will prepare students to understand and use the methods by which historians examine society and culture, through historical research and writing. Students will learn to locate, evaluate and interpret evidence, and then use that evidence to construct an argument or develop a thesis, using both historical case studies and comparative studies. Students will explore history as a field, including the examination in depth of issues concerning world, national or state and local history. Initially, the history emphasis will focus on world history, American history and the history of science and technology.

The Literature emphasis will prepare students in the multiple perspectives from which literature as a product of culture is read. Students will learn how to interpret texts by applying different critical methods and hone their own interpretive skills through analysis and writing. Students will have the opportunity to take courses on a national tradition, transnational movements, historical periods, cultural analysis, literary genres, women's and ethnic literatures, regional literatures, environmental writings and children's literature. Students will use this study to build written, oral and other communication skills. They will develop the ability to create well-crafted analyses for specialists in their field, as well as to interpret the results of their research and analyses for a non-specialist public.

During their undergraduate careers, World Cultures and History majors will have a variety of opportunities to apply what they are learning. Possibilities include undergraduate research with individual faculty; community or regional internships in a variety of cross-cultural settings; and enrichment experiences through the World Cultures Institute. The rich and diverse historical experiences and cultural heritages of California and the San Joaquin Valley offer an excellent living laboratory for this research.

A unique part of the World Cultures and History major will be a public research project that enables students to use their research and communication skills either individually or as part of a team to educate and inform the public. Students might work, for example, on researching and writing an interpretative account linking the environmental and human histories of near- by Yosemite or Sequoia National Park; or on representations through the arts of a San Joaquin Valley cultural group at a Valley museum; or on an aspect of irrigation history and water policy for a public agency in the Valley. The final product might be in the form of an interpretive web site that combines writ- ten and oral texts with visual material, an interpretive text for the public or a written and oral report to a sponsoring agency. Extensive writing will be a keystone of the World Cultures and History major, and a requirement of any public research project.

World Cultures and History majors may also elect to study overseas through the University of California Education Abroad Program (EAP) or participate in the University of California programs in Washington DC (UCDC) or Sacramento. To fulfill the public research project requirement, the EAP, UCDC or Sacramento experience would need to be planned under UCM faculty supervision and lead to completion of a final written report (for EAP students: in English or in the language of the EAP country) addressed to a well-defined public audience.

Students will also complete a two-semester senior proseminar in which they will explore connections among the World Cultures and History courses they have completed and write a senior thesis. The proseminar will require students to demonstrate their skills in communicating effectively both orally and in writing with an audience in their emphasis field. Semester one will focus on directed research in preparation for writing a senior thesis; semester two will be devoted to completing the thesis.

World Cultures and History students will be well-prepared to enter advanced study programs in law, education, journalism, diplomacy, library science and management, as well as graduate study in their field of emphasis. Career opportunities will be found in academe, business, publishing, public service, non-governmental organizations and at museums and archives.

Public as well as private agencies seeking employees with strong cross-cultural communication skills and understanding should find graduates from this program especially appealing.

REQUIREMENTS FOR THE WORLD CULTURES AND HISTORY

(WCH) MAJOR

In **addition** to adhering to the UC Merced and School of Social Science, Humanities and Arts requirements, the additional requirements that must be met to receive the B.A. in World Cultures and History at UC Merced are:

World Cultures and History Requirements: Students in the World Cultures and History major must complete at least 41 units in World Cultures and History courses, of which 8 units will be from lower division courses in the student's area of emphasis, 1-4 units will be a senior public research project and 8 units will be through senior proseminars. 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. In addition to the emphasis areas of history and literature, World Cultures and History includes courses in anthropology, art and art history, languages (initially, Spanish) and philosophy. Required courses include:

Lower Division Major Requirements (32 units): A two-semester lower division introductory sequence in the student's intended area of emphasis:

History emphasis (one of the following combinations): . . . .8 units

- Introduction to World History to 1500 (HIST 10) and Introduction to World History Since 1500 (HIST 11)

- The Forging of the United States, 1607-1877 (HIST 16) and The Modern United States, 1877-Present (HIST 17)

Or

Literature emphasis (one of the following combinations): . . .8 units

- Introduction to World Culture and Literature I and II (LIT 20 and LIT 21)

- Introduction to American Literature I and II (LIT 30 and LIT 31)

- Introduction to British Literature I and II (LIT 40 and LIT 41)

- Introduction to Hispanic Literature I and II (LIT 50 and LIT 51)

Two Years of College-level Courses in a Language other than English . . . .16 units

(can be satisfied through alternative means such as proficiency testing, prior course work, etc.)

Two introductory World Cultures and History courses selected from the student's non-emphasis area . . . . . .8 units

(lower division courses with prefix HIST, LIT, WCH or ANTH 1, ARTS 10 or PHIL 1) – it is recommended that students satisfy this requirement by completing related sequences, for example, LIT 30 and 31 with HIST 16 and 17

Check WCH website for most recent list of approved courses. Students may petition to substitute a suitable course in place of taking a course from the list included here.

Upper Division Major Requirements (33-40 units):

History Emphasis:

- The Historian's Craft (HIST 100)

  (must be taken in junior year) . . . . . .4 units
- History electives . . . . . .16-20 units
- One non-US History course . . . . . .4 units
- World Cultures and History Proseminar:

  Research (WCH 190) . . . . . .4 units
- World Cultures and History Proseminar:

  Senior Thesis (WCH 191) . . . . . .4 units
- Public Research Project in World Cultures and

  History (WCH 192) . . . . . .1-4 units

Or

Literature emphasis:

- Engaging Texts: Introduction to Critical Practice (LIT 100)

  (must be taken in junior year) . . . . . .4 units
- At least three upper division literature emphasis

  courses from the following areas: . . . . . .12 units
  - Area A: Literatures and cultures of the Spanish Speaking world
  - Area B: Literatures and cultures of the Americas
  - Area C: Literatures and cultures of the English-speaking world

  (SPAN 100 and 101 may be used to meet requirements in either Area A or B.)

- Literature Electives . . . . . .8-12 units
- World Cultures and History Proseminar: Research

(WCH 190) . . . . . .4 units

- World Cultures and History Proseminar: Senior Thesis

(WCH 191) . . . . . .4 units

- Public Research Project in World Cultures and History

(WCH 192) . . . . . .1-4 units **Transfer Students.** Transfer students who wish to major in World Cultures and History should complete the Intersegmental General Education Transfer Curriculum (IGETC) at their community college. In addition, students should complete at least two full-year UC- transferable introductory course sequences, one sequence selected from history and one from literature.

SAMPLE PLAN OF STUDY FOR WCH DEGREE – HISTORY EMPHASIS

SEMESTER 1

CORE 1 The World at Home 4

Quantitative Reasoning Course# 4

WRI 10 College Reading & Composition 4

Introductory History Sequence I 4

Semester Units 16

SEMESTER 2

Nat Sci/Engin w/Lab/Field Work/Studio 4

Elective* 4

Elective 4

Introductory History Sequence II 4

Semester Units 16

SEMESTER 3

Introductory Literature or WCH Sequence I 4

Introductory SCS course 4

Elective* 4

NS/ENG Introductory Course 4

Semester Units 16

SEMESTER 4

Introductory Literature or WCH Sequence II 4

LIT or WCH Upper Division Course 4

Elective* 4

Elective 4

Semester Units 16

SEMESTER 5

HIST 100 The Historian's Craft 4

Upper Division non-US HIST course 4

Elective 4

Upper Division LIT or WCH course 4

Semester Units 16

SEMESTER 6

CORE 100 The World at Home 4

Upper Division HIST Course 4

WCH 192 Public Research Project 4

Upper Division LIT or WCH course 4

Semester Units 16

SEMESTER 7

WCH 190 Proseminar in World Cultures and History: Research 4

Upper Division HIST course 4

History Elective 4

Upper Division Course outside History 4

Semester Units 16

SEMESTER 8

WCH 191 Proseminar in World Cultures and History:

Senior Thesis 4

Upper Division HIST course 4

History Elective 4

Upper Division Course outside History 4

Semester Units 16

Total Program Units 128

 # Students who need to fulfill the foreign language requirement can take a foreign language course in Semester 1 and postpone the quantitative reasoning course until Semester 3.

- *Students who need to fulfill the foreign language requirement can take a foreign language course in place of an elective in Semesters 2, 3 and/or 4.*

SAMPLE PLAN OF STUDY FOR WCH DEGREE - LITERATURE EMPHASIS

SEMESTER 1

CORE 1 The World at Home 4

Introductory Literature Sequence I 4

Quantitative Reasoning Course# 4

WRI 10 College Reading & Composition 4

Semester Units 16

SEMESTER 2

Nat Sci/Engin w/Lab/Field Work/Studio 4

Introductory Literature Sequence II 4

Elective* 4

Elective 4

Semester Units 16

SEMESTER 3

Introductory History or WCH course 4

Introductory SCS course 4

Elective* 4

NS/ENG Introductory Course 4

Semester Units 16

SEMESTER 4

Introductory History or WCH course 4

Elective* 4

Elective 4

Elective 4

Semester Units 16

SEMESTER 5

LIT 100 Engaging Texts: Intro to Critical Practice 4

Literature Area course 4

Literature Elective 4

Upper Division HIST or WCH course 4

Semester Units 16

SEMESTER 6

CORE 100 The World at Home 4

WCH 192 Public Research Project 4

Literature Area course 4

Upper Division HIST or WCH course 4

Semester Units 16

SEMESTER 7

WCH 190 Proseminar in World Cultures and History: Research 4

Literature Area course 4

Literature Elective 4

Upper Division course outside Literature 4

Semester Units 16

SEMESTER 8

WCH 191 Proseminar in World Cultures and History:

Senior Thesis 4

Literature Elective 4

Literature Elective 4

Upper Division course outside Literature 4

Semester Units 16

Total Program Units 128

 # Students who need to fulfill the foreign language requirement can take a foreign language course in Semester 1 and postpone the quantitative reasoning course until Semester 3.

** Students who need to fulfill the foreign language requirement can take a foreign language course in place of an elective in Semesters 2, 3 or 4.*