EXECUTIVE COMMITTEE
COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES
REPORT TO THE RIVERSIDE DIVISION
MAY 24, 2022

To be adopted:

Proposed Changes to the Major in Environmental Sciences

PRESENT:	**PROPOSED:**
Major	
The Department of Environmental Sciences offers B.A. and B.S. degrees in Environmental Sciences. Students are encouraged to concentrate their studies in one of five specialization areas: Soil Sciences, Hydrologic Sciences, Atmospheric Sciences, Environmental Toxicology, and Environmental Management. Modern human activities related to natural resource development, agriculture, urbanization, industry, and transportation are placing unprecedented pressure on the earth's life support systems. Changes taking place in atmospheric physics and chemistry, land cover, freshwater and marine resources, and chemical cycling threaten the ability of human society to sustainably meet current and future needs. Science-based solutions are needed to sustainably manage our natural resources and improve public health. To help meet these challenges, our program emphasizes training for students in the biological, chemical, and physical aspects of environmental sciences and health, centered on the major environmental media of air, soil, water, and the biosphere.	[no change]
The structure of the Environmental Sciences curriculum provides a broad scope of instruction that enables students to explore various disciplines and professions focused on solving environmental problems. All students majoring in Environmental Sciences must complete a set of "core requirements" consisting of courses that provide a basic understanding of the physical, biological, and social sciences and their application to the analysis of environmental processes and management issues. In addition to the core requirements, students must complete 8 units of lower-division and 20 units of upper-division elective courses.	[no change]

Students have the option to select their electives from different specialization areas or to focus their training in one of the five specialization areas based on their own educational and career objectives. The specialization areas of Soil Sciences, Hydrologic Sciences, or Atmospheric Sciences are suitable for students wishing to maintain a broad range of choices in technically-oriented environmental professions such as pollution control, hazardous materials management, public health, natural resource management, environmental monitoring, and impact analysis. These options also provide the necessary background for graduate study in soil science, water resources, or atmospheric sciences as well as interdisciplinary areas such as ecosystem science and forestry. The Environmental Toxicology specialization area emphasizes the chemistry and biochemistry of toxic substances in the environment, preparing students for careers dealing with the control of contaminants in various environmental media as well as related fields such as public health and industrial hygiene. The Environmental Management specialization area is oriented for the social context of environmental sciences and prepares students for careers dealing with environmental regulation, land-use planning, environmental impact analysis, and administration of environmental protection programs.	[no change]

Environmental Internship Program

The Environmental Internship Program offers students opportunities to work with government agencies, private firms, and nonprofit organizations involved in environmental affairs. As excursions into professional life, internships provide “hands-on” experience in applying the principles presented in courses. Beyond the highly specialized training associated with on-the-job activities, students can gain insights into their aptitudes, aspirations and work habits that enable them to clarify their academic and career objectives. Professional acquaintances established during internships can continue to serve as important contacts for students after the internship is completed.	[no change]

Although most internships are part-time (12–15 hours per week) positions in the Riverside area, organizations that host student interns are located throughout the United States and in Washington, D.C. Students working as interns may receive stipends, hourly wages, or serve as volunteers, depending upon the specific appointment. Up to 16 units of credit toward the bachelor's degree may be earned by developing an academic component of the internship in consultation with a faculty super-visor and enrolling in ENSC 198-I.

[no change]

Undergraduate Research

Students interested in enhancing the status of knowledge about environmental processes or seeking new solutions to environmental problems may gain training and experience as part-time employees in the department's research laboratories and other research facilities, such as the U.S. Salinity Laboratory, located on campus, and the USDA Pacific Southwest Research Station, located on Canyon Crest Drive. Those wishing to conduct their own research under faculty supervision may earn academic credit by enrolling in ENSC 197. Expenses for both laboratory and field experiments are eligible for funding by the campus mini-grant program which supports undergraduate research and creative activity.

[no change]

California Teach-Science/Mathematics Initiative (CalTeach-SMI)

California Teach-Science Mathematics Initiative (CalTeach-SMI) has a goal of addressing the critical need of highly qualified K-12 science and mathematics teachers in California. With an economy increasingly reliant on science, technology, engineering, and mathematics (STEM) and the anticipated large scale retirement of qualified teachers, this is an essential time to explore and prepare for a career in teaching science or mathematics.

[no change]

CalTeach-SMI at UCR offers undergraduate students opportunities to explore STEM teaching as a career option. Through CalTeach-SMI, students receive advising and mentoring to prepare for entrance into an intern teaching credential program while diligently coordinating

[no change]

with academic advisors to ensure completion of STEM degree requirements. The CalTeach-SMI Resource Center provides future STEM teachers opportunities to promote planning and professional development towards a science/ mathematics education career.	
For more information about the CalTeach-SMI program, please visit smi.ucr.edu, the Resource Center at 1114 Pierce Hall, or on Facebook at facebook.com/ScienceMathInitiativeAtUcr.	[no change]

Transfer Selection Criteria

Applicants to majors in the College of Natural and Agricultural Sciences are selected on the basis of academic preparation, as assessed by their GPA and the strength of preparation for the intended major. A GPA of at least 2.70 is required. (This is a baseline GPA for consideration and not a guarantee of admission.)	[no change]
In addition, applicants will need to complete college courses comparable to at least two of the following UCR year-long sequences in order to meet selection criteria for this major. Courses must be completed with "C-" grades or better:	[no change]
MATH 007A or MATH 009A; MATH 007B or MATH 009B (mandatory)	[no change]
And at least one sequence from: 1. BIOL 005A/BIOL 05LA or BIOL 020 and BIOL 005B (and BIOL 005C, if articulated) 2. CHEM 001A, CHEM 01LA, CHEM 001B, CHEM 01LB, CHEM 001C, and CHEM 01LC 3. Organic chemistry (one-year lower-division), each course completed with a grade of "B" or better 4. PHYS 002A, PHYS 02LA, PHYS 002B, PHYS 02LB, PHYS 002C, and PHYS 02LC 5. PHYS 040A, PHYS 040B, and PHYS 040C 6. MATH 009C, MATH 010A, MATH 010B, and MATH 046	[no change]
Courses must be completed with a letter grade, with no grade lower than a "C-." Students should visit assist.org for updated and comprehensive major preparation requirements.	[no change]

University Requirements

See Undergraduate Studies section.	[no change]
College Requirements	
See College of Natural and Agricultural Sciences, Colleges and Programs section.	[no change]
Some of the following requirements for the major may also fulfill some of the College's breadth requirements. Consult with a department advisor for course planning.	[no change]
Major Requirements	
The major requirements for both the B.A. and the B.S. degrees in Environmental Sciences are as follows: Students must fulfill ~~MATH 007A or MATH 009A or MATH 09HA; MATH 007B or MATH 009B or MATH 09HB; CHEM 001A or CHEM 01HA, CHEM 001B or CHEM01HB, CHEM 001C or CHEM 01HC; BIOL 005A; BIOL 005B; BIOL 05LA or BIOL 020; ENSC 001, ENSC 002, ENSC 006, ENSC 100, ENSC 101, and ENSC 102~~ with a grade point average of 2.0 or better and no grade lower than a C-. If a grade lower than a C- is received in 2 or more core courses required for the major, either in separate courses or repetitions of the same course, the student may be discontinued from the major. Students must, under such circumstances, petition the department to remain in the major. Students in Environ-mental Sciences are required to demonstrate adequate progress towards earning the degree. Adequate progress is defined as completion of MATH 009B or MATH 09HB or MATH 007B prior to the beginning of the Winter Quarter of the second year of residence or Junior standing (>90 units) and at least one course from ENSC 100, ENSC 101, or ENSC 102 must be completed prior to the end of the third year of residence or senior standing (>135 units).	The major requirements for both the B.A. and the B.S. degrees in Environmental Sciences are as follows: Students must fulfill <u>all required core courses in environmental science, biology, chemistry, math, physics, and statistics</u> with a grade point average of 2.0 or better and no grade lower than a C-. If a grade lower than a C- is received in 2 or more core courses required for the major, either in separate courses or repetitions of the same course, the student may be discontinued from the major. Students must, under such circumstances, petition the department to remain in the major. Students in Environ-mental Sciences are required to demonstrate adequate progress towards earning the degree. Adequate progress is defined as completion of MATH 009B or MATH 09HB or MATH 007B prior to the beginning of the Winter Quarter of the second year of residence or Junior standing (>90 units) and at least one course from ENSC 100, ENSC 101, or ENSC 102 must be completed prior to the end of the third year of residence or senior standing (>135 units).
Note	
To gain maximum benefit from participating in the Undergraduate Research and Environmental Internship Programs, students intending to enroll in ENSC 197 and ENSC 198-I should contact their advisor during the quarter prior to enrollment in these courses.	[no change]

Core Requirements

1. Lower-division requirements (77 ~~or 78~~ units)	1. Lower-division requirements (77-79 units)
a) ~~ENSC 001, ENSC 002, ENSC 006 or ECON 006~~	a) ENSC 001 and ENSC 002
b) BIOL 005A, BIOL 05LA or BIOL 020, BIOL 005B	[no change]
c) CHEM 001A or CHEM 01HA, CHEM 001B or CHEM 01HB, CHEM 001C or CHEM 01HC, CHEM 01LA or CHEM 1HLA, CHEM 01LB or CHEM 1HLB, CHEM 01LC or CHEM 1HLC	[no change]
d) CHEM 008A and CHEM 08LA or CHEM 08HA and CHEM 08HLA; CHEM 008B and CHEM 08LB or CHEM 08HB and CHEM 08HLB	[no change]
e) MATH 007A or MATH 009A or MATH 09HA; MATH 007B or MATH 009B or MATH 09HB	[no change]
f) PHYS 002A or PHYS 02HA, PHYS 02LA or PHYS 02HLA, PHYS 002B or PHYS 02HB, PHYS 02LB or PHYS 02HLB, PHYS 002C or PHYS 02HC, PHYS 02LC or PHYS 02HLC	[no change]
g) POSC 010	[no change]
h) STAT 010	[no change]
	i) One course from ENSC 006, ECON 006, PBPL 001, ECON 003, or POSC 020
2. Upper-division requirements (18 units): ENSC 100, ENSC 101, ENSC 102, ENSC 110, ENSC 191	[no change]

Electives

Students are free to choose from the lists below to fulfill their lower-division and upper-division elective requirements:	
1. Lower-division electives (8 units): At least two electives from BIOL 005C, CHEM 005, CHEM 008C and CHEM 08LC, CHEM 08HC and CHEM 08HLC, MATH 009C or MATH 09HC or MATH 010A, GEO 001 or GEO 002	
2. Upper-division electives (20 units): At least 20 units of electives from the following list, with a minimum of 16 units from Environmental Sciences or Environmental Toxicology:	

ENTX 101, ENTX 154, ENSC 103/ENTX 103, ENSC 104, ENSC 105, ENSC 107, ENSC 120/NEM 120, ENSC 127, ENSC 130, ENSC 133/MCBL 133, ENSC 134/BPSC 134, ENSC135/CHEM 135/ENTX 135, ENSC 136/CHEM136, ENSC 138/GEO 138, ENSC 139/GEO 139, ENSC 140, ENSC 144/ENVE 144, ~~ENSC 153,~~ ENSC 163, ENSC 165, ENSC 172, ENSC 174, ENSC 175, ENSC 177, ENSC 197, ENSC 198-I, BCH 100 or both BCH 110A or BCH 110HA and BCH 110B or BCH 110HB; BCH 110C or BCH 110HC or BIOL 107A; BIOL 102 or BIOL 121/MCBL 121; BIOL 116, BIOL 121L/MCBL 121L, BPSC 104/BIOL 104, BPSC 146, BPSC 165, BPSC 166, CBNS 150/ENTX 150, CHEM 109, GEO 157, GEO 160	ENTX 101, ENTX 154, ENSC 103/ENTX 103, ENSC 104, ENSC 105, ENSC 107, ENSC 120/NEM 120, ENSC 127, ENSC 130, ENSC 133/MCBL 133, ENSC 134/BPSC 134, ENSC135/CHEM 135/ENTX 135, ENSC 136/CHEM136, ENSC 138/GEO 138, ENSC 139/GEO 139, ENSC 140, <u>ENSC 144/ENVE 144,</u> <u>ENSC 163,</u> ENSC 165, ENSC 172, ENSC 174, ENSC 175, ENSC 177, ENSC 197, ENSC 198-I, BCH 100 or both BCH 110A or BCH 110HA and BCH 110B or BCH 110HB; BCH 110C or BCH 110HC or BIOL 107A; BIOL 102 or BIOL 121/MCBL 121; BIOL 116, BIOL 121L/MCBL 121L, BPSC 104/BIOL 104, BPSC 146, BPSC 165, BPSC 166, CBNS 150/ENTX 150, CHEM 109, GEO 157, GEO 160
Suggested courses of study are also provided below for specialized areas in environmental sciences to assist students to meet minimum employment requirements for entry-level positions in government agencies, nongovernment organizations (NGO), and environmental consulting firms. Students are strongly encouraged to schedule a meeting with a Faculty in their specialization area of interest for curriculum and career advice. A list of core Faculty in each specialization area is available at envisci.ucr.edu/undergrad.	[no change]
Soil Sciences:	
Recommended to meet lower-division electives: BIOL 005C, GEO 001 or GEO 002, MATH 009C or MATH 09HC or MATH 010A; Recommended to meet upper-division electives: ENSC 104, ENSC 107, ENSC 120/NEM 120, ENSC 127, ENSC 133/MCBL 133, ENSC 134/BPSC 134, ENSC 138/GEO 138, ENSC 139/GEO 139, ENSC 144, ENSC 175, ENSC 177, BPSC 146	[no change]
Hydrologic Sciences:	
Recommended to meet lower-division electives: MATH 009C or MATH 09HC or MATH 010A, GEO 001 or GEO 002; Recommended to meet upper- division electives: ENSC 105, ENSC 107,	[no change]

ENSC 127, ENSC 136/CHEM136, ENSC 140, ENSC 163, ENSC 165, ENSC 175, ENSC 177	
Atmospheric Sciences:	
Recommended to meet lower-division electives: CHEM 005, CHEM 08C and CHEM 08LC, CHEM 08HC and CHEM 08HLC, MATH 009C or MATH 09HC or MATH 010A; Recommended to meet upper-division electives: ENSC 103/ENTX 103, ENSC 130, ENSC135/CHEM 135/ENTX 135, ENSC 136/CHEM 136, ENSC 175, ENSC 177, GEO 160	[no change]
Environmental Toxicology:	
Recommended to meet lower-division electives: BIOL 005C, CHEM 005, CHEM 008C and CHEM 08LC or CHEM 08HC and CHEM 8HLC; Recommended to meet upper- division electives: ENTX 101 required + at least 3 electives from ENSC or ENTX: ENSC 103/ENTX 103, ENSC 135/CHEM 135/ENTX 135, ENSC 136/CHEM 136, ENSC 177, CBNS 150/ENTX 150, ENTX 154, BCH 100 or both BCH 110A or BCH 110HA and BCH 110B or BCH 110HB, BIOL 102 or BIOL 121, BCH 110C or BCH 110HC or BIOL 107A	[no change]
Environmental Management:	
Recommended to meet lower-division electives: BIOL 005C, GEO 001 or GEO 002, MATH 009C or MATH 09HC or MATH 010A; Recommended to meet ~~upperdivision~~ electives: ENSC 103/ENTX 103, ENSC 144, ENSC 153, ENSC 172, ENSC 174, ENSC 175, ENSC 177	Recommended to meet lower-division electives: BIOL 005C, GEO 001 or GEO 002, MATH 009C or MATH 09HC or MATH 010A; Recommended to meet <u>upper-division</u> electives: ENSC 103/ENTX 103, ENSC 144, ENSC 153, ENSC 172, ENSC 174, ENSC 175, ENSC 177
Minor	
The minor in Environmental Sciences consists of the following.	[no change]
1. Lower-division requirements (~~23~~ units) a) ENSC 002~~, ENSC 006/ECON 006~~ b) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC 2.	1. Lower-division requirements (<u>23 or 24</u> units) a) ENSC 002 b) CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC 2.

	c) One course from ENSC 006, ECON 006, PBPL 001, ECON 003, or POSC 020
Upper-division requirements (20 units) a) ENSC 100, ENSC 101, ENSC 102 b) Eight (8) units of additional upper-division courses in Environmental Sciences, no more than 4 units of which are in courses numbered 190-198	[no change]
Of the specified upper-division units, a minimum of 16 units must be unique to the minor and may not be used to satisfy major requirements.	[no change]
See Minors under the College of Natural and Agricultural Sciences in the Colleges and Programs section of this catalog for additional information on minors.	[no change]

Justification for changes in Majors' grade requirements:
When ENSC field areas (which had different major requirements) were removed from the curriculum a few years ago, this list didn't get modified to include all the required core courses for the Major. This change is to apply the same grade requirement to the core ENSC/CHEM/BIOL/PHYS/MATH/STAT requirements of the major.

Justification for addition of alternative courses to ENSC 006:
With the departure of Environmental Economics faculty to SPP, none of our core faculty have the expertise to teach ENSC 006. In the last few years, a lecturer has been hired to offer this course; however, this may not be sustainable in the long run. Since ENSC 006 is cross-listed as ECON 006, we approached the Chair of the Economics department in case they have faculty to take the lead of this course. We also inquired whether faculty in SPP are willing to take on teaching this course. Neither programs have the ability nor a plan to teach this course as is in the next few years. Given that some faculty strongly believe our majors should be introduced to social/economic/policy aspects of the environment, we didn't want to remove this type of a course from the requirements altogether. After reviewing the catalog course descriptions, we voted to list PBPL 001, ECON 003, and POSC 020 as alternatives since they touch on one or more of the topics covered in ENSC 006 (please see below). These courses are also offered regularly, allowing our students to fulfill their requirements without a delay. Furthermore, since they are at the introductory level, our students don't need to enroll in additional courses as prerequisites. Our department's decision to add these courses as alternatives to ENSC 006 was shared with the impacted departments in Nov-Dec. 2021 and we received no objections. Below is the list of the topics currently covered in ENSC/ECON 006, followed by descriptions of each of the alternative courses:

List of Topics covered in ENSC/ECON 006:
Introduction to Environmental Economics

- Coevolution
- Tradeoffs
- Social Priorities
- Contemporary environmental crisis
- Social interventions

Analytical Tools (supply and demand) and Welfare Analysis
- Willingness to pay
- Benefits and demand curves
- Costs and supply curves
- Economic efficiency and the Equimarginal Principle
- External costs and open-access resources
- External benefits and public goods

Environmental Quality
- Pollution control
- Abatement cost
- Socially efficient level of abatement

Environmental Policy
- Command and Control strategies
- Incentive based strategies

Natural Resource Economics
- Non Renewable Resources
- Renewable Resources
- Dynamic Equilibrium
- Introduction to Hotelling's rule

Contemporary Environmental Issues
- California water resources
- Climate change and global agreements
- Environment and development
- Environment and equity

Catalog descriptions of the suggested alternative courses:
ECON 003 Introduction to Microeconomics 5 Lecture, 3 hours; discussion, 1 hour; written work, 3 hours.
Prerequisite(s): none. An introduction to the study of the economic system from the micro, or individual decision-maker's, perspective. Includes the study of opportunity cost, markets, consumption, production, and competition. Credit is awarded for one of the following ECON 003 or ECON 003H.

PBPL 001 Introduction to Public Policy
Analysis 4 Lecture, 3 hours; discussion, 1 hour. Introduces the basic concepts and processes underlying policy analysis. Includes application of these concepts to economic and budgetary policy, health care policy, welfare and social security policy, education policy, and environmental and energy policy

POSC 020 World Politics 5 Lecture, 3 hours; discussion, 1 hour; extra reading, 3 hours. Prerequisite(s): none. Explores approaches
to and models of international relations: theories, the causes of war, international organizations, cooperation and conflict, international political economy, regional economic agreements, and international social issues such as human rights and the environment. Credit is awarded for only one of POSC 020 or POSC 020H.

Justification for removal of ENSC-153 from the catalog:
ENSC 153 needs to be removed from this list of upper division electives since it is no longer listed in the catalog.

Approvals:
Approved by the faculty of the Department of Environmental Science: November 1, 2021
Approved by the Executive Committee of the College of Natural and

Agricultural Sciences:	March 1, 2022
Approved by the Committee on Educational Policy:	April 29, 2022