ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

Contact Information

Division
Sciences and Mathematics

Dean
Megan D'Errico

Associate Dean
Keely Carroll

Division Office
V 211, Rocklin Campus

Overview

The Environmental Sciences and Sustainability program at Sierra College provides students with the opportunity to meet the requirements to transfer to four-year colleges in the environmental fields including Environmental Studies and Environmental Science. The program provides students with a common interdisciplinary base with which to address issues of environmental health, sustainability and global stewardship. Students will have the opportunity to apply principles from a range of fields including the physical and life sciences, social sciences and philosophy, as well as technical skills utilized in ecosystem assessment and the expanding field of solar energy.

Faculty

Kristine D. Gilbert
Professor, Environmental Sciences and Sustainability
B.A., University of California, Davis
M.S., California State University, Chico

Degrees/Certificates

Associate Degree for Transfer

- Environmental Science for Transfer (p. 1)

Associate Degrees

- Environmental Sciences (p. 2)
- Environmental Studies (p. 3)

Environmental Science for Transfer

AS-T Degree

This program provides students with a strong foundation in environmental sciences. Upon completion of this degree, students will be able to identify and describe the essential components of earth's natural environment - its physical, biological, energy-related, and ecological elements; describe and analyze core environmental problems, their causes and consequences, and practical solutions; evaluate and apply principles of sustainability to human activity on earth; apply the scientific method to design, conduct experiments, and test hypotheses; critically evaluate and interpret environmental information; and, as informed and responsible individuals, evaluate contemporary environmental issues that have social and/or ethical implications.

The Associate in Science in Environmental Science for Transfer degree (AS-T) prepares students to transfer into the CSU system to complete a bachelor's degree in environmental sciences, or a major deemed similar by a CSU campus. Students earning an associate degree for transfer and meeting the CSU minimum transfer admission requirements are guaranteed admission with junior standing within the CSU system. Students are also given priority admission consideration to their local CSU campus but not to a particular campus or major. Upon transfer, students will be required to complete no more than 60 additional prescribed units to earn a bachelor's degree.

Successful completion of the Environmental Science for Transfer curriculum will prepare students for transfer to four-year colleges or universities. The major has been designed to meet lower-division requirements for certain majors at transfer institutions. In all cases, students should consult with a counselor for more information on university admission and transfer requirements.

To earn the Associate in Science in Environmental Science for Transfer degree, students must complete 60 CSU-transferable semester units with a minimum grade point average of 2.0, including both of the following:

- completion of all courses required for the major with grades of "C" or better; and
- completion of the Intersegmental General Education Transfer Curriculum for Science, Technology, Engineering, and Mathematics (IGETC for STEM) (http://catalog.sierracollege.edu/archive/2023-2024/student-resources/general-education/intersegmental-general-education-transfer-curriculum-igetc/) pattern.[1] (Students transferring to a CSU campus must complete Area 1C Oral Communication to be eligible for admission.)

NOTE: The California State University General Education Breadth pattern (CSU GE) is NOT an option for this degree.

The exact wording of the law pertaining to associate degrees for transfer may be found in Education Code Section 66746.

It is highly recommended that, prior to transferring, students complete courses that satisfy the CSU United States History, Constitution and American Ideals graduation requirement. In all cases, students should consult with a counselor for more information on university admission and transfer requirements.

RESTRICTION: International coursework from non-United States regionally accredited institutions cannot be applied to associate degrees for transfer.

Required Courses

Code	Title	Units
BIOL 0001	General Biology	4
CHEM 0001A or CHEM 0003A & CHEM 0003B	General Chemistry I General Chemistry I - Part 1 and General Chemistry I - Part 2	5-6
CHEM 0001B	General Chemistry II	5
ECON 0001B	Principles of Microeconomics	3
ESS 0001	Introduction to Environmental Sciences and Sustainability	3
PHYS 0105	General Physics I	4
PHYS 0105L	General Physics I Laboratory	1
PHYS 0110	General Physics II	4
PHYS 0110L	General Physics II Laboratory	1

Select an Earth Science or Geography option:		**4**
ESCI 0001 & 0001L	Physical Geology and Physical Geology Laboratory	
GEOG 0001 & 0001L	Physical Geography and Physical Geography Laboratory	
Select a Statistics and Calculus option:		**7-10**
MATH 0013 & MATH 0030	Elementary Statistics and Analytical Geometry and Calculus I	
PSYC 0142 & MATH 0030	Introduction to Psychological Statistics and Analytical Geometry and Calculus I	
Total Units		**41-45**

Environmental Sciences

AS Degree

Successful completion of the Environmental Sciences curriculum will prepare students for transfer to four-year colleges or universities in areas including environmental studies and sciences, wildlife conservation biology, ecology, forestry, toxicology, waste management, and others. Environmental Sciences is the combination of biological, chemical, geological, and mathematical principles as they apply to the environment and environmental problems. Commonly, environmental science is thought of as the study of solving these problems, such as degradation and pollution of the environment, that may have been caused by humans. Environmental science also focuses on preserving and managing natural resources. The major has been designed to meet lower-division requirements for Environmental Sciences majors at transfer institutions. In all cases, students should consult with a counselor for more information on university admission and transfer requirements. Students must fulfill the following major requirements with grades of "C" or better, complete a minimum of 60 degree-applicable semester units (12 of which must be completed at Sierra College) with a grade point average of at least 2.0 and complete one of the following three general education patterns:

- Sierra College Associate Degree Requirements (http://catalog.sierracollege.edu/archive/2023-2024/student-resources/general-education/associate-degree-requirements/);
- California State University General Education Breadth (http://catalog.sierracollege.edu/archive/2023-2024/student-resources/general-education/california-state-university-general-education-breadth-requirements/) pattern;
- Intersegmental General Education Transfer Curriculum (IGETC) (http://catalog.sierracollege.edu/archive/2023-2024/student-resources/general-education/intersegmental-general-education-transfer-curriculum-igetc/).

Required Courses

Code	Title	Units
BIOL 0001	General Biology	4
BIOL 0002	Botany	4.5
BIOL 0003	General Zoology	4.5
CHEM 0001A	General Chemistry I	5-6
or CHEM 0003A & CHEM 0003B	General Chemistry I - Part 1 and General Chemistry I - Part 2	
ESCI 0001	Physical Geology	3
or GEOG 0001	Physical Geography	
ESS 0001	Introduction to Environmental Sciences and Sustainability	3
Select 4-6 units from the following:		**4-6**
AGRI 0198	Food, Society and the Environment	
AGRI 0221	Introduction to Soil Science	
ANTH 0002	Cultural Anthropology	
ANTH 0014	Global Problems	
BIOL 0013	Field Methods in Ecology	
BIOL 0014	Natural History, Ecology and Conservation (also ESS 0014)	
BIOL 0016A	Local Ecosystems of Placer County [1]	
BIOL 0016B	Local Ecosystems of Nevada County [1]	
BIOL 0016C	Vernal Pools and the California Prairie [1]	
BIOL 0016D	Biology of Waterfowl and Marsh Birds [1]	
BIOL 0016E	Ecology of the Sierran Conifer Forest [1]	
BIOL 0016G	Field Paleontology and Ancient Environments (also ESCI 0016G) [1]	
BIOL 0016H	Ecology of the Mendocino Coast [1]	
BIOL 0016I	Biology of Mono Lake and the Great Basin [1]	
BIOL 0016J	Ecology of Point Reyes National Seashore [1]	
BIOL 0016K	Foothill Ecology of the Sierra Nevada [1]	
BIOL 0016L	Aquatic and Riparian Environments of California Waterways [1]	
BIOL 0016M	Marine Mammals and Birds [1]	
BIOL 0016N	Ecology of the Modoc Plateau [1]	
BIOL 0016O	Ecology of the High Sierra and White-Inyo Mountains [1]	
BIOL 0016P	Ecology of Death Valley and Desert Ecosystems [1]	
BIOL 0016Q	Ecology of Mid-Western North America [1]	
BIOL 0016R	Canyon Lands of the Southwest [1]	
BIOL 0016T	Ecology of the Northern California Coast [1]	
BIOL 0016U	Ecology of the Central California Coast [1]	
BIOL 0016V	Ecology of Southern California Deserts [1]	
BIOL 0016W	Ecology of the Klamath and Southern Cascade Ranges [1]	
BIOL 0016Y	Ecology of National Parks and Wilderness Ecosystems [1]	
BIOL 0016Z	Ecology of the American River [1]	
BIOL 0017B	Ecology of the Sutter Buttes [1]	
BIOL 0023	Wildflower Identification	
BIOL 0024	Wildland Trees and Shrubs (Dendrology)	
ECON 0001A	Principles of Macroeconomics	
or ECON 0001B	Principles of Microeconomics	
ESCI 0001L	Physical Geology Laboratory	
ESCI 0010	Introduction to Earth Science	
ESCI 0054A	Sierra Nevada and Western Basin and Range Provinces [1]	
ESCI 0054B	Great Valley and Coast Range Provinces [1]	

ESCI 0054C	Great Valley, Coast Ranges, and Sutter Buttes [1]	
ESCI 0054D	Western Sierra Nevada and the Mother Lode [1]	
ESCI 0054E	Major Rock Units of the Northern Sierra [1]	
ESCI 0055C	Weekend Field Geology - Point Reyes [1]	
ESCI 0055F	Weekend Field Geology [1]	
ESS 0001L	Introduction to Environmental Science Laboratory	
ESS 0006	The Sierra Nevada	
ESS 0006F	Sierra Nevada Field Trip	
ESS 0007	Energy, Environment, and Climate (also ESCI 0007)	
ESS 0008	California Water	
ESS 0010	Conservation of Natural Resources	
ESS 0013	Environmental Regulations	
GEOG 0001	Physical Geography	
GEOG 0001L	Physical Geography Laboratory	
GEOG 0002	Cultural Geography	
GEOG 0090	Introduction to Geographic Information Systems (GIS)	
GEOG 0091A	Beginning Geospatial Design	
GEOG 0091B	Intermediate Geospatial Design	
MATH 0013	Elementary Statistics	
PHIL 0060	Introduction to Environmental Ethics	
Total Units		**28-31**

1

A maximum of 2 units may be taken from the BIOL 0016, BIOL 0017, BIOL 0023 and ESCI 0016, 0054 and 0055 field studies courses.

Environmental Studies

AA Degree

Successful completion of the Environmental Studies curriculum will prepare students for transfer to four-year colleges or universities in areas including sustainability, environmental policy, regulations and law, land use planning, environmental education, environmental justice, and others, or entry level positions in related fields. While there is a required foundation of environmental science, ecology and conservation, the environmental studies degree includes more emphasis on the political, economic, and social aspects related to the environment and sustainability rather than the biological, chemical geological and mathematical aspects. In all cases, students should consult with a counselor for more information on university admission and transfer requirements. Students must fulfill the following major requirements with grades of "C" or better, complete a minimum of 60 degree-applicable semester units (12 of which must be completed at Sierra College) with a grade point average of at least 2.0 and complete one of the following three general education patterns:

- Sierra College Associate Degree Requirements (http://catalog.sierracollege.edu/archive/2023-2024/student-resources/general-education/associate-degree-requirements/);
- California State University General Education Breadth (http://catalog.sierracollege.edu/archive/2023-2024/student-resources/general-education/california-state-university-general-education-breadth-requirements/) pattern;
- Intersegmental General Education Transfer Curriculum (IGETC) (http://catalog.sierracollege.edu/archive/2023-2024/student-resources/general-education/intersegmental-general-education-transfer-curriculum-igetc/).

Required Courses

Code	Title	Units
BIOL 0014	Natural History, Ecology and Conservation (Also ESS 0014)	4
ECON 0001B	Principles of Microeconomics	3
ESS 0001	Introduction to Environmental Sciences and Sustainability	3
ESS 0013	Environmental Regulations	1
MATH 0013	Elementary Statistics	4-6
Select 6-9 units from the following:		**6-9**
AGRI 0198	Food, Society and the Environment	
ANTH 0002	Cultural Anthropology	
ANTH 0014	Global Problems	
BIOL 0016A	Local Ecosystems of Placer County	
BIOL 0016B	Local Ecosystems of Nevada County [1]	
BIOL 0016C	Vernal Pools and the California Prairie [1]	
BIOL 0016D	Biology of Waterfowl and Marsh Birds [1]	
BIOL 0016E	Ecology of the Sierran Conifer Forest [1]	
BIOL 0016G	Field Paleontology and Ancient Environments [1]	
BIOL 0016H	Ecology of the Mendocino Coast [1]	
BIOL 0016I	Biology of Mono Lake and the Great Basin [1]	
BIOL 0016J	Ecology of Point Reyes National Seashore [1]	
BIOL 0016K	Foothill Ecology of the Sierra Nevada [1]	
BIOL 0016L	Aquatic and Riparian Environments of California Waterways [1]	
BIOL 0016M	Marine Mammals and Birds [1]	
BIOL 0016N	Ecology of the Modoc Plateau [1]	
BIOL 0016O	Ecology of the High Sierra and White-Inyo Mountains [1]	
BIOL 0016P	Ecology of Death Valley and Desert Ecosystems [1]	
BIOL 0016Q	Ecology of Mid-Western North America [1]	
BIOL 0016R	Canyon Lands of the Southwest [1]	
BIOL 0016T	Ecology of the Northern California Coast [1]	
BIOL 0016U	Ecology of the Central California Coast [1]	
BIOL 0016V	Ecology of Southern California Deserts [1]	
BIOL 0016W	Ecology of the Klamath and Southern Cascade Ranges [1]	
BIOL 0016Y	Ecology of National Parks and Wilderness Ecosystems [1]	
BIOL 0016Z	Ecology of the American River [1]	
BIOL 0017B	Ecology of the Sutter Buttes [1]	
BIOL 0023	Wildflower Identification	

ECON 0001A	Principles of Macroeconomics
ESCI 0001 or GEOG 0001	Physical Geology Physical Geography
ESCI 0054B	Great Valley and Coast Range Provinces [1]
ESCI 0054C	Great Valley, Coast Ranges, and Sutter Buttes [1]
ESCI 0054D	Western Sierra Nevada and the Mother Lode [1]
ESCI 0054E	Major Rock Units of the Northern Sierra [1]
ESCI 0055C	Weekend Field Geology - Point Reyes [1]
ESCI 0055F	Weekend Field Geology [1]
ESS 0001L	Introduction to Environmental Science Laboratory
ESS 0006	The Sierra Nevada
ESS 0006F	Sierra Nevada Field Trip
ESS 0007	Energy, Environment, and Climate
ESS 0008	California Water
ESS 0010	Conservation of Natural Resources
GEOG 0002	Cultural Geography
PHIL 0060	Introduction to Environmental Ethics
SOC 0110	Introduction to Social Justice
Total Units	**21-26**

1

A maximum of 2 units may be taken from the BIOL 0016, BIOL 0017, BIOL 0023 and ESCI 0016, 0054 and 0055 field studies courses.

Courses

Understanding course descriptions (http://catalog.sierracollege.edu/archive/2023-2024/student-resources/course-information/understanding-course-descriptions/)

ESS 0001. Introduction to Environmental Sciences and Sustainability
Units: 3
Formerly known as INT 1
Advisory: Eligibility for ENGL 1A
Hours: 54 lecture
A study of the natural world and how it is influenced by human activity. This course will introduce and analyze the scientific basis of major environmental issues and evaluate potential solutions within the context of diverse human cultures and societies. Topics include principles of physical and biological systems, biogeochemical cycles, global climate, natural laws, land, air and water resources, consumption and waste, pollution, toxicology, human population growth, and sustainability on a local, regional and global level. (CSU, UC)

ESS 0001L. Introduction to Environmental Science Laboratory
Unit: 1
Prerequisite: Completion with grade of "C" or better or concurrent enrollment in ESS 1
Hours: 54 laboratory
Hands-on, inquiry-based learning in topics associated with environmental science. Laboratory and field studies including applications of physical science principles, ecological studies, and exposure to sustainability issues related to human society. Promotes critical thinking, problem solving, scientific and environmental literacy. May include field trip(s) during or in lieu of lab time. (CSU, UC)

ESS 0006. The Sierra Nevada
Units: 3
Formerly known as INT 6
Advisory: Eligibility for ENGL 1A
Hours: 54 lecture
Integrated study of the Sierra Nevada including its physical attributes, geological characteristics, origin and development, flora and fauna, water resources, historical and economic significance, and influences on literature, art, and culture. Includes contemporary environmental, economic, and management issues in the Sierra. (CSU, UC)

ESS 0006F. Sierra Nevada Field Trip
Units: 0.5-1
Prerequisite: Completion with grade of "C" or better or concurrent enrollment in ESS 6
Hours: 18 lecture per unit
Field lecture course designed to be taken concurrently with ESS 6. A field study of selected sites in the Sierra Nevada ecoregion, comparing their biological inventory, ecological relationships, physical environments, and sensitivity to human interactions and activities. Moderate hiking and/or camping may be involved. (CSU)

ESS 0007. Energy, Environment, and Climate
Units: 3
Also known as ESCI 7
Advisory: Eligibility for ENGL 1A
Hours: 54 lecture
Analysis of the nature of energy and the environmental impact of its societal use in the context of Earth's record of changing climate. Explores current global climate change due to post-1750 greenhouse gas emissions and strategies for mitigation and adaptation to changing climate predictions, emphasizing future alternative energy sources. Designed for students majoring in areas related to the environmental sciences and/or those interested in developing a substantiated understanding of the role played by citizens in ensuring a healthy environment for future generations. (CSU, UC)

ESS 0008. California Water
Units: 4
Hours: 108 (54 lecture, 54 laboratory)
Interdisciplinary examination of California water ecosystems, infrastructure, uses, and impacts. Students will learn about: hydrology; aquatic ecosystems including rivers, lakes, wetlands, estuaries, and marine environments; water infrastructure including dams, levees, aqueducts, and wastewater treatment facilities; groundwater recharge, withdrawal, use and impacts; the role of water in agricultural, urban, environmental and political systems; water quality; water storage and transfers; water policy; and conflicts arising from water scarcity. May include field trips during or in lieu of lab time. Students may be required to provide their own transportation. (CSU, UC)

ESS 0010. Conservation of Natural Resources
Units: 3
Formerly known as AGRI 190 and NATR 10
Advisory: Eligibility for ENGL 1A
Hours: 54 lecture
Use and protection of natural resources, including soil, water, forest, mineral, plant, and animal life. Ecological principles, history of the conservation movement, modern problems in resource use, and the citizen's role in conservation. (CSU, UC)

ESS 0013. Environmental Regulations
Unit: 1
Formerly known as BIOL 13A
Advisory: Completion of BIOL/ESS 14, ESS 1 or ESS 10 with grade of "C" or better
Hours: 18 lecture
Survey of major California environmental regulations and relevant federal regulations. Designed using case study analyses to explore environmental laws applicable to water, land and air resources. (CSU)

ESS 0014. Natural History, Ecology and Conservation
Units: 4
Also known as BIOL 14
Advisory: Eligibility for ENGL 1A
Hours: 108 (54 lecture, 54 laboratory)
Introduction to the study of biology and ecology of organisms and ecosystems of the world, with an emphasis on California. Special focus on significance of functioning ecosystems and human influence on the environment. May include field trips during or in lieu of lab time. (CSU, UC)

ESS 0028. Independent Study
Units: 1-3
Designed for students interested in furthering their knowledge at an independent study level in an area where no specific curriculum offering is currently available. Independent study might include, but is not limited to, research papers, special subject area projects, and research projects. See Independent Study page in catalog. (CSU, UC-with unit limitation)

ESS 0095. Internship in Environmental Studies and Sustainability
Units: 0.5-4
Designed for advanced students to work in an area related to their educational or occupational goal. Provides new on-the-job technical training under the direction of a worksite supervisor, allowing students to expand knowledge and skills in the chosen field. Mandatory orientation session and faculty approval to determine eligibility. One unit of credit is equal to each 60 hours of non-paid work, or each 75 hours of paid work. Students may earn up to a total of 16 units in internship courses. (CSU-with unit limitation)

Program Student Learning Outcomes (PSLOs)

- Identify and describe the essential components of earth's natural environment, the physical, chemical, and biological components of the earth's systems, and show how they function.
- Describe and analyze core environmental problems, their causes, consequences, and practical solutions.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Investigate the role of governmental policy, citizen involvement, and/or ethics/values/morals in influencing human interaction with the environment.
- Demonstrate an integrative, interconnective and interdisciplinary approach to environmental issues, with a focus on sustainability.