Environmental Science (ENVS)

ENVS 1010. Intro to Environmental Science (PS). 3 Hours.
Fulfills General Education Physical Science requirement. Introduction to the field of environmental science, focusing on how an understanding of the natural world around us and the application of scientific method can help us address problems facing our planet. Subject areas include environmental policy, natural resources, energy, and human impact to the environment. Inclusive Access Course Material (electronic book) fees may apply, see Fees tab under each course section for details. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Demonstrate knowledge of basic fundamental laws, concepts, and theories in the physical sciences. 2. Explain and apply the scientific method. 3. Demonstrate knowledge of the process of science by being able to interpret data in the form of tables, graphs, and charts and communicate those findings in oral and/or written form. 4. Describe a variety of environmental problems and solutions in a scientific context. 5. Evaluate environmental issues using a scientific approach. FA, SP, SU.

ENVS 1210. Introduction to Environmental Science. 3 Hours.
A scientific foundation in Environmental Science with exploration of the social and political aspects that may impact implementation of policies. Topics include ecology, biodiversity, sustainable practices, environmental health and quality, and threats to current environmental conditions. Inclusive Access Course Material (electronic book) fees may apply, see Fees tab under each course section for details. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Evaluate the physical and natural world using scientific principles. 2. Develop analytical and critical thinking skills. 3. Evaluate the "big questions" regarding sustainable practices, resources, and biodiversity. 4. Critique and communicate the impact of possible solutions to environmental issues from multiple perspectives. 5. Synthesize potential approaches to combat global effects of climate change. Corequisites: ENVS 1215. FA, SP.

ENVS 1215. Introduction to Environmental Science Laboratory. 1 Hour.
Introduction to Environmental Science Lab is a multidisciplinary course within chemistry, ecology, basic hydrology, energy and environment. It includes laboratory exercises and filed trips. Lab exercises give the students an opportunity to make scientific observations, design experiments and gather data with emphasis on the local issues. Field trips are the fundamental part of learning about the complexity of environmental problems. As a part of Introduction to Environmental Science Lab 2000 field trips, students will be taken to local natural areas, conservation features as well as treatment facilities. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Identify and explain local and national environmental issues. 2. Give examples of basic scientific techniques and tools to analyze and address the environmental science issues. 3. Collaborate with other students to explore and analyze environmental concerns and solutions. 4. Explain and discuss findings from experiments and observations. 5. Use supporting evidence to identify solutions to environmental issues. Course fee required. Corequisite: ENVS 1210. FA, SP.

ENVS 2000R. Field Experience: Environmental Science (LAB). 1 Hour.
Fulfills General Education Laboratory Sciences requirement. Provides an opportunity for students to meet each other in a field-research setting and discuss a major environmental issue. The class will be held over a 3-4 day weekend (overnight stays required). Each semester the class will focus on a particular issue related to the environment that is of interest to the region where the class is being held. Repeatable up to 2 credits. Offered on sufficient student need. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Demonstrate knowledge of basic fundamental laws, concepts, and theories in the physical sciences. 2. Explain and apply the scientific method. 3. Demonstrate knowledge of the process of science by being able to utilize data in the form of tables, graphs, and charts through interpretation and then communicate those finding in oral and/or written form. 4. Analyze a variety of environmental problems and solutions in a scientific context. 5. Demonstrate basic scientific literacy. Course fee required.

ENVS 2099. Special Topics in Environmental Science. 1 Hour.
Special Topics in Environmental Science. 1 hour. Open to all students. This course will focus on a specific environmental science topic of interest to faculty and students that is not represented in the main curriculum. It can be taught as seminars, standard lectures, guest speakers, laboratory exercises, or other traditional or nontraditional instruction methods. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1) Find and evaluate scientific publications on a specific topic of interest; 2) write or present a synthesis of the information gathered with proper citations; and 3) discuss conclusions of the semester's research.

ENVS 2210. Environmental Pollution and Remediation Techniques. 3 Hours.
The environmental Pollution and Remediation Technique course gives the students the skills to diagnose land and groundwater pollution issues. In this course students will learn about the common types of land (soil) and groundwater pollutants and the remediation methods currently employed by remediation industry. This course uses case studies of the local environment to take an in-depth look at the real and local pollution issues. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Identify common types of land and groundwater pollutants. 2. Apply the fundamental principles of remediation to remove and/or process pollutants. 3. Devise protocols to minimize and mitigate pollution to avoid remediation processes. 4. Evaluate the key indicators for sustainable remediation approaches. Prerequisites: ENVS 1210 and ENVS 1215 and MATH 1050 or higher (All grade C- or higher); and CHEM 1210 and CHEM 1215 (Both may be taken concurrently). SP.

ENVS 2700R. Field Methods in Environmental Science. 1 Hour.
A preparatory course for undergraduate participation in collaborative research projects in environmental science. Repeatable for a maximum of 3 credits. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Develop skills in collecting and organizing scientific data from field investigations. 2. Consider how concepts and skills acquired in coursework can be developed through interdisciplinary research. 3. Develop a hypothesis for a research project in the environmental or related sciences, and devise a protocol to test that hypothesis. Course fee required. Prerequisite: ENVS 1210 and ENVS 1215 (Both grade C- or higher).
ENVS 2990R. Seminar in Environmental Science. 1 Hour.
Seminar course aimed to help students who have declared the EEES major prepare for future careers in their field. Seminar and workshop activities will include potential career paths in the EEES areas, professional development and research experience opportunities, preparing cover letters and resumes/CVs, and the process of applying to graduate programs and jobs. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Identify potential opportunities as a chemistry degree graduate. 2. Prepare and evaluate professional materials that will be needed to apply for summer and post-graduate jobs and programs. 3. Interact and collaborate with faculty, peer students, and guest speakers in a professional setting. 4. Develop professional skills for interviews and collaborative settings. Prerequisite: ENVS 1210 (Grade C- or higher). SP.

ENVS 3280. Environmental Policy, Regulations, Health, and Safety. 3 Hours.
This course studies the interrelationships of people, public and private sector business, policy, politics and the environment. The Environmental Policy and Regulation course examines the real-world environmental issues from a policy perspective. In this course students will explore how to effectively communicate over environmental problems which is a significant factor in politics. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Identify and explain local and national environmental issues from a policy perspective. 2. Evaluate and critique global and local environmental strategies and policies. 3. Survey and analyze legal approaches to pollution control, environmental planning and natural resource management. 4. Develop communication skills through public speaking, and engaging the public on environmental issues. Prerequisite: ENVS 2210 (Grade C- or higher). **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Distinguish the elements and mechanisms of air pollution. 2. Describe current air pollution issues at different scales (from local to global). 3. Survey the adverse effects of primary and secondary air pollutants on human health and the environment. 4. Evaluate methods for control, and prevention of air pollution to meet desired needs within realistic constraints such as economic, environmental, political, health and safety, and sustainability. 5. Assess the mechanisms responsible for the performance effectiveness of each air quality control technology. Prerequisite: ENVS 2210 and CHEM 1210 (Both grade C- or higher). SP (odd).

ENVS 3410. Air Quality and Control Technologies. 3 Hours.
The Air Quality & Control Technologies course is a multidisciplinary course consisting of Math, Physics and Chemistry. Topics include sufficient information on major chemical compounds cause outdoor and indoor air pollution; health and environmental effects of air pollution; pollution prevention; and theory and practice of air pollution control technologies to reduce particulate matter, volatile organic compound (VOC), nitrogen oxide emissions, and sulfur dioxide emissions. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Identify environmental problems caused by waste mismanagement. 2. Categorize sources, types and compositions of solid wastes. 3. Evaluate methods for solid waste collection, transportation, and disposal. 4. Describe and analyze current and proposed waste collection systems. Prerequisites: ENVS 2210 and CHEM 1210 (Both grade C- or higher). SP (odd).

ENVS 3510. Waste Management. 3 Hours.
This course is an in-depth course in waste management. Waste Management 3510 talks about the generation, prevention, characterization, monitoring, treatment, handling, reuse and disposal of solid wastes. In this course students will learn about the integrated sustainable waste management strategies including recycling, landfilling and energy recovery. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Identify evidence that meets the criteria of science in recognizing and differentiating hypotheses, theories and/or laws using the resources of Costa Rica. 2. Collect and organize scientific data from field investigations. 3. Consider how concepts and skills acquired in coursework can be developed through interdisciplinary research. Course fee required.

ENVS 3910. Costa Rica Natural History. 3 Hours.
An interdisciplinary course that introduces students to the geography, cultural history, literature, ecology and biodiversity of Costa Rica. The course will meet for an hour a week during the semester, then the participants will travel to Costa Rica for a 2-week study abroad experience. The students will live and study at field research stations in Costa Rica. Pre-trip preparation will include selected literary and scientific readings to prepare students to understand their experiences in Costa Rica. Lectures and laboratory/field experiences will focus on incorporating these readings into observations and experiences while in Costa Rica. The fee covers most costs while in Costa Rica, airfare is not included. Offered upon sufficient student need. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Identify evidence that meets the criteria of science in recognizing and differentiating hypotheses, theories and/or laws using the resources of Costa Rica. 2. Collect and organize scientific data from field investigations. 3. Consider how concepts and skills acquired in coursework can be developed through interdisciplinary research. Course fee required.

ENVS 3920. Peruvian Amazon Natural History. 3 Hours.
An interdisciplinary course that introduces students to the geography, cultural history, literature and biodiversity of the Amazon region of Peru. The course will meet for an hour a week during the semester, then the participants will travel to Peru for a 10 day study abroad experience. Participants live and study at field research stations in Peru. Pre-trip preparation will include selected literary and scientific readings to prepare students to understand their experiences in Peru. Lectures and laboratory/field experiences will focus on incorporating these readings into observations and experiences while in Peru. Offered upon sufficient student need. Fee covers program costs while in Peru, it does not cover international flights round-trip to Iquitos, Peru ($800-$1200). Offered upon sufficient student need. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Identify evidence that meets the criteria of science in recognizing and differentiating hypotheses, theories and/or laws using the resources of the Peruvian Amazon. 2. Collect and organize scientific data from field investigations. 3. Consider how concepts and skills acquired in coursework can be developed through interdisciplinary research. Course fee required.

ENVS 3930. South Africa Natural History. 3 Hours.
An interdisciplinary course that introduces students to the geography, cultural history, literature and biodiversity of South Africa. The course will meet for an hour a week during the semester, then the participants will travel to South Africa for a study abroad experience. Participants live and study at field research stations. Pre-trip preparation will include selected literary and scientific readings to prepare students to understand their experiences. Lectures and laboratory/field experiences will focus on incorporating these readings into observations and experiences while in South Africa. Offered upon sufficient student need. For international travel, see studyabroad.dixie.edu for additional travel costs that may apply. Offered upon sufficient student need. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Acquire skills in understanding literary and scientific readings, while collecting and organizing scientific data from field investigations. 2. Gain familiarity with the context of the particular data set under consideration and will discover how the concepts and skills they are acquiring in their other coursework can be developed through interdisciplinary research. SP (even).
ENVS 4080. Environmental Monitoring and Characterization. 4 Hours.
Environmental Monitoring and Characterization course emphasizes on the fundamental principles used in the environmental assessment processes. In this course students will learn the theoretical and practical knowledge in various sector of environmental monitoring. Upon completion of this course, students should be able to describe significant environmental regulations, current sampling and laboratory techniques and quality control measures. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Explain the principles of environmental assessment and monitoring including characterizing the sampling sites, developing sampling plans for the collection of various media and selecting the contaminant transportation method. 2. Demonstrate standard field and laboratory sampling techniques and safety. 3. Apply data handling methods to interpret results from monitoring and characterization sites. 4. Apply knowledge of environmental sciences to implementation of laws, regulations, and policies. Prerequisites: ENVS 3410 and ENVS 2700R (Both grade C- or higher). SP (odd).

ENVS 4800R. Independent Research. 1-3 Hours.
An independent research course that allows the students to explore science through the scientific method, and allows close interaction between the student and faculty member to address scientific problems through experiment design and execution. Projects are at the discretion of the faculty member, in line with the student’s interests in the various scientific areas. Repeatable up to 6 credits subject to graduation and program restrictions. Variable credit: 1-3. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Use the scientific method to develop hypothesis for a research project in the environmental sciences, design experiments or identify resources from which to collect data, and draw conclusions from results. 2. Design and modify experiments throughout the progress of a research project. 3. Complete research projects independently while also interacting with other students and faculty that are engaged in the project. 4. Utilize outside resources (scientific databases, literature, etc) to interpret results and compare to existing and previous work in the field of your research project. FA, SP, SU.

ENVS 4910. Senior Seminar. 1 Hour.
A seminar course where students will share their research results or literature searches with fellow students and faculty in written and oral formats. **COURSE LEARNING OUTCOMES (CLOs) At the successful conclusion of this course, students will be able to: 1. Use the scientific method to develop hypotheses, search literature or utilize results from experimentation, and defend in an oral presentation to faculty and students. 2. Discuss relevant scientific topics in oral presentations in a scientific group setting. 3. Collaborate with other environmental science students and faculty that are engaged in scientific research to analyze data, results, and varying perspectives, and participate in scientific discussions. 4. Utilize outside resources (scientific databases, literature, etc.) to help interpret results and compare to existing and previous work in the field. 5. Prepare written reports that effectively summarize a chosen scientific topic related to the environmental sciences using the vast literature and compiled data. SP.