

ENVIRONMENTAL SCIENCES (ENV)

Courses and Descriptions

ENV 100 Introduction to Environmental Sciences 4 Credits

Examines how ecosystems function, with emphasis on the interactions between biological organisms and their physical environment, and the chemical processes that govern these interactions. The impact of human populations on natural ecosystems is investigated in detail using case studies from history and current events. The laboratory provides for hands-on experiences and/or short field trips to local sites for a better understanding of many of the concepts discussed. Weekday and weekend field trips may be required. Three hours of lecture and one three-hour lab per week. CLAS general education areas addressed: DP, SP, GP.
Corequisite(s): ENV 100L.

ENV 100L Introduction to Environmental Sciences Lab 0 Credits

This lab is a co-requisite and must be taken with the corresponding course.

Corequisite(s): ENV 100.

ENV 110 Future of Natural Resources 3 Credits

In this course, students are introduced to topics in the natural sciences through studies of human exploitation of selected natural resources (e.g. water, fisheries, mineral resources, energy, etc.). The course work includes a study of the scientific process and how it can contribute to solutions to contemporary issues. Topics covered will include factors that influence real-world decisions to manage natural resources more sustainably (e.g. political, economic, ethical factors). During the three hours of class meetings each week, lecture and exercises will be integrated. Field trips will be required. This course counts towards the fulfillment of the Disciplinary Perspectives element of the CLAS general education curriculum.

ENV 110L Future of Natural Resources Lab 0 Credits

This lab is a co-requisite and must be taken with the corresponding course.

Corequisite(s): ENV 110.

ENV 120 Introduction to Climate Change 3 Credits

This course offers students an overview of the human impacts on Earth's climate and emerging solutions to limit future climate change. Students will learn scientific insights into the interconnected components of Earth's climate as a system including the atmosphere, oceans, land, geology, and ice. Human effects on Earth's climate system will be contrasted with natural climate variation that preceded the industrial revolution. Students will also consider the personal, societal, and ethical implications of climate change through the lens of environmental justice.

ENV 200 Statistical and Computer Applications in the Natural Sciences 4 Credits

This course introduces important statistical concepts, their application, and the usage of computer technology relevant to biological, environmental, geological, and marine problems. Students will learn various graphical and statistical techniques and how to execute them on personal computers. The curriculum emphasizes the integrated nature of these techniques and their importance to meaningful data evaluation and representation. Laboratory exercises are designed to emphasize useful solutions to problems found in many scientific disciplines using computer-based methodologies. Three hours of lecture and one three-hour lab per week.

Corequisite(s): ENV 200L.

ENV 200L Statistical and Computer Applications in the Natural Sciences Lab 0 Credits

This lab is a co-requisite and must be taken with the corresponding course.

Corequisite(s): ENV 200.

ENV 205 Introduction to Geographic Information Systems 3 Credits

This course introduces the computer-based concepts and skills of Geographic Information Systems (GIS). It covers the basic GIS concepts, such as map characteristics and projections, spatial data models and analysis, and relational databases. It explores data sources, data quality, and metadata, as well as implementation and management of specific GIS projects. Hands-on experience with ArcGIS software is provided through a series of student exercises completed throughout the semester. Students will also be taught how to process both vector and raster data using ArcGIS software. The course is relevant for students from numerous disciplines in the natural sciences, social sciences, and business, which require the analysis and graphical representation of spatial data. Three hours of lecture per week.

ENV 220 Weather and Climate Change 3 Credits

This course introduces students to the concepts of weather and climate change. These concepts frame a continuum from short-term or daily changes in the atmosphere (meteorology) to those changes averaged over much longer periods of time (climatology). Students will learn the fundamentals of weather forecasting, the causes of natural variation in the Earth's climate, and the impact of human actions on the Earth's climate. Connections will be drawn to other current issues in the Earth system, including land use change, biodiversity, and pollution. Three hours of lecture per week.

Prerequisite(s): GEO 100 or GEO 113 or permission of instructor.

ENV 290 Directed Research and Study in Environmental Sciences 1-4 Credits

Provides an opportunity for freshman and sophomore students to gain hands-on research experience in the environmental sciences. This is an individual program of study and each student will work with a selected faculty member on a topic of mutual interest. The course consists of a combination of project meetings, supervised research, and guided readings. The focus will be on formulating research questions, designing and conducting experiments, collecting the necessary data, reviewing the scientific literature as it relates to each student's research topic in weekly meetings with the instructor, and communicating the findings by writing a final project report.

ENV 320 Global Biogeochemistry 4 Credits

This course introduces students to global biogeochemical processes in the earth system and their influences on marine and terrestrial ecosystems. With a focus on systems thinking and interdisciplinary science, students will learn about the interactions of the biosphere, lithosphere, hydrosphere and atmosphere through elemental cycling and energy transfers. The course extends from the origin of our planet to the modern earth system and considers the anthropogenic impacts of climate change and pollution on humans and other species. Students will analyze scientific data with examples in regulatory and research settings. Students will also gain first-hand experience with field methods including sampling ocean and freshwater using various techniques and equipment and interpreting chemical data. Field trips may be required for this course. Course

Prerequisite(s): GEO 100 or GEO 113; GEO 102; CHE 120 & 121.

ENV 320L Global Biogeochemistry Lab 0 Credits

This course introduces students to global biogeochemical processes in the earth system and their influences on marine and terrestrial ecosystems. With a focus on systems thinking and interdisciplinary science, students will learn about the interactions of the biosphere, lithosphere, hydrosphere and atmosphere through elemental cycling and energy transfers. The course extends from the origin of our planet to the modern earth system and considers the anthropogenic impacts of climate change and pollution on humans and other species. Students will analyze scientific data with examples in regulatory and research settings. Students will also gain first-hand experience with field methods including sampling ocean and freshwater using various techniques and equipment and interpreting chemical data. Field trips may be required for this course. Course

Prerequisite(s): GEO 100 or GEO 113; GEO 102; CHE 120 & 121.

ENV 340 Field Methods and Data Analysis 3 Credits

This course will provide students with practical experience in field methods and data analyses within environmental and marine sciences. The course will apply advanced scientific methods such as field-based exercises, GIS or coding analyses, statistical analyses, and database management. Students will also complete an independent or group project focused on a relevant topic. Local field trips during lab and potentially longer trips on weekends may be required. This course earns 3 Engaged Learning points in Civic and Community Engagement (CCE.)

Prerequisite(s): D or better in (MTH 105, or MTH 106, or MTH 210) and GEO 100, GEO 102, ENV 100, and MAR 120; or Permission of Instructor.

ENV 375 Environmental Biogeochemistry 3 Credits

This course examines the biogeochemical interactions among various environmental components, including water, rock, soil, organisms, and atmosphere. Covered topics focus on the relation between the biosphere and changes in the Earth's environment and atmosphere. The transfer of energy and nutrients within terrestrial ecosystems also is explored. Case studies from various examples will be used to understand ecosystem dynamics. Long-term environmental change and present-day ecosystem restoration activities are examined in the context of biotic offsets and land-use planning. The biogeochemical cycles of some environmentally sensitive compounds and elements in natural systems, such pesticides, mercury, and lead, also may be examined. Three hours of lecture per week.

Prerequisite(s): GEO 100 or GEO 113, CHE 120, CHE 121, CHE 122, CHE 123.

ENV 480 Senior Thesis 3 Credits

A senior thesis is optional for environmental science majors. However, a senior thesis is required for eligibility to graduate with honors in environmental science. The topic for investigation will be chosen by the student in consultation with the faculty of the Department of Geological, Environmental, and Marine Sciences. The student must initiate consideration of a proposal to the Department. The proposal must contain a discussion of the proposed project and a timetable to be followed in the study. A departmental committee consisting of a major and minor advisor will evaluate the written paper submitted at the conclusion of the study. An oral presentation before the department at the conclusion of the semester in which the study is completed is required. Proposals must be submitted in final form no later than the end of the ninth week of the semester prior to the semester in which the study is undertaken.

Prerequisite(s): senior standing in the geosciences major and permission of instructor.

ENV 490 Independent Study: Research and Creative Expression 1-4 Credits

Immerses the student in field or laboratory research. The student learns to organize material, use the literature, make precise measurements, and obtain reproducible data. If possible, the student will publish the results or present them at a scientific meeting.

ENV 491 Internship in Environmental Sciences 1-4 Credits

A supervised work experience in an approved organization where qualified students gain real-world knowledge and utilize their academic training in a professional environment. Placements may be in private, public, non-profit, or governmental organizations. These can include consulting firms, regulatory agencies, advocacy groups, and educational or research institutions. Normally, 50 hours of internship per credit is required. A mutually agreed upon method of evaluation will be formalized prior to the approval of the internship by the sponsoring faculty and could include a term paper or project report and a poster presentation.

Prerequisite(s): 2.5 GPA and permission of instructor.