EES. EARTH AND ENVIRONMENTAL SCIENCES

EES-395/396. INDEPENDENT RESEARCH
Credits: Varies with topic 1-3 credits.
Independent study or research of specific earth or environmental science topic at an advanced level under the direction of a departmental faculty member.
Click here for course fees.

Pre-Requisites
Upper class standing and approval of academic advisor, research advisor, and department chairperson.

EES-198/298/398. TOPICS IN EES
Credits: Varies with topic
Departmental courses on topics of special interest, not extensively treated in regularly scheduled offerings, will be presented under this course number on an occasional basis. May be repeated for credit.
Click here for fee for courses with a lab.

Pre-Requisites
Varies with topic studied.

EES-105. PLANET EARTH
Credits: 3
The nature of our planet and how it works are examined in the context of Earth as a constantly changing dynamic system. An emphasis on global scale processes and the interaction of humans and their physical environment is coupled with in-depth coverage of how science is done and the scientific principles that influence our planet, its rocks, mountains, rivers, atmosphere, and oceans. Major sub-topical areas in the Planet Earth series may include geology (Forces of Geologic Change), oceanography (The Restless Ocean), astronomy (The Cosmic Perspective), geography (Global Regions and Geography), and the relationship between people and their physical surroundings (The Global Environment). Intended for students who are not majoring in science, engineering, pre-pharmacy, nursing, or B.S. programs in mathematics or computer science. Two hours of lecture and two hours of lab per week.
Click here for course fees.

Pre-Requisites
No previous background in science or college-level mathematics is required.

EES-202. BIOGEOCHEMISTRY
Credits: 3
Fundamentals of the circulation of materials through the earth’s air, soils, waters, and living organisms are examined from the perspective of introductory chemical principles. Global cycles of water, carbon, nitrogen, phosphorus, and sulfur are investigated in detail with emphasis on the roles of microorganisms, chemical equilibrium, and oxidation-reduction processes in biogeochemical cycling. Laboratory focuses on 1) student designed projects to gather data that illustrate key concepts in chemical weathering processes in aqueous solutions, oxidation-reduction reactions, and microbial mediation of elemental cycling and 2) building problem solving skills. Two hours of lecture and three hours of lab per week.
Click here for course fees.

Pre-Requisites
CHM-115.

EES-210. GLOBAL CLIMATE CHANGE
Credits: 3
The nature and function of earth’s global climate are examined from a unified system perspective. Major questions focus on scientific versus public understanding of trends in global temperature, precipitation, and sea level. The course emphasizes negative and positive feedback processes that force key changes in the earth’s climate system: past, present, and future. Topics include fundamentals of global and regional heat and water balance, the role of elemental cycles in controlling climate (e.g., the carbon cycle), descriptive climate classification, long-term, short-term, and catastrophic climatic change (e.g., ice ages and bolide impacts), and human effects on climate (e.g., enhanced greenhouse, rising sea level). This course integrates a scientific understanding of climatic change and explores contemporary social and economic policy responses to change scenarios. Three hours of lecture per week.

EES-211. PHYSICAL GEOLOGY
Credits: 4
Description, analysis, and laboratory studies of earth materials, structure, and processes, including earth’s surface, interior, age, and origin. Three hours of lecture and three hours of lab per week. Requirements: For CS, Engineering, Math, and Science majors only. Cross listed with GEO-211.
Click here for course fees.

Pre-Requisites
EES-211 or permission of the instructor.
EES-218. ENVIRONMENTAL ETHICS
Credits: 3
An examination of the central problems of environmental ethics as viewed from the perspectives of science and of philosophy. The value of nature and 'natural objects,' differing attitudes toward wildlife and the land itself, implications of anthropocentrism, individualism, eocentrism, and ecofeminism, bases for land and water conservation, and other topics will be examined within a framework of moral and scientific argument. Cross-listed with PHL-218.

Pre-Requisites
PHL-101 or EES-240 or permission of the instructor.

EES-230. OCEAN SCIENCE
Credits: 4
An interdisciplinary approach to the study of the fundamentals of oceanography emphasizing physical, chemical, and biological interrelationships. Three hours of lecture and three hours of lab. Requirements: For CS, Engineering, Math, and Science majors only
Click here for course fees.

EES-240. PRINCIPLES OF ENVIRONMENTAL ENGINEERING & SCIENCE
Credits: 4
A study of physical, chemical, and biological components of environmental systems and a discussion of processes involved in water quality management, air quality management, waste management, and sustainability. Three hours of lecture and three hours of lab per week.
Click here for course fees.

Pre-Requisites
MTH-111 or higher. Requirements For CS, Engineering, Math, and Science majors only.

EES-242. ENVIRONMENTAL HEALTH
Credits: 3
To provide students with an understanding of man's impact on the environment and how those impacts can be controlled or mitigated. Students completing this course should be able to recognize environmental problems and understand control and preventative measures. Three hours of lecture.

Pre-Requisites
Introductory physics and chemistry. Students who have taken EES-240 will be admitted only with the consent of the instructor.

EES-251. SYNOPTIC METEOROLOGY
Credits: 4
Topics include surface and upper air weather systems, weather phenomena, climate, and local weather influences. Synoptic map analysis and interpretation are emphasized. Three hours of lecture and three hours of lab per week.
Requirements: For CS, Engineering, Math, and Science majors only
Click here for course fees.

EES-261. REGIONAL GEOGRAPHY
Credits: 3
Topics covered include maps and charts and basic elements of physical, cultural, historical, and economic geography as applied to specific geographic regions. Three hours of lecture per week.

EES-271. ENVIRONMENTAL MAPPING I: THE GLOBAL POSITIONING SYSTEM
Credits: 3
An introduction to the Global Positioning System (GPS) and environmental mapping concepts and applications. Topics include coordinate systems, reference ellipsoids, geodetic datums, and map projections. Practical field use of GPS is emphasized within the context of understanding system components, satellite signal processing, selective availability, base station differential correction, and data export to a geographical information system. Two hours of lecture and two hours of lab per week.
Click here for course fees.

EES-272. ENVIRONMENTAL MAPPING II: GEOGRAPHIC INFORMATION SYSTEMS
Credits: 3
An introduction to Geographic Information Systems (GIS). Topics include history of GIS, relational database management, data input and output, quality control, integration with CAD and remote sensing technologies, data analysis, and GIS as a decision support tool. Laboratory component emphasizes practical skills in GIS data management and analysis. Two hours of lecture and three hours of lab per week.
Click here for course fees.

EES-280. PRINCIPLES OF ASTRONOMY
Credits: 4
Topics include orbital mechanics, results of planetary probes, spectra and stellar evolution, and cosmology. Three hours of lecture and three hours of lab per week. Requirements: For Science majors only
Click here for course fees.

EES-302. LITERATURE METHODS
Credits: 1
The nature and use of important sources of information in earth and environmental sciences are developed through retrospective searching methods and current awareness techniques. The use of computer databases, the design of personal computer information files, information search strategies, and manual search procedures are included.
Literature preparation for Senior Projects (EES 391-392).

Pre-Requisites
Junior standing.
EES-304. ENVIRONMENTAL DATA ANALYSIS  
Credits: 2  
To acquaint students majoring in earth and environmental sciences with the techniques and methods of data acquisition and analysis, including environmental sampling methodology and data management. Emphasis will be placed on examination of real data sets from various areas of the earth and environmental sciences with particular emphasis placed on using and applying graphical and statistical procedures used in EES-391-392 (Senior Projects). Two hours of lecture per week.

Pre-Requisites  
MTH-150 and Junior standing or permission of the instructor.

EES-340. CONSERVATION BIOLOGY  
Credits: 3  
This course will cover the major topics of conservation biology including an introduction to biodiversity, threats to biodiversity, and solutions to diminish extinctions and population declines. Lecture: three hours per week. Cross-listed with BIO-340.

Pre-Requisites  
BIO 121-122, BIO 225-226 or permission of the instructor.

EES-341. FRESHWATER ECOSYSTEMS  
Credits: 3  
A study of the biological and ecological aspects of streams, lakes, and wetlands from a watershed perspective. An initial introduction to physical, chemical, and geological principles of limnology is followed by a focus on freshwater biology. Laboratories include field-based watershed investigations and lake management assessments using geographic information systems techniques. Cross-listed with BIO-341. Two hours of lecture and three hours of lab per week. Offered in alternate years.

Pre-Requisites  
EES-211 or 240 or BIO-121-122 or permission of the instructor.

EES-343. MARINE ECOLOGY  
Credits: 3  
An examination of the biology of marine life within the context of modern ecological principles. The structure and physiology of marine organisms will be studied from the perspectives of adaptation to the ocean as habitat, biological productivity, and interspecific relationships. Emphasis will be placed on life in intertidal zones, estuaries, surface waters, and the deep sea. Two hours of lecture and three hours of lab per week. Cross-listed with BIO-343. Offered in alternate years.

Pre-Requisites  
EES-230 and BIO-121-122 or permission of the instructor.

EES-344. ECOLOGY  
Credits: 4  
Ecology examines contemporary ecological thinking as it pertains to the interrelationships of organisms and their environments. Interactions at the populations and community level are emphasized. Two hours of lecture and three hours of lab per week. Cross-listed with BIO-344. Offered in alternate years.

Pre-Requisites  
BIO-121-122, 223-224, or permission of the instructor.

EES-366. FIELD BOTANY  
Credits: 3  
This is a specialized summertime field course, which emphasizes a taxonomic, phylogenetic, and ecological survey of higher plants indigenous to Northeastern Pennsylvania. Due to the extensive field work, enrollment is somewhat more restricted than in other courses; therefore, written permission from the instructor is the primary prerequisite for those upperclassmen who wish to register for the course. Cross-listed with BIO-366. Offered in alternate years.

Pre-Requisites  
BIO-121-122, 223-224, or permission of the instructor.

EES-370. GEOMORPHOLOGY  
Credits: 3  
Land forms, their evolution, and the human role in changing the surface of the earth, utilization of geologic and hydrologic information, and field investigations. Two hours of lecture and three hours of lab per week. Cross-listed with GEO-370.

Pre-Requisites  
EES-211.

EES-381. MINERALOGY  
Credits: 3  
The systematic study of the major classes of the mineral kingdom utilizing the department's collection. Concepts in crystal chemistry, crystal structure, mineral behavior, crystallography and optical mineralogy are studied and advanced techniques in mineral analysis are used. Two hours of lecture and three hours of lab per week. Cross-listed with GEO-281.

Pre-Requisites  
EES-211 and CHM-115.
EES-382. PETROLOGY
Credits: 3
A study of the identification, classification, composition, genesis, and alteration of igneous, sedimentary, and metamorphic rocks and their relation to crustal processes and tectonic environments. Two hours of lecture and three hours of lab per week. Cross listed with GEO-282.
Click here for course fees.

Pre-Requisites
EES-381

EES-391. SENIOR PROJECTS I
Credits: 1
Design and development of selected projects in earth and environmental sciences and other related fields under the direction of a staff member. Technical as well as economical factors will be considered in the design. A professional paper and detailed progress report are required. Requirements: Senior standing in Earth and Environmental Sciences and department permission. (See the department for more details about the department permission.)
Click here for course fees.

EES-392. SENIOR PROJECTS II
Credits: 2
Design and development of selected projects in earth and environmental sciences and other related fields under the direction of a staff member. Technical as well as economical factors will be considered in the design. A professional paper to be presented and discussed in an open forum is required.
Click here for course fees.

Pre-Requisites
EES-391 or department permission. (See the department for more details about the department permission.)

EES-394. FIELD STUDY
Credits: 1-3
On-site study of an earth or environmental problem or situation incorporating field documentation and investigative techniques. May be repeated for credit when no duplication of experience results. One hour of lecture, plus field trips.
Click here for course fees.

Pre-Requisites
EES-211 and EES-240.

EES-399. COOPERATIVE EDUCATION
Credits: 1-6
Professional cooperative education placement in a private or public organization related to the student's academic objectives and career goals. In addition to their work experience, students are required to submit weekly reaction papers and an academic project to a Faculty Coordinator in the student's discipline. See the Cooperative Education section of this bulletin for placement procedures.

Pre-Requisites
Sophomore standing; minimum 2.0 cumulative GPA; consent of the academic advisor; and approval of placement by the department chairperson.

EES-498. TOPICS
Credits: Varies with topic
Departmental courses on advanced topics of special interest, not extensively treated in regularly scheduled offerings, will be presented under this course number on an occasional basis. Available for either undergraduate or graduate credit. May be repeated for credit.
Click here for fee for courses with a lab.

Pre-Requisites
Senior or graduate standing