

# ENVIRONMENTAL SCIENCE (ENSC)

## **ENSC 1015 - Foundations of Environmental Science (3 credits)**

Interrelationships between human activities and the environment; emphasis on biological, chemical, and physical principles that govern the flow of energy, materials, and information among physical, ecological and human systems.

**Pathway Concept Area(s):** 4 Reasoning in Natural Sci., 11 Intercultural&Global Aware.

**Instructional Contact Hours:** (3 Lec, 3 Crd)

## **ENSC 1016 - Foundations of Environmental Science (3 credits)**

National and global perspective on societal concerns about the environment and human sustenance, including agriculture. Emphasizes the relationship between human systems and natural systems; ecosystem services and land, water and atmospheric resources.

**Pathway Concept Area(s):** 4 Reasoning in Natural Sci., 11 Intercultural&Global Aware.

**Instructional Contact Hours:** (3 Lec, 3 Crd)

## **ENSC 2964 - Field Study (1-19 credits)**

**Instructional Contact Hours:** Variable credit course

## **ENSC 2974 - Independent Study (1-19 credits)**

**Instructional Contact Hours:** Variable credit course

## **ENSC 2984 - Special Study (1-19 credits)**

**Instructional Contact Hours:** Variable credit course

## **ENSC 3134 - Soils in the Landscape (3 credits)**

A study of soils as functional landscape components, emphasizing their physical, chemical, mineralogical, and biological properties in relation to plant growth, nutrient availability, land-use management, and soil and water quality. Primarily for FOR/FIW, LAR, and other plant/earth science related majors. May not be taken by CSES or ENSC majors. Partially duplicates 3114 and 3124. Pre: one year of introductory CHEM or BIOL or GEOS.

**Instructional Contact Hours:** (2 Lec, 3 Lab, 3 Crd)

## **ENSC 3604 - Fundamentals of Environmental Science (3 credits)**

Interrelationships between human activities and the environment; provides national and global perspective; emphasis is on the physical, chemical, and biological principles and processes that are essential to an understanding of human-environment interactions; the role of energy in human and natural systems; environmental legislation and human behavior.

**Prerequisite(s):** BIOL 1105 or CHEM 1035

**Instructional Contact Hours:** (3 Lec, 3 Crd)

## **ENSC 3634 - Physics of Pollution (3 credits)**

Physical processes that control the fate of pollutants in our land, air, and water resources. Types and sources of pollutants, physical processes in the soil-water-atmosphere continuum controlling the dispersion and deposition of pollutants, the movement of pollutants, including radionuclides, by surface and subsurface water flow in soils, and physics of disturbed soils.

**Instructional Contact Hours:** (3 Lec, 3 Crd)

## **ENSC 3644 - Plant Materials for Environmental Restoration (3 credits)**

Overview of ecological principles related to revegetation and restoration of disturbed sites. Function and species requirements of plants in stabilizing disturbed areas including mines, rights-of-way, constructed wetlands, and for the remediation of contaminated soils.

**Prerequisite(s):** BIOL 1106

**Corequisite(s):** CSES 3114

**Instructional Contact Hours:** (3 Lec, 3 Crd)

## **ENSC 3984 - Special Study (1-19 credits)**

**Instructional Contact Hours:** Variable credit course

## **ENSC 4164 - Environmental Microbiology (3 credits)**

Ecology, physiology, and diversity of soil and aquatic microorganisms; incorporates the significance of these topics within the context of environmental applications such as bioremediation, wastewater treatment, control of plant- pathogens in agriculture, and pollution abatement in natural systems. The laboratory portion of the course will stress methodology development, isolation and characterization of microorganisms from natural and engineered systems, and examination of the roles of microorganisms in biogeochemical cycling.

**Prerequisite(s):** BIOL 2604

**Instructional Contact Hours:** (2 Lec, 3 Lab, 3 Crd)

**Course Crosslist:** BIOL 4164

## **ENSC 4244 - Ecological Restoration (3 credits)**

Process of assisting the recovery of degraded ecosystems by linking ecological concepts to restoration interventions. Invasive species management, revegetation methods, soil and water quality, faunal restorations. Restoration project design, planning, monitoring and implementation.

**Prerequisite(s):** BIOL 2804

**Instructional Contact Hours:** (3 Lec, 3 Crd)

## **ENSC 4314 - Water Quality (3 credits)**

Provide comprehensive information on the physical, chemical, biological, and anthropogenic factors affecting water quality, fate and transport of contaminants in water, water quality assessment and management, and current water quality policies.

**Prerequisite(s):** MATH 1026 or MATH 1226 and (BIOL 1105 or BIOL 1106) and (CHEM 1035 or CHEM 1036)

**Instructional Contact Hours:** (3 Lec, 3 Crd)

## **ENSC 4324 - Water Quality Laboratory (1 credit)**

Teach students a variety of laboratory chemical and biological techniques for water quality analysis. Complementary to ENSC/CSES 4314.

**Prerequisite(s):** CHEM 1046

**Corequisite(s):** CSES 4314, ENSC 4314

**Instructional Contact Hours:** (3 Lab, 1 Crd)

**Course Crosslist:** CSES 4324

## **ENSC 4344 - Ecological Restoration Field Practicum (2 credits)**

Hands-on experience in planning ecological restoration projects, designing ecological restoration strategies, preparing degraded sites for restoration, managing invasive species in ecological restoration projects, implementing ecological restoration techniques, and monitoring restoration outcomes in degraded sites. Additional topics include adaptive management, stakeholder relationships, effective communication in ecological restoration projects, and challenges and barriers to restoration success.

**Prerequisite(s):** BIOL 1106

**Instructional Contact Hours:** (2 Lec, 2 Crd)

**ENSC 4414 - Monitoring and Analysis of the Environment (2 credits)**

Provides comprehensive hands-on-laboratory-and field-based experience and information on the principles and methods for field monitoring and sampling, as well the physical, chemical, and biological analysis of soil, surface water, groundwater, and solid wastes within the context of regulatory compliance. Optional 40-hour Hazards Materials (HAZMAT) training will be available. Senior standing required.

**Prerequisite(s):** (ENSC 3604 or ENSC 4314 or CSES 4314 or BIOL 4004) and (MATH 1026 or MATH 2015 and CHEM 1036 and BIOL 1105)

**Instructional Contact Hours:** (1 Lec, 3 Lab, 2 Crd)

**ENSC 4444 - Managed Ecosystems, Ecosystem Services, and Sustainability (3 credits)**

Description and interactions of climate, soils, and organisms within intensively managed ecosystems used to produce food, fiber, bioenergy, fresh water, recreation, cultural, and other ecosystems services essential for human well-being. Ecological concepts applied to agricultural, grassland, and urban/turf ecosystems. Ecologically-based principles for sustainably managed ecosystems. Regional and global significance of managed ecosystems in context of sustainable food systems, and the Millennium Ecosystem Assessment. Pre-Requisite: Junior or Senior Standing required.

**Prerequisite(s):** CSES 3114 or CSES 3134

**Instructional Contact Hours:** (3 Lec, 3 Crd)

**Course Crosslist:** CSES 4444

**ENSC 4734 - Environmental Soil Chemistry (3 credits)**

Chemistry of inorganic and organic soil components with emphasis on environmental significance of soil solution-solid phase equilibria, sorption phenomena, ion exchange processes, reaction kinetics, redox reactions, and acidity and salinity processes.

**Prerequisite(s):** CSES 3114 or ENSC 3114 or GEOS 3614 and CSES 3124 or ENSC 3124 or GEOS 3624 and CHEM 2514 or CHEM 2535 and CHEM 2114 and (MATH 1026 or MATH 1226)

**Instructional Contact Hours:** (3 Lec, 3 Crd)

**Course Crosslist:** CHEM 4734

**ENSC 4764 - Bioremediation (3 credits)**

Overview of environmental biotechnology and the use of microbes and other organisms to remove contaminants and improve environmental quality. Topics include treatment of contaminated soils, waters, and wastewaters, as well as remediation of industrial waste streams.

**Prerequisite(s):** BIOL 2604

**Instructional Contact Hours:** (3 Lec, 3 Crd)

**ENSC 4774 - Reclamation of Drastically Disturbed Lands (3 credits)**

Remediation, rehabilitation, revegetation strategies for lands disturbed by mining, construction, industrialization, and mineral waste disposal. Disturbed site characterization and materials analysis procedures. Regulatory and environmental monitoring frameworks for mining sites and other disturbed lands. Prediction and remediation of water quality impacts from acid drainage.

**Prerequisite(s):** CSES 3114 or ENSC 3114 or GEOS 3614 or CSES 3134 or ENSC 3134 or CSES 3304 or GEOG 3304 or GEOS 3304

**Instructional Contact Hours:** (3 Lec, 3 Crd)

**ENSC 4864 - Capstone: Env Science (1 credit)**

Discussion based learning that utilizes prior knowledge gained in the major to synthesize information, and prepare a written comprehensive work plan. The work plan will demonstrate the students understanding of contaminant fate and mobility in different environmental media and will be defended orally. Review and explore available careers in environmental science through seminars and working groups within environmental professionals discussing the role and responsibilities of environmental scientists in industry, consulting, regulatory agencies, and non-profits. ENSC majors only. Senior Standing.

**Prerequisite(s):** (CSES 3634 or ENSC 3634) and (ENSC 4414) and (CHEM 4734 or CSES 4734 or ENSC 4734) and (CSES 4854 or ENSC 4854)

**Instructional Contact Hours:** (3 Lab, 1 Crd)

**ENSC 4964 - Field Study (1-19 credits)**

**Instructional Contact Hours:** Variable credit course

**ENSC 4974 - Independent Study (1-19 credits)**

**Instructional Contact Hours:** Variable credit course

**ENSC 4984 - Special Study (1-19 credits)**

**Instructional Contact Hours:** Variable credit course

**ENSC 4994 - Undergraduate Research (1-19 credits)**

**Instructional Contact Hours:** Variable credit course