

ENVS-ENVIRONMENTAL SCIENCE

ENVS 1110G. Environmental Science I 4 Credits (3+2P)

Introduction to environmental science as related to the protection, remediation, and sustainability of land, air, water, and food resources. Emphasis on the use of the scientific method and critical thinking skills in understanding environmental issues.

Learning Outcomes

1. Students will learn to critically analyze cause-and-effect relationships in the environment
2. Students will integrate and synthesize knowledge and draw appropriate conclusions based on the scientific method

ENVS 2111. Environmental Engineering and Science 3 Credits (3)

Principles in environmental engineering and science: physical chemical systems and biological processes as applied to pollution control. Crosslisted with: C E 256.

Prerequisite: (C- or better grade in CHEM 1215G) and (C- or better grade in MATH 1511G or ENGR 190).

Learning Outcomes

1. To understand the nature of water quality parameters in the context of Civil Engineering and Environmental Science (Water Treatment/Wastewater Treatment/Environmental Science).
2. To learn to apply engineering and scientific solutions to water quality problems.
3. To understand environmental regulations and their consequences on the design of pollution control systems.

ENVS 2111L. Environmental Science Laboratory 1 Credit (1)

Laboratory experiments associated with the material presented in ENVS 2111. Same as C E 256 L.

Corequisite(s): ENVS 2111.

Learning Outcomes

1. List typical analyses commonly performed to evaluate physical, chemical, and microbiological parameters used to describe water quality.
2. Follow experimental procedures listed in the class laboratory manual, or other publications such as Standards Methods, to perform common water quality analyses.
3. Evaluate, analyze, and discuss experimental results and present the conclusions in the form of a professional report

ENVS 300. Special Topics 1-4 Credits

Special subjects and credits to be announced in the Schedule of Classes. Consent of instructor required. Maximum of 4 credits per semester. Restricted to majors.

ENVS 301. Principles of Ecology 3 Credits (3)

A survey of ecology including general theory, the adaptations of organisms, population dynamics, species interactions, and the structure and function of natural communities and ecosystems. Crosslisted with: BIOL 301

Prerequisite(s): BIOL 2610G, A ST 311, and grade of C or better in MATH 1511G or Math Placement Exam score adequate to enroll in mathematics courses beyond MATH 1511G.

ENVS 312. Emergency Response to Hazardous Material Incidents 2 Credits (2)

EPA approved Environmental Response Training Program Course 165.15. In compliance with OSHA 29 CFR 1910.120. Normally taken during last year of study.

Prerequisite: Same as E T 312 and WERC 312.

Learning Outcomes

1. Satisfy OSHA training requirements for members of hazardous materials response teams and for environmental personnel requiring access to superfund sites.
2. Recognize, evaluate, and safely control an incident involving the release or potential release of hazardous materials.
3. Participate in mock scenarios using self-contained breathing apparatus, fully encapsulated suits, and a variety of equipment to test hazardous levels.

ENVS 361. Basic Toxicology 3 Credits (3)

Introduction to the principles of toxicology, discussion of toxic agents, environmental problems, testing procedures, and regulations. Prior course work in biology and chemistry recommended.

Prerequisite: CHEM 2120 or CHEM 313 or ANSC 1170 and BIOL 2610G or BIOL 2110G.

Learning Outcomes

1. Learn how toxins are absorbed, distributed, metabolized, and excreted from living systems.
2. Demonstrate how metabolism can appreciably alter the toxicity of compounds as well as dictate the resultant toxicity with an emphasis on target organ(s).
3. Explain the specific mechanism(s) of actions of toxins targeting the liver, lung, kidney, and nervous systems.
4. Delineate how certain toxins induce cancer and/or promote the development of cancer.
5. Understand how and why certain plants and animals are poisonous and venomous, specifically linking discreet chemicals or complex mixtures to the resultant toxic manifestation.

ENVS 370. Environmental Soil Science 3 Credits (3)

Continuation of SOIL 2110 that emphasizes soil properties and processes that directly relate to environmental pollution problems. Same as SOIL 370.

Prerequisite: SOIL 2110.

Learning Outcomes

1. Connect soil science to the environment.
2. Describe several contaminants and their methods of remediation.
3. Design a remediation plan based on environmental transport mechanisms.
4. Demonstrate a clear understanding of the direct and indirect costs (consequences) associated with poor soil and water management.

ENVS 391. Internship 3 Credits (3)

Professional work experience under the joint supervision of the employer and a faculty member. A written report is required. Maximum of 3 credits toward a degree. Consent of Instructor required. Graded: S/U Grading (S/ U, Audit).

ENVS 422. Environmental Chemistry**3 Credits (3)**

Chemistry of organic and metal ion pollutants in the environment and principles important to their remediation including bioremediation.

Restricted to: Main campus only. Crosslisted with: CHEM 422

Prerequisite(s): CHEM 1225G and either CHEM 2120 or CHEM 313.

Learning Outcomes

1. Describe and explain the solid, liquid, and gas phases of the environment and how they interact.
2. Understand the chemical reactions and processes that occur between various phases of the environment.
3. Learn how the chemical processes can be managed to promote environmental remediation, including the techniques and calculations used.

ENVS 447. Seminar**1 Credit (1)**

Organization, preparation, and presentation of current topics in agronomy, environmental sciences, horticulture, and soil science. Crosslisted with: AGRO 447, HORT 447 and SOIL 447.

Learning Outcomes

1. Develop professional communication skills through teamwork, case study preparation and presentation, data interpretation, and role-playing in mock interviews.
2. Prepare a professional resume, personal statement of goals for graduate school or permanent employment and make a Case Study presentation to faculty and peers.

ENVS 449. Special Problems**1-3 Credits**

Research problem, experience training, or other special study approved by a faculty adviser. Maximum of 3 credits per semester and 6 credits toward a degree. May be repeated up to 6 credits. Consent of Instructor required. Restricted to: E S majors.

ENVS 451. Special Topics**1-4 Credits (1-4)**

Specific subjects and credits to be announced in the Schedule of Classes. Maximum of 4 credits per semester and a total of 9 credits toward a degree. May be repeated up to 9 credits. Consent of Instructor required.

ENVS 452. Geohydrology**3-4 Credits (3+1P)**

Origin, occurrence, and movement of fluids in porous media and assessment of aquifer characteristics. Development and conservation of ground water resources, design of well fields. Crosslisted with: C E 452 and GEOL 452.

Learning Outcomes

1. An understanding of the movement of water in porous media and its effects on aquifers.
2. An understanding of the development and conservation of ground water resources.

ENVS 457. Water Measurement**3 Credits (3)**

The fundamentals of measuring water will be covered. Participants will learn about measurement techniques that are used to estimate evapotranspiration as well as commonly used water measurement structures to estimate water use. The benefits and problems that are associated with using each measurement will be discussed. Students will also learn about the principles of how to use water measurement as a management tool.

Prerequisite(s): MATH 1215 or higher, or consent of Instructor.

ENVS 460. Introduction to Air Pollution**3 Credits (3)**

An introduction to the physics and chemistry of tropospheric air pollution including sources of air pollution, local and long-range transport, instrumentation, regulatory requirements, control technology.

Prerequisite: PHYS 1310G, CHEM 1225G, MATH 1511G.

Learning Outcomes

1. Gain experience in critical thinking and assessment and presenting the results in a clear and concise manner.
2. Describe and communicate air pollution issues.
3. Develop skills for approaching air quality problems and calculating air quality data analysis.
4. Gain practical experience in operating air pollution instrumentation and sample collection.
5. Communicate science using social media.

ENVS 462. Sampling and Analysis of Environmental Contaminants**3 Credits (1+6P)**

Theory, application, methodology, and instrumentation used in the sampling and analysis of environmental contaminants. May be repeated up to 3 credits. Same as ENVE 462.

Prerequisite: ENVS 2111 or C E 256.

Learning Outcomes

1. Plan and execute the collection of relevant and useful data for environmental projects based on procedures outlined by the EPA, DOD, and DOE.
2. Understand the importance of careful planning, implementation, and assessment of environmental chemical data collection.
3. Work in teams to master the scientific method, including originating a question, collecting and analyzing samples, and presenting the findings orally and in professionally written reports.

ENVS 470. Environmental Impacts of Land Use and Contaminant Remediation**3 Credits (3)**

The course will cover the integrated assessment of soil erosion, contaminant transport in soil and water, and contaminant remediation from site scale to watershed scales. Understanding of the controlling factors for each type land use impact will be gained through the use of risk assessment, case studies, and computer modeling. Case studies will illustrate the processes under various environmental applications. This course will also cover the application of solute transport principles and methods for the remediation of contaminated soil and groundwater. It will also discuss the contaminated site characterization, monitoring, and remediation design. Discussions of innovative methodologies will be supported with case studies.

Learning Outcomes

1. Apply knowledge of mathematics, science, and engineering to identify, formulate, and solve environmental problems.
2. Function on multidisciplinary teams and exhibit professional and ethical responsibility and communicate findings effectively.
3. Recognize the need for, and an ability to engage in, life-long learning.
4. Describe contemporary land-use impact and cleanup issues.
5. Use the techniques, skills, and modern environmental science and engineering tools necessary for current industry practice.

ENVS 505. Research Orientation**4 Credits (3+2P)**

Training in writing research proposals, presentation of research results, and interpretation of research results. Crosslisted with: HORT 505, SOIL 505 and AGRO 505.

Learning Outcomes

1. Gain insight into the nature of scientific research and skills vital for graduate research and future careers in science.
2. Navigate graduate school processes and protocols.
3. Demonstrate critical thinking.
4. Generate a scientific hypothesis.
5. Communicate science effectively in written and oral formats, including drafting a proposal for thesis or dissertation research.

ENVS 596. Master's Proposal

1 Credit (1)

Current research proposal written by masters level graduate students. Consent of Instructor required. Crosslisted with: AGRO 596, HORT 596, GENE 596 and SOIL 596. Restricted to: Masters HORT; Masters PLEN majors.

Prerequisite: Master level graduate students.

Learning Outcomes

1. Student will review academic literature and draft a research proposal.

ENVS 599. Master's Thesis

1-15 Credits

Thesis Graded: Thesis/Disertation.