

# Environmental Science (ENV SCI)

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## Courses

### **ENV SCI 102. Introduction to Environmental Sciences. 3 Credits.**

Examines the interrelationships between people and their biophysical environment, including the atmosphere, water, rocks and soil, and other living organisms. The scientific analysis of nature and the social and political issues of natural resource use.

Fall and Spring.

### **ENV SCI 103. Introduction to Environmental Sciences Lab. 1 Credit.**

Laboratory course to accompany ENV SCI 102

P: ENV SCI 102 or concurrent enrollment.

### **ENV SCI 105. Scientific Literacy. 3 Credits.**

The word 'science' comes from the Latin for 'to know.' But how does science actually 'know'? And how can we know what to know? In this course, you will learn about the scientific process beginning with its origin. We'll learn about how scientific knowledge is created and communicated, and most importantly how to make evidence-based decisions about scientific knowledge in our daily lives.

Fall and Spring.

### **ENV SCI 198. First Year Seminar. 3 Credits.**

Reserved for New Incoming Freshman.

### **ENV SCI 203. Environmental Sustainability. 3 Credits.**

Principles of environmental sustainability rooted in interdisciplinary and systems perspectives; sustainability of our natural resource system; natural chemical, physical and biological systems which affect and influence sustainable practices; politics and economics of environmental sustainability.

Fall and Spring.

### **ENV SCI 220. Sustainability Strategies and Tools for Addressing Climate Change. 3 Credits.**

This course delves into the critical issue of climate change, exploring both the strategies and tools necessary for building a sustainable future. Students will investigate the scientific foundations of climate change, understand its far-reaching impacts, and analyze the effectiveness of various mitigation and adaptation strategies. The course will cover renewable energy technologies, sustainable agricultural practices, urban planning, policy frameworks, and innovative tools like life cycle assessment and environmental impact assessment. Through a blend of theoretical knowledge, and practical applications, students will be equipped to tackle climate challenges and contribute to a resilient, sustainable world.

Fall and Spring.

### **ENV SCI 239. Scientific Writing. 3 Credits.**

This course focuses on key elements of scientific writing, including grammar, attention to audience, and building a logical argument. Students will develop their writing skills through mock grant applications, reports, and journal articles. Scientific writing will prepare students to be competent technical and professional writers, both for the scientific community and the general public. Students will learn how to construct well researched and organized papers and lab reports that meet proper grammar guidelines. This will include appropriate use of figures and tables in technical communications. Students will also learn how to write technical directions for assembly and use of equipment

P: Declared major in Biology, Chemistry, Environmental Science, Geoscience, or Water Science AND WF 100 with a C or better, or WF 164 with a C or better, or ACT English score of 25 or higher, or SAT reading score of 32 or higher.

Fall and Spring.

### **ENV SCI 250. Introduction to Geographic Information Systems (GIS). 3 Credits.**

Computerized Geographic Information Systems (GIS) represent revolutionary software advancement that allow sophisticated information management, analysis and mapping with computer systems. In this class you will learn basic principles for creation and analysis of digital maps, cartographic concepts, and experience an intensive introduction to GIS software (e.g., ArcGIS).

Fall and Spring.

### **ENV SCI 260. Energy and Society. 3 Credits.**

The issues relating energy and society rather than energy technology per se: global energy flows; sources of energy; energy-related problems, policy and conservation; energy growth; future scenarios.

Fall and Spring.

### **ENV SCI 299. Travel Course. 1-6 Credits.**

Travel courses are conducted to various parts of the world and are led by one or more faculty members. May be repeated to different locations.

P: cons of instr & prior trip arr & financial deposit.

### **ENV SCI 301. Radioactivity: Past, Present, and Future. 3 Credits.**

Radioactive isotopes play a significant role in many aspects of the natural and human environments. People are affected throughout their lives by natural and anthropogenic isotopes at local, national, and global scales. From radon in houses and radium in local drinking water supplies to fallout from Chernobyl, humans are directly impacted through health, economic, and technological pathways.

REC: HS chemistry or earth science, or Geosci 102 with at least a C grade

Fall Only.

**ENV SCI 303. Environmental Sustainability. 3 Credits.**

Principles of environmental sustainability rooted in interdisciplinary and systems perspectives; sustainability of our natural resource system; natural chemical, physical and biological systems which affect and influence sustainable practices; politics and economics of environmental sustainability.

P: None. REC: Env Sci 102

Fall and Spring.

**ENV SCI 305. Environmental Fate and Transport. 4 Credits.**

Physical and chemical aspects of natural environmental processes. The movement, transformation, and fate of materials and contaminants.

P: CHEM 212 with at least a C grade AND GEOSCI 202 with at least a C grade AND MATH 104 or MATH 202 with at least a C grade AND BIOLOGY 201/202 with at least a C grade

Spring.

**ENV SCI 320. The Soil Environment. 4 Credits.**

The physical, chemical and biological properties and principals of soils; formation, classification and distribution of major soil orders; function and management of soils in natural, agricultural and urban environments. Includes field and laboratory experiences.

P: CHEM 108 with at least a C grade or CHEM 212 with at least a C grade; REC: GEOSCI 202.

Fall Only.

**ENV SCI 330. Hydrology. 3 Credits.**

Study of the principal elements of the water cycle, including precipitation, runoff, infiltration, evapotranspiration and ground water; applications to water resource projects such as low flow augmentation, flow reregulation, irrigation, public and industrial water supply and flood control.

P: MATH 104 with at least a C or higher math course

Fall Only.

**ENV SCI 334. Solid Waste Management. 3 Credits.**

This course will focus on technical concepts of solid waste management related to the design and operation of landfills, waste-to-energy systems, composting facilities, recycling facilities, and other emerging waste management technologies.

P: ET 201

Spring Even.

**ENV SCI 335. Water and Waste Water Treatment. 3 Credits.**

Water and waste water treatment systems, including both sewage and potable water treatment plants and their associated collection and distribution systems. Study of the unit operations, physical, chemical and biological, used in both systems.

P: GEOSCI 202 with at least a C grade or CHEM 211 with at least a C grade or BIOLOGY 201 & BIOLOGY 202 with at least C grades

Spring.

**ENV SCI 336. Environmental Statistics. 3 Credits.**

This course emphasizes the principles of data analysis using advanced statistical software (such as R, SAS, etc.). It employs primarily environmental examples to illustrate procedures for elementary statistical analysis, regression, analysis of variance and nonparametric statistics.

P: MATH 260

Fall Only.

**ENV SCI 337. Environmental GIS. 3 Credits.**

This is a project based course where students conduct geospatial data manipulation, analysis and management with a suite of GIS software tools and web-based GIS interfaces. Students will learn about a range of applications of remotely sensed and other geospatial data to natural science problems. Through the course project, students will create a functional GIS to study or model an environmental phenomena or problem.

P: ENV SCI 250 with at least a C grade. REC: GEOSCI 202

Fall Only.

**ENV SCI 338. Environmental Modeling. 2 Credits.**

This course introduces the fundamental concepts and approaches in dynamic modeling of environmental systems, in which system changes through time are a concern. The course will be focused on the creation, analysis, and interpretation of dynamic models within the framework of systems thinking for exploring a variety of environmental problems. Throughout the course, we will use the STELLA software as a tool to assist us in modeling of environmental systems.

P: MATH 104, MATH 202 or MATH 203

Fall Only.

**ENV SCI 339. Scientific Writing. 3 Credits.**

This course focuses on key elements of scientific writing, including grammar, attention to audience, and building a logical argument. Students will develop their writing skills through mock grant applications, reports, and journal articles.

Fall and Spring.

**ENV SCI 351. Web GIS and Applications. 3 Credits.**

This course will focus Web GIS for addressing spatial patterns/processes in environmental science and policy, including but not limited to StoryMaps, ArcGIS Online, widgets, online dashboards and other formats. Basic CAD (computer aided design) using Sketchup software will also be introduced. GIS applications tailored to public and environmental policy will be emphasized, e.g., tax base analysis, property mapping, natural resources inventory, natural hazards, and emergency management.

P: ENV SCI 250  
Spring.

**ENV SCI 389. Colloquium in Environmental Sustainability & Business. 3 Credits.**

Required component of the Sustainability Minor. Focus is placed upon the nature of systems thinking systems dynamics, and problem solving. Will address systems dynamics in natural world policy creation, human creativity and the arts, and business decision making. Course is non-repeatable for credit.

Fall and Spring.

**ENV SCI 401. Stream Ecology. 4 Credits.**

The goal of this course is to develop a profound understanding of the abiotic and biotic processes responsible for shaping the ecosystem in running waters. Focus will be on ecological processes, but nutrient dynamics and fluid mechanics are also important issues as well as the fauna associated to the streambed, mainly macro invertebrates and their ecological role. Theory will be combined with hands on experience providing the student with a tool to manage a stream based on ecological principles.

P: BIOLOGY 203  
Fall Even.

**ENV SCI 403. Limnology. 4 Credits.**

Limnology is a broad sub-discipline of ecology that is the study of the structural and functional interrelationships of organisms of inland waters as they are affected by their dynamic physical, chemical and biotic environments. In this course, we will examine the dominant organizing principles and the current conceptual advances in the field of limnology focusing on lakes.

P: BIOLOGY 203  
Fall Odd.

**ENV SCI 415. Solar and Alternate Energy Systems. 3 Credits.**

Study of alternate energy systems which may be the important energy sources in the future, such as solar, wind, biomass, fusion, ocean thermal, fuel cells and magneto hydrodynamics.

P: PHYSICS 104 with a C or higher OR PHYSICS 202 with a C or higher OR ENGR 210 with a C or higher or ENGR 308 with a C or higher  
Spring.

**ENV SCI 424. Hazardous and Toxic Materials. 3 Credits.**

The handling, processing, and disposal of materials which have physical, chemical, and biological properties that present hazards to human, animal, and plant life; procedures for worker safety and for compliance with regulations. The metals and nonmetals, carcinogens, radioactive materials, and pathogenic human, animal, and plant wastes.

P: CHEM 212  
Spring Odd.

**ENV SCI 425. Global Climate Change. 3 Credits.**

Examines changes in global climate with emphasis on the processes by which climate change occurs. Focuses on the recent changes in the concentration of atmospheric greenhouse gases and their impact on the earth's global energy budget. Examines the potential environmental impact of a changed climate.

P: Geosci 222 with at least a C grade or Env Sci 102 with at least a C grade.  
Spring.

**ENV SCI 433. Ground Water: Resources and Regulations. 3 Credits.**

An overview of the geology, properties, flow, and pollution of ground water systems. Techniques of aquifer characterization and water quality monitoring are introduced and evaluated. Regulatory and policy approaches to moderate use and ensure adequate high quality supplies of this valuable resource in the future are also reviewed.

P: GEOSCI 202  
Fall Even.

**ENV SCI 460. Resource Management Strategy. 3 Credits.**

Application of the principles of systems analysis to the sustainable use of material and energy resources. Emphasis on use of analytical tools of economics (e.g. costs-benefit, cost-effectiveness, and risk-benefit analysis) and the process of public policy making and implementation. REC: background in econ and conservation.

Spring.

**ENV SCI 464. Atmospheric Pollution and Abatement. 3 Credits.**

This course will provide students an understanding of atmospheric processes and weather patterns and how they affect pollutant transport. Sources, sinks, environmental effects, and abatement technologies for air pollutants will be addressed. Atmospheric reactions that create pollution or deplete stratospheric ozone will be included.

P: CHEM 212 and CHEM 214 and ET 201

Fall Odd.

**ENV SCI 467. Research Experience in Environmental Science. 4 Credits.**

This course provides a dedicated research experience for environmental science students. Students are guided through the process of developing a research idea using sound experimental design practices, implementing the research in field/laboratory settings, building a story with graphical and statistical analyses and producing an undergraduate like thesis that will be formatted for submission to a scientific journal. Research topics vary.

P: BIOLOGY 306 with at least a C grade or ENV SCI 305 with at least a C grade, MATH 260 with at least a C grade and ENV SCI 239 with at least a C grade

Fall Only.

**ENV SCI 478. Honors in the Major. 3 Credits.**

Honors in the Major is designed to recognize student excellence within interdisciplinary and disciplinary academic programs.

P: min 3.50 all cses req for major and min gpa 3.75 all UL cses req for major.

Fall and Spring.

**ENV SCI 490. EMBI Co-Op/Experience. 3 Credits.**

Required component of the Certificate in Environmental Sustainability and Business. Enrolled students will be placed by EMBI in a business, nonprofit, or governmental setting that involves interdisciplinary problem solving within an environmental sustainability context. This will be a special co-op/internship/project experience. Course is repeatable for credit; may be taken 2 times for a total of 6 credits.

P: Enrollment in Environmental Sustainability and Business certificate program.

Fall and Spring.

**ENV SCI 491. Senior Thesis/Research in Environmental Science. 3-4 Credits.**

A project-based capstone experience where individual students address a specific aspect of the environmental sciences through the use of scientific and mathematical skills.

P: BIOLOGY 306 with at least a C grade or ENV SCI 305 with at least a C grade; MATH 260 with at least a C grade; instr consent. REC: BIOLOGY 306 and ENV SCI 305.

Fall and Spring.

**ENV SCI 495. Teaching Assistantship. 1-6 Credits.**

The student and supervising teacher must prepare a statement that identifies the course with which the assistantship will happen, objectives for the assistantship, and expectations in order to fulfill the course objectives. Students are not eligible to receive credit in both the course they assist the instructor with and the teaching assistantship in the same semester. Typically student has previously taken the course prior to enrollment in the assistantship. Course is repeatable for credit.

Fall and Spring.

**ENV SCI 497. Internship. 1-12 Credits.**

Supervised practical experience in an organization or activity appropriate to a student's career and educational interests. Internships are supervised by faculty members and require periodic student/faculty meetings. All internships must be taken P-NC. Course is repeatable for credit.

P: jr st and gpa  $\geq$  2.75 and completion of 3 UL cses in maj or min.

Fall and Spring.

**ENV SCI 498. Independent Study. 1-4 Credits.**

Independent study is offered on an individual basis at the student's request and consists of a program of learning activities planned in consultation with a faculty member. A student wishing to study or conduct research in an area not represented in available scheduled courses should develop a preliminary proposal and seek the sponsorship of a faculty member. The student's advisor can direct him or her to instructors with appropriate interests. A written report or equivalent is required for evaluation, and a short title describing the program must be sent early in the semester to the registrar for entry on the student's transcript. Course is repeatable for credit.

P: fr or so st with cum gpa  $\geq$  2.50; or jr or sr st with cum gpa  $\geq$  2.00.

Fall and Spring.

**ENV SCI 499. Travel Course. 1-6 Credits.**

Travel courses are conducted to various parts of the world and are led by one or more faculty members. May be repeated to different locations.

P: cons of instr & prior trip arr & financial deposit.