

# ENVIRONMENTAL ENGINEERING SCIENCES

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Not all courses are offered every semester. Refer to the schedule of courses for each term's specific offerings.

More Info (<http://registrar.ufl.edu/soc/>)

*Courses at the University of Florida, with the exception of specific foreign language courses and courses in the online Master of Arts in Mass Communication program, are taught in English.*

## Department Information

The broad undergraduate environmental engineering curriculum of EES has earned the department a ranking as a leading undergraduate program. The ABET-accredited engineering bachelor's degree is comprehensively based on physical, chemical, and biological principles to solve environmental problems affecting air, land, and water resources. An advising scheme including select faculty, led by the undergraduate coordinator, guides each student through the program.

Website (<https://www.essie.ufl.edu/environmental-engineering-sciences/>)

### CONTACT

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### Curriculum

- Combination Degrees
- Environmental Engineering

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## Courses

### EES 3000L Environmental Science and Humanity Laboratory 1 Credit

**Grading Scheme:** Letter Grade

Field and laboratory instruction on ecosystems, environmental treatment and control systems, and methods of environmental analysis. Intended for junior level environmental science majors and minors. (B)

**Attributes:** General Education - Biological Science

### EES 3008 Energy and Environment 3 Credits

**Grading Scheme:** Letter Grade

Consideration of the energy basis for man and nature including principles of energy analysis, systems ecology and public policy. (P)

**Attributes:** General Education - Physical Science

### EES 3206 Environmental Chemistry 4 Credits

**Grading Scheme:** Letter Grade

This course is designed to provide students with fundamental knowledge needed to solve pollution problems specific to environmental systems.

The course focuses primarily on thermodynamic equilibrium and kinetic principles associated with both natural and engineered systems.

**Prerequisite:** (CHM 2046 or CHM 2096) and MAC 2311.

### EES 4005C Ecological Engineering 3 Credits

**Grading Scheme:** Letter Grade

Application of ecological and engineering principles to natural resource management and problem solving.

**Prerequisite:** CHM 2046 or CHM 2096;

**Corequisite:** EES 4203.

### EES 4050 Environmental Planning and Design 3 Credits

**Grading Scheme:** Letter Grade

Principles and practices of environmental planning. Planning for and designing sustainable communities and regions. Exploration of quantitative methods for the evaluation of environmental impacts and analysis of carrying capacity of economic development. Exploration of theories of spatial and temporal organization of systems of humanity and nature.

### EES 4102 Wastewater Microbiology 2 Credits

**Grading Scheme:** Letter Grade

General concepts in microbiology and cell biology with major emphasis on the role of microorganisms in polluted environments. (B)

**Prerequisite:** CHM 2046.

**Attributes:** General Education - Biological Science

### EES 4102L Environmental Biology Laboratory 1 Credit

**Grading Scheme:** Letter Grade

Focuses on the biota (microorganisms, algae, zooplankton, fish, and plants) found in natural (lakes and wetlands) and engineered systems, ecological engineering approach to management of surface waters and ecological modeling.

### EES 4103 Applied Ecology 2 Credits

**Grading Scheme:** Letter Grade

Application of ecological principles to technological resource management and problem solving. (B)

**Attributes:** General Education - Biological Science

### EES 4201 Water Chemistry 3 Credits

**Grading Scheme:** Letter Grade

Kinetics and equilibrium of aqueous chemistry including acid-base, complexation, precipitation and redox equilibria. (P)

**Prerequisite:** CHM 2046 or CHM 2096 and MAC 2311 or MAC 2233.

**Attributes:** General Education - Physical Science

### EES 4203 Phase Partitioning in the Environment 4 Credits

**Grading Scheme:** Letter Grade

A study of the fate of organic pollutants in the environment through application of principles of organic chemistry and chemical thermodynamics, including phase partitioning between environmental media.

**Prerequisite:** CHM 2046 or CHM 2096.

### EES 4316 Industrial Ecology 3 Credits

**Grading Scheme:** Letter Grade

Linkage of industrial activity with environmental and social sciences. Corporate environmental management and environmental ethics. Resources, laws and economics. Environmental account. Industrial products and processes and life cycle assessments. Case studies of corporate environmental policies.

### EES 4401 Public Health Engineering 3 Credits

**Grading Scheme:** Letter Grade

Application of engineering principles to protect public health. Areas covered include water supply, waste treatment, air pollution, radiological health, occupational health, milk and food sanitation, vector control, solid wastes, and housing hygiene. (P)

**Attributes:** General Education - Physical Science

**EGN 4912 Engineering Directed Independent Research 0-3 Credits****Grading Scheme:** S/U

Provides firsthand, supervised research with a faculty advisor or postdoctoral or graduate student mentor. Projects may involve inquiry, design, investigation, scholarship, discovery or application. (S-U)

**EGS 1005 Prep for Success 1-4 Credits****Grading Scheme:** S/U

Freshman success course that includes academic preparation in calculus, chemistry, student success and technical communications. (S-U)

**Prerequisite:** EG student.**EMA 4535 Sustainable Nanotechnology 3 Credits****Grading Scheme:** Letter Grade

Increase in production and use of engineered nanomaterials (ENMs) raises concerns on their potential impacts on the environment and human health. The sustainable development of nanotechnology requires knowledge of life cycle and environmental fate/implications of ENMs. Focuses on linkages between ENMs properties and environmental implications.

**Prerequisite:** CHM 2046 or CHM 2047 or CHM 2096.**ENV 2003 Introduction to Environmental Engineering 1 Credit****Grading Scheme:** S/U

Introduction to topics in environmental engineering, including water and air quality, sustainable materials management, and ecosystems.

**Prerequisite:** Environmental Engineering Sciences major.**ENV 3001 Core 1: Introduction to Environmental Systems 4 Credits****Grading Scheme:** Letter Grade

Introduction to environmental systems, including water, air, materials, and ecological resources with motivating case studies across topics and fundamental definitions, laws, and theories in environmental engineering sciences. Throughout the course, students will build knowledge base and relevant skills in topics that bridge disciplines, including statistics, thermodynamics, microbiology, and organic chemistry.

**Prerequisite:** PHY 2048 and CHM 2046 and MAC 2312.**ENV 3002 Core 2: Fundamentals of Environmental Engineering 4 Credits****Grading Scheme:** Letter Grade

Fundamentals of environmental engineering, including water, air, materials, and ecological resources. Environmental laws and regulations that motivate environmental engineering practice. Theoretical approaches for quantifying fundamental environmental processes, interactions, impact and risks. Students will build knowledge and relevant skills in topics that bridge disciplines, including statistics, thermodynamics, microbiology, and organic chemistry

**Prerequisite:** ENV 3001.**ENV 3040C Computational Methods in Environmental Engineering 3 Credits****Grading Scheme:** Letter Grade

Numerical modeling techniques and their application to environmental engineering. Use of personal computers and spreadsheets to solve numerical models. Solution techniques include numerical methods and their implementation using Excel and Visual Basic for Applications (VBA).

**Prerequisite:** MAC 2313;**Corequisite:** MAP 2302.**ENV 3930 Environmental Engineering Ethics Seminar 1 Credit****Grading Scheme:** Letter Grade

Intended for undergraduates majoring in environmental engineering. Lectures and discussion on ethics topics in environmental engineering sciences. (H)

**Attributes:** General Education - Humanities**ENV 4009 Core 5: Environmental Engineering Practice 4 Credits****Grading Scheme:** Letter Grade

Utilize fundamental and applied concepts in environmental engineering practice, including applications of ecological engineering, air pollution control, waste facilities design, and advanced water treatment processes. Throughout the course, students will build knowledge base and relevant skills in topics that bridge disciplines, including statistics, thermodynamics, microbiology, and organic chemistry.

**Prerequisite:** ENV 4454.**ENV 4041C Environmental Analysis 3 Credits****Grading Scheme:** Letter Grade

Theory and laboratory techniques for the analysis of air and water pollutants and basic concepts of ecosystems structure and analysis.

**Prerequisite:** (CHM 2046 or CHM 2096) and (STA 3032 or STA 2023).**ENV 4101 Elements of Atmospheric Pollution 3 Credits****Grading Scheme:** Letter Grade

Sources, effects and regulation of air pollutants. Meteorology and dispersion of pollutants. Sampling and analysis of gaseous and particulate air pollutants. Photochemical air pollution and mobile sources. (P)

**Prerequisite:** EES 4203 and PHY 2049.**Attributes:** General Education - Physical Science**ENV 4112C Air Sampling and Analysis 3 Credits****Grading Scheme:** Letter Grade

Applies physical and chemical principles to measurement of gaseous and particulate pollutants in ambient air.

**Prerequisite:** ENV 4101.**ENV 4121 Air Pollution Control Design 3 Credits****Grading Scheme:** Letter Grade

Principles of particulate and gaseous emission control; design and operation of particulate and gas control equipment to meet federal emission standards.

**Prerequisite:** ENV 4101.**ENV 4122 Design of Air Pollution Control System 3 Credits****Grading Scheme:** Letter Grade

Design of a complete air pollution control system including the industrial ventilation system needed to capture, transport and condition the hot, corrosive gases from an industrial process.

**Prerequisite:** ENV 4101 and ENV 4121.**ENV 4212 Nuclear Power Radioactive Waste Technology 3 Credits****Grading Scheme:** Letter Grade

Characterization and description of low and high level radwastes, regulatory requirements and method of treatment. Transportation, burial and surveillance of radwaste. Decommissioning of nuclear facilities.

**Prerequisite:** refer to the department.**ENV 4300 Solid Waste Containment Design 3 Credits****Grading Scheme:** Letter Grade

Design fundamentals of solid and hazardous waste landfills, waste piles, monofills and surface impoundments. Regulations, site requirements, sizing, liner design, leachate and gas management system design, operations and closure.

**Prerequisite:** ENV 4351;**Corequisite:** ENV 4561 or CWR 4202.

**ENV 4351 Solid and Hazardous Waste Management 4 Credits****Grading Scheme:** Letter Grade

Generation of solid and hazardous wastes. Collection, methods, equipment, costs and disposal. Rules, regulations and management systems for proper control of solid and hazardous wastes. Evaluation of engineering systems to minimize costs and regulatory problems. (P)  
**Prerequisite:** EES 4201.

**Attributes:** General Education - Physical Science**ENV 4353 Solid Waste Systems Design 3 Credits****Grading Scheme:** Letter Grade

A capstone design experience focusing on the design of solid waste management systems such as landfills, waste-to-energy facilities, compost operations, recycling facilities and hazardous waste treatment/storage/disposal facilities.

**Prerequisite:** ENV 4351.**ENV 4405 Nutrient Control and Water Reuse 3 Credits****Grading Scheme:** Letter Grade

Biological and physicochemical processes for advanced treatment of municipal wastewater. Reuse guidelines and applications.

**ENV 4411 Stormwater Control Systems 3 Credits****Grading Scheme:** Letter Grade

Chemical, physical, biological and hydrologic aspects of rainfall runoff and control through unit operations and processes (UOPs). Stormwater physical and chemical loads. Interactions between hydrologic processes, water chemistry, sediment transport, infrastructure materials and UOPs for treatment and reuse.

**Prerequisite:** EES 4201 or instructor permission.**ENV 4430 Water Treatment Process Design 3 Credits****Grading Scheme:** Letter Grade

Design of selected water treatment processes including disinfection, air stripping, adsorption, ion exchange and membrane processes.

**Prerequisite:** ENV 4514C and EES 4201.**ENV 4432 Potable Water System Design 3 Credits****Grading Scheme:** Letter Grade

Design of conventional water treatment operations, including reactor design, coagulation, flocculation, mixing, sedimentation, filtration, softening, disinfection and sludge management.

**Prerequisite:** EES 4201 and ENV 4514C.**ENV 4453 Core 3: Processes in Environmental Engineering 4 Credits****Grading Scheme:** Letter Grade

Theoretical and applied knowledge in environmental engineering processes across the air, water, and solid phases. Quantitative tools for describing materials and energy flows and transformations. Throughout the course, students will build knowledge base and relevant skills in topics that bridge disciplines, including statistics, thermodynamics, microbiology, and organic chemistry.

**Prerequisite:** ENV 3002.**ENV 4454 Core 4: Environmental Engineering Applications 4 Credits****Grading Scheme:** Letter Grade

Application of fundamental concepts and laws to design, assess, and predict outcomes in environmental engineering systems handling water, air, materials and ecosystems. Throughout the course, students will build knowledge base and relevant skills in topics that bridge disciplines, including statistics, thermodynamics, microbiology, and organic chemistry.

**Prerequisite:** ENV 4453.**ENV 4501 Environmental Hydrology 1 3 Credits****Grading Scheme:** Letter Grade

Surface and atmospheric hydrology. Hydrologic processes controlling streamflow events. Practical application to stormwater management.

**Prerequisite:** ENV 3040C and (STA 3032 or STA 2023) and (CWR 3201 or EGN 3353C).**ENV 4506 Environmental Hydrology 2 3 Credits****Grading Scheme:** Letter Grade

Subsurface hydrology. Properties of porous media governing flow and chemical transport in the subsurface. Environmental site evaluation methods.

**Prerequisite:** ENV 3040C and (CWR 3201 or EGN 3353C).**ENV 4514C Water and Wastewater Treatment 3 Credits****Grading Scheme:** Letter Grade

Design of water and wastewater treatment units.

**ENV 4532 Wastewater System Design 3 Credits****Grading Scheme:** Letter Grade

Detailed design and layout of gravity wastewater collection systems, pumping facilities, force mains, and a wastewater treatment plant. Emphasis on the preparation of design drawings and estimating costs.

**Prerequisite:** ENV 4514C;**Corequisite:** ENV 4561 or CWR 4202.**ENV 4545 Environmental Hydrology 4 Credits****Grading Scheme:** Letter Grade

Atmospheric, surface, subsurface hydrology and interactions as part of the water cycle. Properties of natural and anthropogenic surfaces and porous media governing flow and transport.

**Prerequisite:** (ENV 3040C or CGN 3421) and (STA 3032 or STA 2023) and (CWR 3201 or EGN 3353C).**ENV 4561 Hydraulic Systems Design 3 Credits****Grading Scheme:** Letter Grade

Hydraulic design of water distribution systems, wastewater collection and disposal systems, and water and wastewater treatment plants.

**Prerequisite:** CWR 3201.**ENV 4601 Environmental Resources Management 2 Credits****Grading Scheme:** Letter Grade

Theory and application of engineering economics and systems analysis to the design of environmental management systems.

**Prerequisite:** ENV 3040C.**ENV 4892 Environmental Engineering Design 1 3 Credits****Grading Scheme:** Letter Grade

The first semester of a two-semester capstone design experience where environmental engineering seniors work in teams on an actual project. Students will be encouraged to use their creativity, innovation, curiosity and educational foundation to solve complex real-world problems.

**Prerequisite:** ENV 4453.**ENV 4893 Environmental Engineering Design 2 3 Credits****Grading Scheme:** Letter Grade

The second semester of a two-semester capstone design experience where environmental engineering seniors work in teams on an actual project. Students will be encouraged to use their creativity, innovation, curiosity and educational foundation to solve complex real-world problems.

**Prerequisite:** ENV 4892.**ENV 4905 Individual Studies in Environmental Engineering Sciences 1-4 Credits****Grading Scheme:** Letter Grade

Selected problems or projects in the student's major field of study.

**ENV 4912 Integrated Product and Process Design 1: Environmental Engineering Sciences 3 Credits**

**Grading Scheme:** Letter Grade

The first part of a two-course sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes-on time and within budget. Working closely with industry liaison engineers and a faculty coach, students gain practical experience in teamwork and communication, problem solving and engineering design, and develop leadership, management and people skills.

**Prerequisite:** ENV 4514C;

**Corequisite:** ENV 4121 or ENV 4351.

**ENV 4913 Integrated Product and Process Design 2: Environmental Engineering Sciences 3 Credits**

**Grading Scheme:** Letter Grade

The second part of the sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes-on time and within budget. Working closely with industry liaison engineers and a faculty coach, students gain practical experience in teamwork and communication, problem solving and engineering design, and develop leadership, management and people skills.

**Prerequisite:** ENV 4912.

**ENV 4932 Special Problems in Environmental Engineering Sciences 1-4 Credits**

**Grading Scheme:** Letter Grade

Special problems in environmental engineering science.

**ENV 4949 Environmental Engineering Internship/Co-op 1-3 Credits**

**Grading Scheme:** S/U

Practical internship/co-op work experience under approved industrial supervision. (S/U)

**Prerequisite:** Engineering major.

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