

# Environmental Engineering (ENVE)

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**ENVE 111. Introduction to Environmental Engineering. 1 Credit.**

Introduction to the environmental engineering discipline; overview of the design process and pertinent regulations; exposure to professional ethics and licensure; and, development of technical, communication, and presentation skills. One 2 hr. lab per week.

**ENVE 112. Analysis and Design Methods for Environmental Engineers. 1 Credit.**

Exposure to real-life environmental design, analysis, and processes. This will include an overview of contemporary software, exposure to sustainability, cultural, global, environmental, social, risk, and economic considerations. 1 three-hour lab.

**ENVE 240. Microbiological Principles for Environmental Engineers. 3 Credits.**

Overview of microbiology for natural and engineered systems; fundamentals of microbiology for water/wastewater treatment and hazardous waste remediation; microbial risk assessment; microbial kinetics. 3 one-hour lectures.

**ENVE 250. Fundamentals of Environmental Engineering. 3 Credits.**

Fundamental principles in environmental engineering; basic principles of calculation; introduction to mass and energy balances; chemical stoichiometry; biology, microbiology, biochemistry, and enzyme kinetics; risk and uncertainty; and, fundamental concepts for assessing sustainability. 3 one-hour lectures. Prereq: MATH 165.

**ENVE 360. Environmental Chemistry for Water and Wastewater. 3 Credits.**

Chemical principles applied to surface water quality issues in water supply, wastewater treatment, natural water/pollution. Includes coverage of organic loads, trace metals, organic compounds, nutrients, solids, disinfectants, and dissolved oxygen. 3 one-hour lectures. Co-req: CHEM 240.

**ENVE 370. Sustainability Engineering. 3 Credits.**

Social, economic, and environmental aspects of sustainable design, including regulations; introduction to life cycle assessment and environmental impacts; overview of GIS and risk assessment; and use of probability and statistics to understand uncertainty. Prereq: ENVE 250.

**ENVE 412. Unit Operations and Processes. 2 Credits.**

Application of physical and chemical operations and biological processes in environmental engineering. Topics include biokinetics, coagulation/flocculation, absorption, gas stripping, and bench-scale projects. 1 one-hour lecture and 1 three-hour lab. Prereq: CE 309 and ENVE 360.

**ENVE 450. Environmental Engineering Chemistry Laboratory. 1 Credit.**

Water chemistry laboratory; technical communication and statistical analyses. 1 three-hour laboratory. Prereq: ENVE 360 and coreq: ENGL 321.

**ENVE 460. Environmental Fate and Transport. 3 Credits.**

Introduction to the major physical, chemical, and biological processes of pollutant transformation and transport between air, water, and the subsurface. Three, one-hour lectures. Prereq: CE 309 and ENVE 360.

**ENVE 468. Plastics Pollution to Solution. 3 Credits.**

Detailed understanding of plastics pollution, health and environmental impacts, plastics degradation, micro and nanoplastics fate and transport, challenges with plastics recycling, laws and regulations on plastics waste minimization. Prereq: ENVE 360 or CE 370. {Also offered for graduate credit - see ENVE 668.}.

**ENVE 473. Air Pollution. 3 Credits.**

Air quality management issues and regulations, sources of air pollutants, meteorology as it applies to air quality, chemistry, and physics of air pollutant transport and transformations, and air pollutant dispersion modeling. Prereq: CE 370 or (ENVE 460 and ENVE 412).

**ENVE 488. Senior Design I. 2 Credits.**

Application of cumulative knowledge gained during academic career towards the design of environmental systems for the minimization, treatment/disposal, and/or destruction of wastes across all pertinent media. Initial preliminary design incorporate economic, social, environmental, regulatory, sustainable, and risk-based analyses and requirements; along with ethical judgement. Two, 3-hour labs (studio style). Prereq: ENVE 412 and consent of instructor.

**ENVE 489. Senior Design II. 2 Credits.**

Application of cumulative knowledge gained during the academic career towards the design of environmental systems for the minimization, treatment/disposal, and/or destruction of wastes across all pertinent media. Field, lab, and/or literature work/data collection/experimentation will be undertaken by the design teams to collect data needed for the final design of the project begun during ENVE 488. Final designs will incorporate economic, social, environmental, regulatory, sustainable, life-cycle, and risk-based/uncertainty analyses and requirements; along with ethical judgement. Two, 3-hour labs (studio style). Prereq: ENVE 488.

**ENVE 668. Plastics Pollution to Solution. 3 Credits.**

Detailed understanding of plastics pollution, health and environmental impacts, plastics degradation, micro and nanoplastics fate and transport, challenges with plastics recycling, laws and regulations on plastics waste minimization. {Also offered for undergraduate credit - see ENVE 468.}.