

# ENVIRONMENTAL ENGINEERING (ENVE)

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## ENVE 501

### Environmental Chemistry

Chemical processes in environmental systems with an emphasis on equilibrium conditions in aquatic systems. Processes examined include acid-base, dissolution precipitation, air-water exchange, and oxidation-reduction reactions. Methods presented for describing chemical speciation include analytical and graphical techniques as well as computer models.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 506

### Chemodynamics

Processes that determine the fate and transport of contaminants in the environment. Upon successful completion of this course, students should be able to formulate creative, comprehensive solutions to transport problems, critically evaluate proposed solutions to transport problems, and acquire and integrate new information to build on these fundamentals.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 513

### Biotechnological Processes in Environmental Engineering

Fundamentals and applications of biological mixed culture processes for air, water, wastewater, and hazardous waste treatment. Topics include biochemical reactions, stoichiometry, enzyme and microbial kinetics, detoxification of toxic chemicals, and suspended growth and attached growth treatment processes. The processes discussed include activated sludge process and its modifications, biofilm processes including trickling filters and biofilters, nitrogen and phosphorous removal processes, sludge treatment processes including mesophilic and thermophilic systems, and natural systems including wetlands and lagoons.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 528

### Modeling of Environmental Systems

To introduce students to mathematical modeling as a basic tool for problem solving in engineering and research. Environmental problems will be used as examples to illustrate the procedures of model development, solution techniques, and computer programming. These models will then be used to demonstrate the application of the models including simulation, parameter estimation, and experimental design. The goal is to show that mathematical modeling is not only a useful tool but also an integral part of process engineering.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 542

### Physicochemical Processes in Environmental Engineering

Fundamentals and applications of physicochemical processes used in air, water, wastewater, and hazardous waste treatment systems. Topics include reaction kinetics and reactors, particle characterization, coagulation and flocculation, sedimentation, filtration, membrane separation, adsorption, and absorption.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 551

### Industrial Waste Treatment

Industrial waste sources and characteristics, significance of industrial waste as environmental pollutants; applications of standard and special treatment processes including physical, chemical, and biological systems.

**Prerequisite(s):** [(ENVE 513\*) OR (ENVE 542\*)]An asterisk (\*) designates a course which may be taken concurrently.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 561

### Design of Environmental Engineering Processes

Design of water and wastewater treatment systems. System economics and optimal design principles.

**Prerequisite(s):** [(ENVE 513\*) OR (ENVE 542\*)]An asterisk (\*) designates a course which may be taken concurrently.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 570

### Air Pollution Meteorology

Physical processes associated with the dispersion of windborne materials from industrial and other sources. Atmospheric motion including turbulence and diffusion, mathematical models, and environmental impact assessment.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 576

### Indoor Air Pollution

Indoor air pollution sources, indoor pollutant levels, monitoring instruments and designs, and indoor pollution control strategies; source control, control equipment and ventilation; energy conservation and indoor air pollution; exposure studies and population time budgets; effects of indoor air pollution; risk analysis; models for predicting source emission rates and their impact on indoor air environments.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 577

### Design of Air Pollution Control Devices

Principles and modern practices employed in the design of engineering systems for the removal of pollutants. Design of control devices based on physical and chemical characteristics of polluted gas streams.

**Lecture: 3 Lab: 0 Credits: 3**

## ENVE 578

### Physical and Chemical Processes for Industrial Gas Cleaning

Application of physical and chemical processes in the design of air treatment systems; fundamentals of standard and special treatment processes.

**Lecture: 3 Lab: 0 Credits: 3**

**ENVE 580**

**Hazardous Waste Engineering**

Sources and characteristics of hazardous wastes, legal aspects of hazardous waste management, significance of hazardous wastes as air, water, and soil pollutants. Principles and applications of conventional and specialized hazardous waste control technologies.

**Prerequisite(s):** [(ENVE 506\*)]An asterisk (\*) designates a course which may be taken concurrently.

**Lecture: 3 Lab: 0 Credits: 3**

**ENVE 590**

**Environmental Engineering Seminar**

Current topics in environmental engineering featuring presentations by practitioners from a range of institutions such as academia, industry, consulting, research laboratories, or government.

**Lecture: 0 Lab: 0 Credits: 0**

**ENVE 591**

**Research and Thesis M.S.**

Graduate research.

**Credit:** Variable

**ENVE 597**

**Special Problems**

Independent study and project. (Variable credit)

**Credit:** Variable

**ENVE 691**

**Research and Thesis Ph.D.**

Graduate research.

**Credit:** Variable