

ENVIRONMENTAL ENGINEERING (ENVE)

ENVE 310

Introduction to Environmental Engineering

This course provides an overview of how environmental engineers integrate biological, chemical, and physical sciences with engineering to develop solutions to environmental problems. Topics include air pollution, water pollution, solid waste, fate and transport of contaminants, and pollution prevention.

Lecture: 3 Lab: 0 Credits: 3

ENVE 401

Introduction to Water-Resources Engineering

The theory and practice involved in planning and design of urban water systems are introduced in this course. Topics include storm water management, water supply distribution, and waste water collection and transport systems.

Lecture: 3 Lab: 0 Credits: 3

ENVE 404

Water and Wastewater Engineering

Water quality and water supply issues make up this course including the physical, chemical, and biological processes involved in water treatment. Process design, operations, and management are also considered.

Lecture: 3 Lab: 0 Credits: 3

ENVE 463

Introduction to Air Pollution Control

Air pollution sources and characteristics of source emissions, atmospheric reactions, effects of pollutants, and techniques of emission control are presented in this course. Legal and administrative aspects of air pollution control are also described.

Lecture: 3 Lab: 0 Credits: 3

ENVE 476

Engineering Control of Industrial Hazards

Design of control systems to enhance occupational safety and health; how to recognize and control existing or potential safety and health hazards.

Prerequisite(s): ENVE 426*, An asterisk (*) designates a course which may be taken concurrently.

Lecture: 3 Lab: 0 Credits: 3

ENVE 485

Industrial Ecology

This course provides an overview of industrial ecology, the study of the science and engineering relationships between cultural and ecological systems, and how those relationships can be managed to achieve a more sustainable economy. Because it is an interdisciplinary field, topics include technology (science and engineering), public policy and regulatory issues, and business administration.

Lecture: 3 Lab: 0 Credits: 3

ENVE 497

Special Project

Special design project under individual supervision of instructor. Consent of instructor is required.

Credit: Variable

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* with min. grade of C or ENVE 542* with min. grade of C, 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* with min. grade of C or ENVE 542* with min. grade of C, 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 population; 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* with min. grade of C, An asterisk (*) designates a course which may be taken concurrently.

Lecture: 3 Lab: 0 Credits: 3

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