ENV. ENVIRONMENTAL ENGINEERING

ENV-198/298/398. TOPICS IN ENV
Credits: Varies with topic

Selected topics in the field of engineering and related areas. The may include the following topics: mechanical engineering; civil engineering; engineering management; geotechnology; and radiation.

Pre-Requisites
Permission of the instructor.

ENV-395/396. INDEPENDENT RESEARCH
Credits: Varies with topic 1-3 credits.
Independent study or research for advanced students in the field of their major under the direction of a departmental faculty member.

Pre-Requisites
Approval of department chair and academic advisor.

ENV-201. ENVIRONMENTAL ENGINEERING SYSTEMS I: CHEMICAL KINETICS AND STATISTICAL METHODS
Credits: 1
This course focuses on understanding the factors that control species behavior in environmental systems and provides the foundation for estimating pollutant concentrations and their fate in the environment. This course also provides an introduction of central ideas of probability and statistics and their application in the analysis of environmental data and information. One hour of lecture and one hour of discussion per week.

Pre-Requisites
[[CHM-113]], [[CHM-115]] or instructor's permission.

ENV-202. ENVIRONMENTAL ENGINEERING SYSTEMS II: ANALYTICAL AND COMPUTATIONAL ANALYSIS
Credits: 2
This course focuses on basic methods for obtaining numerical solutions of algebraic and transcendental equations, simultaneous linear equations, and curve fitting techniques; examples provided are relevant to environmental engineering processes; will include an introduction to problem-solving using Excel and MATLAB. Two hours of lab per week.

Pre-Requisites
[[MTH-111]], [[MTH-112]] or instructor's permission.

ENV-205. ENVIRONMENTAL MICROBIOLOGY
Credits: 1
The foundational concepts in microbiology that are important in environmental systems will be explored in this course. This will include the function and formation of cellular components starting from basic molecules (carbohydrates, fatty acids, amino acids, and nucleotides) to the cellular structures that are formed (membranes, proteins, and the nucleic acids RNA & DNA); carbon, energy, and nutrient sources required for cellular growth; and the metabolic pathways for substrates common in environmental systems will be shown. Biodegradation and growth kinetic models will be introduced.

Pre-Requisites
Permission of the instructor.

ENV-298. TOPICS
Credits: Varies with topic
Selected topics in the field of engineering and related areas. The may include the following topics: mechanical engineering; civil engineering; engineering management; geotechnology; and radiation.

Pre-Requisites
Permission of the instructor.

ENV-301. ENVIRONMENTAL ENGINEERING SYSTEMS III: ADVANCED UNIT OPERATIONS AND PROCESSES
Credits: 1
Examination of unit operations and processes encountered in the environmental engineering field that will assist in the design and operation of advanced water, wastewater, and waste management treatment systems. One hour of lecture and one hour discussion per week.

Pre-Requisites
[[ENV-240]]
Co-Requisites
[[ENV-305]], [[ENV-351]] or instructor's permission.

ENV-305. SOLID WASTE MANAGEMENT
Credits: 3
Assessment of the scope of the solid waste problem and engineering and management strategies. Lecture topics include the following: solid waste sources; characterization and generation rates; collection and transportation technologies and management options; sanitary landfill design and operation; and recycling strategies and technologies. Three hours of lecture per week.

Pre-Requisites
[[EES-240]], [[CHM-116]] or [[EES-202]], or permission of the instructor.
ENV-315. SOILS
Credits: 3
Study of the structure, properties, and classification of soils. Fundamental concepts of soils science are applied to the environmental management of terrestrial ecosystems. Topics include soil genesis, the classification, and physical properties of soils, soil chemistry, and soil moisture relationships. Two hours of lecture and three hours of lab per week. Click here for course fees.

Pre-Requisites
[[EES-211]], [[CHM-116]] or [[EES-202]].

ENV-321. HYDROLOGY
Credits: 4
A quantitative analysis of the physical elements and processes that constitute the hydrologic cycle. Topics include precipitation, infiltration, evaporation, runoff, streamflow, and ground water flow. Ground water modeling and advanced treatment of Darcy’s Law is presented within the context of migration of ground water pollutants. Three hours of lecture and three hours of lab per week. Click here for course fees.

Pre-Requisites
[[EES-211]].

ENV-322. WATER RESOURCES ENGINEERING
Credits: 3
Design and development of selected projects in the various fields of engineering under the direction of a staff member. Technical as well as economic factors will be considered in the design. A detailed progress report is required. Three hours of lecture per week.

Pre-Requisites
[[ENV-321]].

ENV-330. WATER QUALITY
Credits: 4
The physical, chemical, and biological processes that affect the quality of water in the natural environment. The measurement of water quality parameters in water and wastes. The behavior of contaminants in ground and surface water. Three hours of lecture and three hours of lab per week. Click here for course fees.

Pre-Requisites
[[CHM-116]] or [[EES-202]], [[EES-240]].

ENV-332. AIR QUALITY
Credits: 3
Study of atmospheric pollutants, their sources and effects; measurement and monitoring techniques for air pollutants; atmospheric chemical transformations; regulatory control of air pollution; meteorology of air pollution; transport and dispersion of air pollutants; and introduction to indoor air pollution. Lab work includes both problem-oriented and hands-on exercises. Exercises include basic gas concepts, volume measuring devices, flow, velocity, and pressure measuring devices, calibration of such devices, and various sampling techniques. Two hours of lecture and three hours of lab per week. Click here for course fees.

Pre-Requisites
[[CHM-116]] or [[EES-202]], [[EES-240]].

ENV-351. WATER AND WASTEWATER TREATMENT
Credits: 4
Design of water and wastewater treatment systems. Estimation of demands. Physical, chemical, biological, and land-based treatment processes. Sludge handling and disposal. Three hours of lecture and three hours of lab per week. Click here for course fees.

Pre-Requisites
[[ENV-330]].

ENV-352. ENVIRONMENTAL ENGINEERING HYDRAULICS
Credits: 3
Water distribution, sewage collections, pipe network models, piping materials, pumps and pumping stations, valves and tanks. Design and operation. Three hours of lecture per week.

Pre-Requisites
[[ME-321]].

ENV-353. AIR POLLUTION CONTROL
Credits: 3
This course provides the philosophy and procedures for design of air pollution control systems. Methods used for controlling air-borne emissions of gases, aerosols, and organic vapors are covered. Designs are carried out based on data for typical systems. Evaluations of alternatives with cost comparisons are also presented. Three hours of lecture per week.

Pre-Requisites
[[ENV-332]].

ENV-354. HAZARDOUS WASTE MANAGEMENT
Credits: 3
An overview and application of engineering principles to management of hazardous wastes and the remediation of contaminated sites. Introduction to regulatory compliance and environmental laws. Three hours of lecture per week.

Pre-Requisites
[[ENV-351]] or permission of the instructor.
ENV-373. OCCUPATIONAL HEALTH
Credits: 3
Appraisal of environmental health hazards, sampling techniques, instrumentation and analytic methods. Principles of substitution, enclosure, and isolation for the control of hazardous operations in industry. Three hours of lecture and demonstration per week. Requirement: Junior or senior standing in engineering.

ENV-391. SENIOR PROJECTS I
Credits: 1
Design and development of selected projects in the various fields of engineering under the direction of a staff member. Technical as well as economic factors will be considered in the design. A professional paper and detailed progress report are required. Requirement: Senior standing and department permission. (See the department for more details about the department permission.)
Click here for course fees.

ENV-392. SENIOR PROJECTS II
Credits: 2
Design and development of selected projects in the field of engineering under the direction of a staff member. Technical as well as economic factors will be considered in the design. This is a continuation of [[ENV-391]]. A professional paper to be presented and discussed in an open forum is required.
Click here for course fees.

Pre-Requisites
[[ENV-391]].

ENV-397. SEMINAR
Credits: 1-3
Presentations and discussions of selected topics and projects. Requirement: Senior standing in environmental engineering.

ENV-398. TOPICS
Credits: Varies with topic
Selected topics in the field of engineering and related areas. The may include the following topics: mechanical engineering; civil engineering; engineering management; geotechnology; and radiation.
Click here course fee.

Pre-Requisites
Permission of the instructor.

ENV-399. COOPERATIVE EDUCATION
Credits: 1-6
Professional cooperative education placement in a private or public organization related to the student's academic objectives and career goals. In addition to their work experiences, students are required to submit weekly reaction papers and an academic project to a Faculty Coordinator in the student's discipline. See the Cooperative Education section of this bulletin for placement procedures.

Pre-Requisites
Sophomore standing; minimum 2.0 cumulative GPA; consent of the academic advisor; and approval of placement by the department chairperson.