ENVE F446  Biological Unit Processes  
3 Credits 
Offered Spring Even-numbered Years 
Theoretical and applied aspects of biological wastewater treatment, including waste-activated sludge processes, trickling filters, lagoons, sludge digestion and processing, nutrient removal, biology of polluted waters, state and federal regulations. 
Prerequisites: MATH F302. 
Recommended: CE F341. 
Stacked with ENVE F646. 
Lecture + Lab + Other: 3 + 0 + 0 

ENVE F641  Aquatic Chemistry  
3 Credits 
Offered As Demand Warrants 
Chemistry of aquatic systems, including the development of equilibrium and kinetic models to understanding the speciation, transformation and partitioning of inorganic chemical species in aqueous systems. Emphasis is on the study of acid-base chemistry, complexation, precipitation-dissolution and reduction-oxidation reactions. 
Prerequisites: Graduate standing. 
Cross-listed with CHEM F605. 
Lecture + Lab + Other: 3 + 0 + 0 

ENVE F642  Contaminant Hydrology  
3 Credits 
Offered Spring Odd-numbered Years 
Theoretical and applied aspects of the movement of contaminants through saturated and unsaturated soil. 
Recommended: CE F663 or equivalent; graduate standing; or permission of instructor. 
Lecture + Lab + Other: 3 + 0 + 0 

ENVE F643  Air Pollution Management  
3 Credits 
Offered Spring 
Major principles and problems associated with air quality, stationary and moving sources, air pollution effects; major air pollution legislation and compliance calculations; meteorology and modeling of pollutant concentrations near a source; greenhouse gas emissions and climate change; control equipment and design of control strategies for specific air pollution problems. 
Prerequisites: CHEM F106X; graduate standing; Recommended: MATH F252X. 
Stacked with CE F443. 
Lecture + Lab + Other: 3 + 0 + 0 

ENVE F644  Environmental Management and Permitting  
3 Credits 
Offered Spring Odd-numbered Years 
Topics of environmental impact statements, environmental law (local, state and federal), public involvement and environmental quality. Impact from projects of mining, highways, airports, pipelines, industrial development, water, wastewater and solid waste, and others--theoretical considerations and case studies. 
Recommended: Graduate standing or permission of instructor. 
Lecture + Lab + Other: 3 + 0 + 0
ENVE F652  Introduction to Toxicology for Engineers and Scientists  
3 Credits  
Offered Fall Even-numbered Years  
Introduction to the science of toxicology for graduate students in fields that use information about hazardous chemicals for input into decisions. Topics include an overview of the effects of chemicals on cells, organs and organ systems, and the toxic effects of classes of chemicals such as pesticides, metals and solvents. Use of data from animal testing and common lists, factors and extrapolation are reviewed.  
**Recommended:** Undergraduate degree in engineering or natural science.  
**Lecture + Lab + Other:** 3 + 0 + 0

ENVE F653  Environmental Measurements Laboratory  
1 Credit  
Offered Spring  
Introduction to analytical methods and measurement techniques used in environmental engineering and environmental quality science. Students will design, conduct and report on a laboratory experiment. Includes sample preparation techniques and analytical methods such as microscopy, atomic adsorption spectroscopy, gas chromatography, liquid chromatography and mass spectrometry.  
**Recommended:** ENVE F641.  
**Lecture + Lab + Other:** 0 + 3 + 0

ENVE F698  Non-thesis Research/Project  
1-9 Credits  
**Lecture + Lab + Other:** 0 + 0 + 1-9

ENVE F699  Thesis  
1-12 Credits  
**Lecture + Lab + Other:** 0 + 0 + 1-12