Natural Resources and the Environment (NRE)

nre.uconn.edu

5115. Field Methods in Hydrogeology

Three credits. Prerequisite: Not open for credit to students who have passed GEOL 5790.

Field methods associated with ground water and contamination assessments.

5135. Water Transport in Soils

Three credits.

Application of the principles of transport of water in soil for various physical properties of soils and fluids, initial conditions and boundary conditions. The differential equations describing the movement of energy and mass for both saturated and unsaturated flow conditions will be applied to soil evaporation and plant transpiration, infiltration and percolation of wetting fronts, and movement of tracers and chemical constituents of water. Both uniform flow and preferential flow will be examined.

5145. Environmental Biophysics

Three credits.

Gas laws and transport processes. Radiation environment. Momentum, heat, and mass transfer. Steady-state and transient energy balance. Microclimate of plants and animals. Physical and physiological interactions between plants/animals and their environment.

5150. Ecosystem Science and Management

Three credits. Prerequisite: Instructor consent.

Ecosystem biogeochemical processes, the organism-environment interactions that regulate them, and natural resources management strategies that explicitly consider ecosystem structure and function.

5155. Principles of Nonpoint Source Pollution

Three credits.

An advanced investigation of sources, impacts, modeling and management of nonpoint sources of water pollution.

5165. Advanced Ground Water Hydrology

Three credits. Prerequisite: Not open for credit to students who have passed GSCI 5710.

Covers ground water resource assessment, management and protection, understanding the flow of ground water in fractured rock, application of tracer studies in evaluating flow conditions.

5175. Climate and Environmental Systems Modeling

Three credits. Prerequisite: Instructor consent. Recommended preparation: Undergraduate Calculus I, II.

How physical processes in climate and environmental systems - such as atmospheric motion, hydrological processes and transport of atmospheric constituents - are represented in numerical models. Topics include classification of numerical models, steps in climate and environmental (mathematical) modeling, conservation theories of mass and energy, mass balance equations, numerical techniques, and initial and boundary conditions.

5200. Sustainable Natural Resources Management

Three credits. Prerequisite: Instructor consent.

Explores social-ecological systems, including relationships between ecosystem services and human well-being and livelihoods; introduces systems theory for understanding disturbance, feedbacks, thresholds, directional change, adaptation and resilience in social-ecological systems; includes applied case studies in sustainable agriculture, fisheries, forestry, freshwater, marine, and wildlife.

5205. Decision Methods in Natural Resources

Three credits. Prerequisite: Instructor consent.

Aspects and methods of decision making for individuals, organizations, and institutions, including structured decision making, adaptive resource management, and organizational learning; concepts and techniques for managing risk and uncertainty, model-based and experience-based approaches to link alternative actions and consequences, tradeoff and optimization approaches, and monitoring and evaluation of resulting outcomes.

5210. Communications for Environmental Decision Makers

Three credits. Prerequisite: Instructor consent.

Methods and techniques for effective communication with diverse audiences using written, spoken, and digital media; includes conflict resolution, crisis situations, persuasion, negotiation, marketing and advocacy.

5215. Introduction to Geospatial Analysis with Remote Sensing

Three credits.

Introduction to collecting, managing, displaying, and analyzing geospatial data. Topics include coordinate systems, finding and using existing sources of geospatial data, analysis of vector and raster data, creating geospatial data with remote sensing, concepts of Global Positioning System (GPS), topographic and landscape analyses, and spatial interpolation.

5220. Environmental Planning for Sustainable Communities and Regions

Three credits. Prerequisite: Instructor consent.

Principles of environmental planning with application to human health, natural areas, working landscapes, and built environments; basis and context for planning, including laws, regulations, zoning, compliance, uncertainty, and risk management.

5252. Physiology and Ecology of Trees

Three credits. Prerequisite: Instructor consent.

An examination of the interactions between trees and their environment at the molecular, individual and forest stand scales. Lectures and reviews of current research span at least two spatial scales of organization for each course topic. Course topics include tree carbon balance, water relations, mineral nutrition, morphology, genomics, phenology, climate change and modeling. Also offered as PLSC 5252.

5325. Wildlife Management

Variable (1-6) credits.

The application of ecological principles as practiced by natural resource agencies throughout North America.

5335. Advanced Stream Ecology

Variable (2-3) credits. Prerequisite: Instructor consent.

Introduction to the current state of knowledge and research in rivers and streams. Topics include both basic structure and function of stream habitats and biotic assemblages as well as branch into the management and conservation applications of ecological information. Term project and paper is required. Students with previous stream ecology coursework (such as NRME 3205) may take the course for two credits and attend the single weekly meeting. Students lacking a basic introduction to stream ecology may take the course for three credits and will attend NRME 3205 lectures in addition to the weekly meeting.

5390. Advanced Wetland Ecology

Three credits. Two class periods and one three hour laboratory. Prerequisite: Instructor consent. Recommended preparation: prior coursework in ecology and wetland science.

The current state of wetlands research and field methods used to quantify wetland vegetation, hydrology, and soils. Discussions of the primary literature will be complemented by field trips to a variety of wetlands to implement field techniques and explore wetland natural history, classification, biogeochemistry, and responses to anthropogenic stressors.

5461. Landscape Ecology

Three credits.

Interdisciplinary focus on the effect of landscape pattern on environmental processes and conditions and the influence of disturbance and underlying geomorphology on landscape pattern. Consideration of landscape ecology principles in planning and management of pattern and processes in which conservation and production land uses are intermingled.

5535. Remote Sensing Image Processing

Three credits. Prerequisite: A course in remote sensing of the environment.

A variety of related topics that include the physical processes involved in remote sensing and various image processing methods. The labs will be primarily focused on how to use image processing software (e.g., ENVI) to analyze satellite imagery.

5545. Quantitative Remote Sensing Methods

Three credits. Prerequisite: A course in remote sensing image processing.

Quantitative remote sensing methods for solving real-world problems, and methods for quantitative analysis of remotely sensed imagery plus various remote sensing applications.

5555. GPS Surveying

Three credits.

Theory and practice of global positioning system (GPS) surveying. Includes network design, control, geodectic coordinate systems, field collection of measurements, data processing, and interpretation of results.

5560. High Resolution Remote Sensing: Applications of UAS and LiDAR

Three credits.

Introduction to high-resolution remote sensing data and collection platforms. The first half of the course focuses on unmanned aerial systems (UAS) including operations, data collection, and post-processing of acquired data. Topics include laws, safety, and ethical considerations; mission planning, sensor selection, and photogrammetric processing of the collected data in commercial software. The second half of the course focuses on the fundamentals of light detection and ranging (LiDAR) and applications of LiDAR in mapping and environmental analysis. Topics include LiDAR point-cloud visualization and interpretation, creation of digital elevation and surface models, and feature extraction using ArcGIS and LAS Tools.

5575. Natural Resource Applications of Geographic Information Systems

Four credits. Prerequisite: Instructor consent. Not open for credit to students who have passed NRE 4575.

The principles and applications of computer-assisted spatial data analysis in natural resources management will be covered. Both hypothetical and actual case studies of the use of geographic information systems (GIS) to solve natural resource problems will be discussed. Raster- and vector-oriented, microcomputer-based GIS software will serve as the hands-on tools for students.

5585. Python Scripting for Geospatial Analysis

Three credits.

GIS scripting techniques in Python for geospatial analyses, enabling students to pursue integrated research in earth resources data geoprocessing applications.5610. Technical Writing and LaTeX

Variable (2-3) credits.

Students learn how to write technical articles and theses using the LaTeX document preparation system. Subjects include grammar, punctuation, technical-writing style elements, citations and bibliographies, plagiarism, and LaTeX. Students are required to install LaTeX on a computer in order to complete assignments. English language learners may take the course for three units with permission of the instructor.

5694. Natural Resources Seminar

One credit. May be repeated for a total of four credits.

Active participation in weekly natural resources seminars given by invited speakers.

5695. Special Topics in Natural Resources

Variable (1-4) credits. Prerequisite: Instructor consent. May be repeated for a total of six credits.

Advanced topics in the field of natural resources. Topics and credits to be published prior to the registration period preceding the semester offerings.

5698. Natural Resources Colloquium

Variable (1-6) credits. May be repeated for a total of six credits.

Study and discussion of readings (journal articles, books, current research) on a selected topic in natural resources.

5699. Independent Study

Variable (1-3) credits. Prerequisite: Instructor consent. May be repeated for credit.

5800. Graduate Seminar

One credit. May be repeated for a total of four credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

The mechanism of presenting and moderating a professional presentation. Topics include presentation, organization, speaking skills, use of media technology, formulation of questions, and moderator activities.

6000. Research Methods in Natural Resources

Three credits.

General research techniques, writing scientific articles and grant proposals, problem solving approaches, experimental design and modeling concepts, and research ethics.

6135. Small Watershed Modeling

Three credits.

Mathematical modeling of hydrologic processes in small watersheds and aquatic systems. Solutions of mass balance and flow relationships. Investigation of dynamic relationships among variables. Examples include infiltration, overland flow, channel routing, chemical transport and transformations, surface-subsurface interactions and biotic growth and degradation.

6175. Ground Water Modeling Applications

Three credits. Not open for credit to students who have passed GSCI 5720.

Application of Modflow to ground water flow and contaminant problems. Well head protection modeling.

6450. Teaching Practicum

Three credits. Prerequisite: Instructor consent. May be repeated for a total of six credits. Students taking this course will be assigned a final grade of S (satisfactory) or U (unsatisfactory).

Doctoral students in the Natural Resources: Land, Water, and Air program take primary teaching responsibility for a course under the supervision of a faculty liaison.