

Undergraduate Water-Related Courses

See [Virginia Tech Undergraduate Academic Catalog](#) for more information.

AAEC 3314 Environmental Law

Principles of law involved in environmental issues, survey of environmental litigation, legislation and administrative rulings. Law topics include natural resources, water pollution, private land use, air pollution, toxic substance, food, drug, pesticides, and biotechnology. Spring semester.

AAEC 3324 Environment and Sustainable Development Economics

Sustainable development through an exploration of hard and soft green schools of thought. Hard Green Strategies – reliance on markets, technology, property rights, human ingenuity to increase production efficiency versus Soft Green Strategies-adoption of simpler lifestyles, government subsidies, natural design of buildings (biomimicry), and urban infrastructure to locate public transportation hubs nearest to densely populated neighborhoods to decrease consumption of natural resources. Connecting the influence of place in personal and group identity. Interdisciplinary examination of environmental justice among poor and minority U.S. communities. Social equity distribution of the economic costs and benefits of natural resources management policies. Roles of property rights, economic incentives, religious values, and political power in determining local communities' capacity to control their environmental destiny. Spring semester.

AAEC 4314 Environmental Economic Analysis and Management

Quantitative methods and computer-aided tools used in the economic analysis of environmental/natural resource issues. Economic concepts and analytical tools will be applied to realistic, problem-solving situations. Topics include cost effectiveness analysis, benefit-cost analysis, economic simulations, and statistical analysis. Spring semester.

ALS/WATR 4614 Watershed Assessment, Management, and Policy

Multidisciplinary perspectives of assessment, management and policy issues for protecting and improving watershed ecosystems. Topics include: monitoring and modeling approaches for assessment, risk-based watershed assessment geographic information systems for watershed analysis, decision support systems and computerized decision tools for watershed management, policy alternatives for watershed protection, urban watersheds, and current issues in watershed management. Spring semester.

BIOL 4004 Freshwater Ecology

Interactions of physical, chemical, and biological properties of freshwater ecosystems. Fall semester.

BIOL 4014 Environmental Toxicology

Discussion of ecotoxicological and philosophical issues in the development of standards for control of toxic chemicals in freshwater, including site-specific examples, application

of current control methods, recovery of damaged ecosystems, and government regulations. Fall semester.

BIOL/ENT 4354 Aquatic Entomology

Biology, ecology and taxonomy of insects and other macroinvertebrates most encountered in freshwater environments. Selected aspects of biology, such as habitat, feeding, locomotion, and life history. Identification of individual taxa, mostly at family and genus level. A focus on field collection (2 required field trips) and taxonomic curation. Significance of these organisms in aquatic ecology, pollution monitoring, and natural resource management. An opportunity for professional taxonomic certification serves as the final exam. Spring semester

BSE 2304 Landscape Measurements and Modeling

Introduction to land surveying, computer-aided design, and drafting for land and water resources engineering. Representation of features in two and three dimensions for documentation and visualization of watershed engineering projects. Create plans, cross sections, detail drawings, and three-dimensional visualizations using computer-aided design and drafting tools. Spring semester.

BSE 2504 Introduction to Fluid Mechanics

Fluid properties. Hydrostatics. Bernoulli's equation. Derivation and application of the mass, momentum, and energy conservation equations for calculating flow rates, fluid forces, and head losses. Analyses of pipe flows and piping systems, and open channel flows. Pumps. Lift and drag. Application to biological and ecological systems. Spring semester.

BSE 3324 Small Watershed Hydrology

Precipitation, soil physics, infiltration, evapotranspiration, groundwater hydrology, overland flow, open channel flow, flow routing, hydraulic analysis. Fall Semester.

BSE 3334 Nonpoint Source Pollution Assessment and Control

Erosion prediction and control; transport and fate of sediment, nutrients, and microorganisms; design of nutrient management plans, wetlands, detention facilities and other management practices for rural and urban nonpoint source pollution control. Spring semester.

BSE 4224 Field Methods in Hydrology

Site characterization: surveying, channel and floodplain mapping, land use, electronic data acquisition. Techniques for measuring surface and subsurface hydrologic processes: water flow, hydrologic conductivity, precipitation, evaporation. Sampling techniques: surface water, groundwater, and soil pore water sampling. In-situ monitoring: automatic samplers, dataloggers, water quality sondes. Laboratory analyses: good laboratory practices, selection of analytical method, calibration, quality assurance/quality control. Fall semester.

BSE 4304: Introduction to Watershed Modeling

Hydrologic and hydraulic modeling using HEC-HMS and HEC-RAS. Fundamental concepts in hydrology: watershed delineation, design storm analysis, infiltration, runoff generation, green infrastructure, channel routing, and detention storage routing. Fundamental concepts in hydraulics: channel geometry, roughness, steady and unsteady flow, one-versus two-dimensional modeling, subcritical and supercritical flow, bridges and culverts, and ecological considerations. Design of detention basins using HEC-HMS. Design of bridge and culvert structures to pass design storms in HEC-RAS. Assessment of floodplain inundation in HEC-RAS. Model calibration. Spring semester.

BSE 4324 Applied Fluvial Geomorphology

Introduction to landscape evolution. Influence of geology and climate on stream form and processes. Fundamental river mechanics and sediment transport. Stream surveying and classification. River system response to changes in hydrology and sediment supply. Interactions between ecosystems and fluvial systems. Human impacts on stream systems. Fall semester.

BSE 4344 Geographic Information Systems for Engineers

Conceptual, technical, and operational aspects of geographic information systems (GIS) as a tool for storage, analysis, and presentation of spatial information. Focus on data and applications relevant to watershed and ecological engineering and analysis. Access public sources of spatial data including: hydrography, political boundaries, aerial photos, land cover, soil, and elevation (lidar). Digitize new data features from aerial photos. Delineate watersheds. Integrate Global Positioning System data into GIS to create topographic cross sections. Implement GIS to solve an independent watershed engineering problem. Spring semester.

BSE 4394 Water Supply & Sanitation in Developing Countries

Social, economic and engineering principles of water supply and sanitation in developing countries as affected by climate, cultural and sociological factors, and material and financial resources. Spring semester

CEE 3104 Introduction to Environmental Engineering

Overall view of environmental engineering with emphasis on hazardous waste management, water treatment, wastewater treatment, air pollution and its control, solid waste management, groundwater pollution and environmental regulations. Fall and spring semesters.

CEE 3304 Fluid Mechanics for Civil and Environmental Engineering

Introductory course in fluid mechanics. Includes concepts and measurements of fluid properties; computing hydrostatic and hydrodynamic forces on hydraulic structures; computing fluid pressures, discharges, and velocities; and determining energy losses in pipe flows. Course includes conducting hydraulic laboratory experiments and

demonstrations, analyzing and interpreting collected data, and preparing technical laboratory reports. Emphasizes the fundamentals of effective interpersonal, written, and visual communication skills for technical civil engineering reports. Fall and spring semesters.

CEE 3314 Water Resources Engineering

Open channel flow; hydrology; hydraulic modeling; hydraulic machinery and structures; laboratory experiments and demonstrations. Fall and spring semesters.

CEE 4104 Water & Wastewater Treatment Design

Design of municipal water and wastewater treatment plants. Emphasis on characterization of water and wastewater and physical, chemical, and biological treatment methods. Sludge processing advanced treatment methods and treatment plant hydraulics are considered. A grade of C- or better required in prerequisites. Fall semester.

CEE 4264 Sustainable Land Development

An introduction to the modern techniques for developing land while maintaining a focus on long-term sustainability. Topics include site layout, stormwater impact, air quality and microclimate, living resources, LEED and EarthCraft development standards. Fall semester.

CEE 4304 Hydrology

Precipitation, evaporation, consumptive use, infiltration; stream flow, flood routing; statistical analysis of hydrologic data, flood and drought forecasting, risk analysis, subsurface flow, well hydraulics, introduction to urban drainage design. Fall semester.

CEE 4314 Groundwater Resources

Fundamentals of groundwater hydrology; flow through porous media, both saturated and unsaturated; flow to wells in both confined and unconfined aquifers; seepage of groundwater to canals and field drains; analysis of aquifer test data to quantify flow and storage parameters; contaminants in groundwater, basic introduction to groundwater modeling. Fall semester.

CEE 4324 Open Channel Flow

Mechanics of open channel flow, including uniform flow, gradually varied flow, channel transitions, and unsteady flow. Fall semester.

CEE 4334 Hydraulic Structures

Hydraulic analysis and design of engineering structures for water control, including reservoirs, dams, spillways, spilling basins, drainage structures, and hydraulic models. Spring semester.

CEE 4344 Water Resources Planning

Analysis of the water resources planning process and the institutional framework for water resources management. Criteria and procedures for evaluating management alternatives are examined, with emphasis on assessment of economic and environmental impacts. Spring semester.

CEE 4394 Urban Water Sustainability

Coupled socio-hydrologic feedback loops and implications for water systems resilience. Urban water transitions theory and the evolution of water systems through time. Water productivity and the soft path for water. Ecosystem services. Urban water system challenges, including climate change, urbanization, equity and environmental justice, and water security. Centralized and distributed drinking water, stormwater, and wastewater treatment systems. Statistical analysis of urban water systems. Spring semester.

CSES 3114 /GEOS 3614 Soils

Characterization of soils as a natural resource emphasizing their physical, chemical, mineralogical, and biological properties in relation to nutrient availability, fertilization, plant growth, land-use management, waste application, soil and water quality, and food production. For CSES, ENSC, and related plant-and earth-science majors. Spring semester.

CSES 3614 Soil Physical and Hydrological Properties

Soil physical and mechanical properties and the physical processes controlling soil water retention and flow in agronomic and natural settings. Grain size distribution, weight-volume relationships, specific surface, electrical charge density, consistency, stress, compaction, rainfall runoff, water retention, steady/non-steady water flow in saturated/unsaturated soil, infiltration, bare soil evaporation, and soil water balance. Spring semester.

CSES 4854 Wetland Soils and Mitigation

Wetland soils as components of natural landscapes: biogeochemistry, hydrology, geomorphology, hydric soil indicators, and wetlands functions under various land uses. Soil and hydrologic factors important to wetland delineation and jurisdictional determination. Mitigation of wetland impacts with emphasis on restoration and creation. Outdoor lectures at local wetlands and a two-day long field trip to observe and identify wetland soils are mandatory. Fall semester.

CSES/GEOG/GEOS 3304 Geomorphology

Examines the variety of landforms that exist at the earth's surface. Detailed investigation of major processes operating at the earth's surface including: tectonic, weathering, fluvial, coastal, eolian, and glacial processes. Field excursion. Spring semester.

ENSC 3604 Fundamentals of Environmental Science

Interrelationships between human activities and the environment; provides national and global perspective; emphasis is on the physical, chemical, and biological principles and

processes that are essential to an understanding of human-environment interactions; the role of energy in human and natural systems; environmental legislation and human behavior. Fall semester.

ENSC 3634 Physics of Pollution

Physical processes that control the fate of pollutants in our land, air, and water resources. Types and sources of pollutants, physical processes in the soil-water-atmosphere continuum controlling the dispersion and deposition of pollutants, the movement of pollutants, including radionuclides, by surface and subsurface water flow in soils, and physics of disturbed soils. Fall semester.

ENSC 4314 Water Quality

Provide comprehensive information on the physical, chemical, biological, and anthropogenic factors affecting water quality, fate and transport of contaminants in water, water quality assessment and management, and current water quality policies. Spring semester.

ENSC 4414 Monitoring and Analysis of the Environment

Provides comprehensive hands-on-laboratory-and field-based experience and information on the principles and methods for field monitoring and sampling, as well the physical, chemical, and biological analysis of soil, surface water, groundwater, and solid wastes within the context of regulatory compliance. Optional 40-hour Hazards Materials (HAZMAT) training will be available. Spring semester.

ENSC/BIOL 4164 Environmental Microbiology

Ecology, physiology, and diversity of soil and aquatic microorganisms; incorporates the significance of these topics within the context of environmental applications such as bioremediation, wastewater treatment, control of plant- pathogens in agriculture, and pollution abatement in natural systems. The laboratory portion of the course will stress methodology development, isolation and characterization of microorganisms from natural and engineered systems, and examination of the roles of microorganisms in biogeochemical cycling. Spring semester.

ENSC/CHEM 4734 Environmental Soil Chemistry

Chemistry of inorganic and organic soil components with emphasis on environmental significance of soil solution-solid phase equilibria, sorption phenomena, ion exchange processes, reaction kinetics, redox reactions, and acidity and salinity processes. Spring semester.

ENSC/CSES 4324 Water Quality Lab

Teach students a variety of laboratory chemical and biological techniques for water quality analysis. Complementary to ENSC 4314. Spring semester.

ENT/BIOL/FIW 4484 Freshwater Biomonitoring

A focus on concepts and practices of freshwater ecology using macroinvertebrates to assess the environmental health of freshwater ecosystems. Field and data tools are used to learn how to detect different types of pollution and environmental stress on assemblages of organisms and the role of underlying ecological principles. Understanding of how biological studies are used in environmental regulation are emphasized. Study design, field and laboratory methods, data analysis and interpretation, verbal and written presentation of results serve as primary course mode of assessment. Even Fall semesters.

ESM 3024 Introduction to Fluid Mechanics

Fluid properties. Hydrostatics. Derivation and application of the mass, momentum, and energy conservation equations. Dimensional analysis and similitude. Introduction to analyses of pipe flows and piping systems, open channel flows, and fluid forces on solid bodies. Fall semester.

ESM 3034 Fluid Mechanics Laboratory

Introduction to experimental fluid mechanics. Dimensional analysis. Experiments on fluid properties, flow measurements, and flow visualization, including manometry, determining hydrostatic forces on submerged surfaces, applications of the impulse-momentum principle, velocity measurements, measuring drag forces, quantifying flow in channels. Modern data acquisition techniques. Fall semester.

FIW 4534 Ecology & Management of Wetland Systems

Introduction to the variety of wetland systems found in North America, though emphasis will focus on eastern and mid-Atlantic wetland systems. Origin and processes of formation of wetlands, functions and values of wetlands, wetland delineation, wetland classification, regulatory processes affecting wetlands. Objectives of and management techniques used to protect and/or manipulate wetland systems for wildlife and other human needs. Enrollment restricted to junior, seniors and graduate students. Fall semester.

FIW 4614 Fish Ecology

Interactions of fish with the physical and biological environment. Adaptations of organisms, populations, and communities. Impacts of human activities on major aquatic ecosystems and important fishes. Ecological principles for management of important sport, commercial, and prey fishes. Spring semester.

FIW 4624 Marine Ecology

Marine organism, biological, ecological, chemical and physical processes of marine ecosystems in open sea, coastal and benthic environments, research methods and models in marine ecosystem simulation; fisheries in a dynamic ecosystem: human interference and conservation. Spring semester.

FIW 4714 Fisheries Management

History, theory, and practice of fisheries management. Emphasis on basic strategies used in effective management and setting management objectives. Synthesis of fish population

dynamics and manipulation, habitat improvement, and human management to achieve objectives. Case studies of major fisheries. Spring semester.

FREC 3104 Principles of Watershed Hydrology

Study of hydrology in watersheds. Qualitative and quantitative principles of physical hydrological processes governing the movement, storage, and transformation of water on the Earth's surface as influenced by watershed characteristics, including human modifications. Fall semester.

FREC 4354 Forest Soil and Watershed Management

Properties and processes of soil and water in forests. Emphasis on management for the delivery of ecosystem services at local to global scales. Includes analysis and interpretation in field and laboratory. Fall semester.

FREC 4374 Forested Wetlands

Classifications, jurisdictional delineation, and management options of forested wetlands. Relationship of hydrology, soils, and vegetation to ecosystem processes, societal values, and management with regard to environmental and legal considerations and best management practices. Emphasis is on forested wetlands in the southern U.S., but national and international wetlands are included. Fall semester.

FREC 4784 Wetland Hydrology and Biogeochemistry

Water flows creating wetland hydrologic regime. Hydrologic controls on wetland processes. Linkages between hydrology and biogeochemical cycles. Carbon, nitrogen, phosphorus, and other element cycles within and across wetland boundaries. Field methods to assess hydrologic regime and biogeochemical cycles. Ecosystems services from hydrologic and biogeochemical processes. Applications of wetland hydrology and biogeochemistry in wetland restoration, delineation, and creation. Spring semester.

FREC/IS/PSCI 4174 Climate Change and the International Policy Framework

Science, causes and impacts of climate change. Mitigation and adaptation measures to address the causes and impacts of climate change. International climate change policy, with attention to the policy making process, in particular the role of the United Nations Framework Convention on Climate Change and climate negotiations. Science and diplomacy in climate negotiations to achieve successful outcomes. The ethical and social implications of climate change policies. Fall semester.

FREC/NR 4014 Natural Resources Economics

Examination of domestic and international natural resource use, exploitation, and degradation problems, with special focus on use of economics to understand why potential overuse of natural resources exists, and what policy options are available to correct these problems and ensure sustainable natural resource use over time. Water, forests, fisheries, land and exhaustible resources. Fall semester.

FREC/NR/LAR 2554 Leadership for Global Sustainability

Leadership principles and humanities perspectives that help examine and engage global sustainable development challenges such as climate change, food-water-energy nexus, rising middle class, circular economy, and environmental justice. Topics include collaboration, stories, conflict resolution, self-awareness, bias, equity, religion, hubris, globalism, and moral naturalism. Examine trade-offs among economic, environmental, and social dimensions of sustainable development. Integration and application of disciplinary topics including ethics, ecology, evolution, anthropology, economics, religion, aesthetics, and risk management. Fall and spring semesters.

FREC/SBIO 2784 Global Forest Sustainability

A socio-economic approach to examining the management and use of the world's forests, enhance knowledge of global forest resources and products, and understand the roles and relationships of key stakeholders. Fall semester.

FREC/WATR 3104 Principles of Watershed Hydrology

Study of hydrology in watersheds. Qualitative and quantitative principles of physical hydrological processes governing the movement, storage, and transformation of water on the Earth's surface as influenced by watershed characteristics, including human modifications. Spring semester.

FREC/WATR 3754 Watersheds and Water Quality Monitoring

Delivery of water quality constituents from watersheds to water bodies (streams, lakes, and estuaries). Field monitoring methods to assess watershed drivers and how they affect water quality and aquatic ecosystem condition. Linkages among water quality, watershed characteristics, land use and management, and climate. Design of watershed monitoring programs to guide watershed management for protecting water quality and ecological condition of aquatic systems. Fall semester.

FREC/WATR 4244 Hydroinformatics

Analysis and examination of hydrologic data using basic statistics and computer programming. Calculation and interpretation of flow frequency and duration, hydrologic analysis of geospatial digital terrain data, and implementation and analysis of simple hydrologic models. Advanced methods of temporal and spatial hydrologic data visualization using computer programming. Spring semester.

FREC/WATR 4464 Water Resources Policy & Economics

Economic theory and methods to explain water use decisions. Efficiency, equity, and ethical considerations in U.S. water policy. Analysis of water markets, climate change, and environmental flows from diverse stakeholder perspectives. Spring semester.

GEOG 1514 Introduction to Meteorology

Foundational properties and processes of Earth's atmosphere. Governing radiative and thermodynamic atmospheric equations. Extratropical weather systems, thunderstorms,

hurricanes, and tornadoes. Cultural and societal impacts of extreme weather and climate change. Using meteorological and atmospheric data to construct weather forecasts. Fall semester.

GEOG 2114 Introduction to Coastal Regions

Introduction to coastal geomorphology (landforms and processes), climate drivers (sea level rise and storms surge), and natural systems that shape coastal regions. Study of human systems including population growth, built environment, and social vulnerability. Overview of coastal zone management and policy. Discussion of the future of coastlines shaped by complexity, emerging challenges, uncertainty, adaptation, and resilience. Fall semester.

GEOG 3104 Environmental Justice, Resources, and Development

Environmental problems in their social, spatial, and global contexts. Impacts of globalization, neoliberalism, and population growth on the environment. Examination of effects of human-environment interaction. Focus on conceptualizing development, population and demographic change, environmental justice, rights of biota and posterity, factory farming, energy, global health, disasters, and intercultural and global awareness. Spring semester.

GEOG 4204 Geography of Resources

Physical and cultural systems that influence the spatial distribution of resources and resource use. Emphasis on historical and current contexts of natural resources use and perspectives in the United States, with consideration of worldwide distributions of resources. Environmental cognition and perception, water, public lands, conservation and preservation, food and hunger, human population, and alternative energy. Fall semester.

GEOG/WATR 2004 Water, Environment, and Society

Introduction to the hydrologic cycle, water resources, and related environmental issues. Emphasis on ethics and relationships between human needs for and effects upon water including: water quality, water treatment, and wastewater treatment; water for health, energy, and food; water management, laws, economics, and conflict; hydrometeorological hazards and climate change; and potential solutions for these and other critical water issues. Fall semester.

GEOG/GEOS 4134 Interdisciplinary Issues and Ethics in Water Resources

Analysis of issues and ethics related to water resources, water as a hazard upon human (infrastructure, economy) and ecological (rivers, groundwater) systems, water and vector borne disease, climate change, dams, and eutrophication. Development of proficiency in demonstrating the multidimensionality of water resources. Fall semester.

GEOS 3014 Environmental Geosciences

The roles of geology and geophysics in defining and monitoring the natural environment, with special application to interactions between humans and the geologic environment.

Both descriptive treatment and quantitative concepts related to environmental processes involving the solid earth and earth's surface, with emphasis on geologic hazards (e.g., earthquakes, volcanoes, landslides and slope failures, flooding, groundwater problems, mineral and rock dusts). Spring semester.

GEOS 3034 Oceanography

Descriptive and quantitative treatment of the geological, physical, chemical and biological processes that occur in, or are influenced by, the oceans. The history of oceanic exploration and discovery is addressed. Spring semester.

GEOS 4314 Coastal Hazards

Study of past, current, and future drivers of coastal change and hazards. Integration of concepts and skills from: climatic, isostatic, and tectonic processes that drive sea-level change; geologic (e.g., coastal stratigraphy, microfossils) and instrumental (e.g., tide gauges, satellite altimetry) coastal change reconstructions, models, measurements, and projections. Coastal earthquake, tsunami, hurricane, and storm-surge hazards. Approaches and challenges of communicating coastal hazards to the public. Coastal hazards and public policy. Fall semester.

GEOS 4634 Environmental Geochemistry

Application of quantitative methods of thermodynamic and physicochemical analysis to the study of the distribution and movement of chemical elements in surface and near-surface geological environments. Emphasis on practical approaches to environmental geochemistry. Fall semester.

GEOS 4804 Groundwater Hydrology

Physical principles of groundwater flow, including application of analytical solutions to real-world problems. Well hydraulics. Geologic controls on groundwater flow. Fall and spring semesters.

LAR 1254 - Environment and Natural Systems

Introduction to the environment, natural systems with emphasis on their relationship to urban sustainability and resilience: natural elements, structures, patterns, natural systems, ecology, and landscape ecology. Impact of human actions and decisions on the environment and natural systems from global to local scale. Application of relevant theories and methods related to the environment and natural systems in planning and design.

LAR 3154 Watershed Sensitive Site Design & Construction

Examines soil and water resource issues related to landscape architectural site planning and design. Key topics include watershed sensitive site design, estimation and management of storm water runoff, rainwater conservation, design of open channel conveyances for site planning applications, and erosion and sedimentation control. Spring semester.

NR/GEOG 4444 Practicing Sustainability

Practicum in sustainability. Synthesize and integrate knowledge from undergraduate career and apply to real world problems of sustainability. Topics and projects selected from opportunities to examine specific local and regional sustainability issues on the VT campus, in the New River Valley and the Commonwealth at large. Spring semester.

PSCI/UAP/IS 3344 Global Environmental Issues: Interdisciplinary Perspectives

Critical examination of major global environmental problems from a humanities perspective, including international community responses to global environmental problems such as global warming, atmospheric ozone depletion, acid rain, tropical deforestation, toxic waste. Actions by key actors in the international community to develop solutions. Relationship of justice, fairness, equality, and diversity to political questions of power or authority. Fall and spring semester.

UAP 3354 Introduction to Environmental Policy and Planning

Introduction to the interdisciplinary principles of environmental policy, planning, economics, and ethics to address pollution abatement, resources conservation, habitat protection, and environmental restoration. The course will focus on practical means of identifying environmental problems and creatively solving them. Fall semester.

UAP 4344 Law of Critical Environmental Areas

This course examines the legal principles and policy debates involved in the regulation and protection of critical environmental resources. Specific topics vary but will likely include wetlands law and policy, endangered species habitat, open space, forestland and farmland protection, coastal zone management, and floodplain regulation and policy. Fall semester.

UAP 4374 Land Use & Environment: Planning & Policy

Environmental factors involved in land use planning and development, including topography, soils, geologic hazards, flooding and stormwater management, ecological features, and visual quality. Techniques used in conducting environmental land inventories and land suitability analyses. Policies and programs to protect environmental quality in land use planning and development. Fall semester.

WATR 2004 Water, Environment, and Society

Introduction to the hydrologic cycle, water resources, and related environmental issues. Emphasis on ethics and relationships between human needs for and effects upon water including: water quality, water treatment, and wastewater treatment; water for health, energy, and food; water management, laws, economics, and conflict; hydrometeorological hazards and climate change; and potential solutions for these and other critical water issues. Fall semester.

WATR 3104 Principles of Watershed Hydrology

Study of hydrology in watersheds. Qualitative and quantitative principles of physical hydrological processes governing the movement, storage, and transformation of water on the Earth's surface as influenced by watershed characteristics, including human modifications. Fall semester.

WATR 3754 Watersheds and Water Quality Monitoring

Delivery of water quality constituents from watersheds to water bodies (streams, lakes, and estuaries). Field monitoring methods to assess watershed drivers and how they affect water quality and aquatic ecosystem condition. Linkages among water quality, watershed characteristics, land use and management, and climate. Design of watershed monitoring programs to guide watershed management for protecting water quality and ecological condition of aquatic systems. Fall semester.

WATR 4244 Hydroinformatics

Analysis and examination of hydrologic data using basic statistics and computer programming. Calculation and interpretation of flow frequency and duration, hydrologic analysis of geospatial digital terrain data, and implementation and analysis of simple hydrologic models. Advanced methods of temporal and spatial hydrologic data visualization using computer programming. Spring semester.

WATR 4614 Watershed Assessment, Management, and Policy

Multidisciplinary perspectives of assessment, management and policy issues for protecting and improving watershed ecosystems. Topics include: monitoring and modeling approaches for assessment, risk-based watershed assessment geographic information systems for watershed analysis, decision support systems and computerized decision tools for watershed management, policy alternatives for watershed protection, urban watersheds, and current issues in watershed management. Spring semester.

WATR 4464 Water Resources Policy & Economics

Economic theory and methods to explain water use decisions. Efficiency, equity, and ethical considerations in U.S. water policy. Analysis of water markets, climate change, and environmental flows from diverse stakeholder perspectives. Spring semester.