

NRES - NATURAL RESOURCES & ENVIRON SC

NRES Class Schedule (<https://courses.illinois.edu/schedule/DEFAULT/DEFAULT/NRES/>)

Courses

NRES 100 Fundamentals of Env Sci credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/100/>)

Introduction to environmental sciences and current environment issues. Topics include population growth, world food supplies, agriculture and the environment, biodiversity, fossil fuels and "green" energy issues, endangered and threatened species, water use, conservation and pollution, global warming, acid rain, ozone depletion, waste management and reduction, recycling, toxins and health, mineral resources, and environmental policies and regulations. Course addresses the complex relationships between the human race and the natural systems that contain our air, water, energy, and biotic and food resources. Credit is not given for both NRES 100 and NRES 102.

This course satisfies the General Education Criteria for:
Nat Sci Tech - Phys Sciences

NRES 101 Wildlife Conservation in the 21st Century credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/101/>)

An introduction to the conservation, diversity and ecology of animals. The diversity of fish, reptiles, amphibians, mammals, and birds both around the world and in Illinois will be explored. The course will have a strong conservation component where students are introduced to a variety of threats facing animals. The students will be introduced to how to manage sustainable wildlife populations. The students will be exposed to current issues in Illinois to illustrate how people and animals can co-occur and a broad overview of the management, restoration, and conservation techniques.

This course satisfies the General Education Criteria for:
Nat Sci Tech - Life Sciences

NRES 102 Introduction to NRES credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/102/>)

Introduction to natural resources (forests, fisheries, soils, aquatic systems) and environmental science. Emphasizes renewable natural resources, ecological concepts, energy use, biodiversity of species, biogeochemical cycles, and air, water, and soil pollution. Provides natural science basis for understanding contemporary environmental issues and natural resource management. Credit is not given for both NRES 100 and NRES 102.

NRES 103 The Great Lakes - Freshwater Wonder at Risk credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/103/>)

Introduction to the ecology of freshwater systems, viewed through the lens of the Great Lakes and associated tributaries. The Great Lakes hold 20% of the world's freshwater and 95% of the freshwater in North America. They have sustained human and wildlife populations for at least 10,000 years. Now, the integrity of this unique and priceless resource is threatened as never before. This eight-week online course will enhance student understanding of the ecology of this imperiled system, as well as the historical events and policies that have led to the present crisis, and the men and women who have played key roles in this unfolding story.

This course satisfies the General Education Criteria for:
Nat Sci Tech - Life Sciences

NRES 105 Climate Change Impacts on Ecological Systems credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/105/>)

Examines the response of ecological systems to climate change by drawing on multiple lines of evidence from the past and present. Topics include species range shifts, timing of biological events, ecosystem function, and feedbacks. The implications for conservation, as well as approaches to mitigating and adapting to climate change, are also explored. Computer-based exercises are used to enhance quantitative reasoning skills and build climate and ecological literacy. Online only. This course satisfies the General Education Criteria for:
Nat Sci Tech - Life Sciences
Quantitative Reasoning II

NRES 108 Env Sc & Nat Resource Careers credit: 1 Hour. (<https://courses.illinois.edu/schedule/terms/NRES/108/>)

Explores career options in the fields of Natural Resource Management and Environmental Sciences. Students will improve understanding of their career goals, expand their knowledge of careers available in these fields, improve their job searching skills, and develop a plan for pursuing a career. Approved for S/U grading only.

NRES 109 Global Environmental Issues credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/109/>)

Discussion course that focuses on analyzing opposing points of view on contemporary environmental issues. Students engage in role-playing activities, debates, and other participatory activities to explore the ecological and social dimensions of the issues.

NRES 199 Undergraduate Open Seminar credit: 1 to 5 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/199/>)

Experimental course on a special topic in natural resources and environmental sciences. Topic may not be repeated except in accordance with the Code. May be repeated in the same or subsequent terms. No more than 12 hours may be counted toward graduation.

NRES 201 Introductory Soils credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/201/>)

The nature and properties of soil including origin, formation, and biological, chemical, and physical aspects. Prerequisite: Successful completion of MATH 115, MATH 234, or equivalent and CHEM 102 is required. CHEM 104 is recommended.

NRES 202 American Environmental History credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/202/>)

Same as ESE 202 and HIST 202. See HIST 202. This course satisfies the General Education Criteria for:
Humanities - Hist Phil
Cultural Studies - Western

NRES 210 Environmental Economics credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/210/>)

Same as ACE 210, ECON 210, ENVS 210, and UP 210. See ACE 210. This course satisfies the General Education Criteria for:
Social Beh Sci - Soc Sci

NRES 219 Applied Ecology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/219/>)
Explores how organisms interact with each other and with their environment. Emphasis is placed on how these interactions lead to positive and negative outcomes in a human-dominated world. Students will learn the fundamental principles of population, community, and ecosystem ecology, and they will apply these principles to understand how ecological systems respond to human management decisions, environmental policy, climate change, and other anthropogenic influences. The goal of this course is to provide students with an ecological toolkit that can inform their decisions in conservation, ecosystem management, restoration, policy, and stewardship.

NRES 220 Communicating Agriculture credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/220/>)
Same as AGCM 220 and ENVS 220. See AGCM 220.
This course satisfies the General Education Criteria for:
Advanced Composition

NRES 223 Watching the Environment credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/223/>)
Same as MDIA 223. See MDIA 223.
This course satisfies the General Education Criteria for:
Social Beh Sci - Soc Sci

NRES 224 Social Justice and Environment credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/224/>)
Over the last 25 years, Environmental Justice (EJ) has expanded from its earliest focus combating environmental racism in the US to an influential global phenomenon. What is EJ and how do we realize it in public policy? Students in this course will examine environmental issues through the lens of social justice and human inequality. We explore how EJ makes connections between environmental (pollution, biodiversity, food, climate) and social justice issues (race, ethnicity, gender, class) in order to inform public policy and mitigate environmental problems.
This course satisfies the General Education Criteria for:
Social Beh Sci - Soc Sci
Cultural Studies - US Minority

NRES 242 Nature and American Culture credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/242/>)
Same as LA 242 and RST 242. See RST 242.
This course satisfies the General Education Criteria for:
Cultural Studies - Western

NRES 270 Applied Entomology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/270/>)
Same as CPSC 270 and IB 220. See CPSC 270.

NRES 285 Field Experience credit: 1 or 2 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/285/>)
Field based course that exposes students to procedures and methods used in various resource settings in a hands-on manner. Includes weekly field trips to visit representative natural resource and environmental science settings with supporting laboratory exercises. Content of offerings vary by section, but all focus on resource management, environmental quality and assessment, and effects of consumption and use on the environment. Field trips required. Additional fees may apply. See Class Schedule. May be repeated in the same term up to 4 hours if topics vary or separate terms to a maximum of 6 hours. Prerequisite: NRES 201 and NRES 219. The department strongly recommends that students take only one section per semester, except under highly unusual circumstances.

NRES 287 Environment and Society credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/287/>)
Examination of the relationship between environment and society and implications for ecological and human well-being. Social science perspective covered on topics such as environmental change, environmental decision-making, natural resource management, agricultural systems, and environmental risks, hazards, and disasters. Students will build critical thinking skills focused on contemporary problems in the interface between people and the physical environment. Same as ESE 287, GIS 287, and PS 273. Prerequisite: NRES 102 and sophomore or higher standing. Introductory social science course recommended.

This course satisfies the General Education Criteria for:
Social Beh Sci - Soc Sci
Cultural Studies - Western

NRES 293 Professional Internship credit: 1 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/293/>)
Off-campus experience in a field directly pertaining to a subject matter in natural resources and environmental sciences. Approved for Letter and S/U grading. May be repeated in separate terms up to 4 hours. Credit is not given for more than a total of 12 hours of Independent Study (IND) courses applying to a degree in ACES. Prerequisite: Consent of academic advisor or Department Internship Coordinator.

NRES 294 Resident Internship credit: 1 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/294/>)
Supervised, on-campus, learning experience with faculty engaged in research. Approved for Letter and S/U grading. May be repeated in separate terms to a maximum of 4 hours. Credit is not given for more than a total of 12 hours of Independent Study (IND) courses applying to a degree in ACES. Prerequisite: Consent of academic advisor or Department Internship Coordinator.

NRES 295 Undergrad Research or Thesis credit: 1 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/295/>)
Individual research, special problems, thesis, development and/or design work under the supervision of an appropriate member of the faculty. May be repeated up to 4 hours in the same term to a maximum of 12 hours in separate terms. Credit is not given for more than a total of 12 hours of Independent Study (IND) courses applying to a degree in ACES. Prerequisite: Junior standing, cumulative GPA of 2.5 or above at the time the activity is arranged, and consent of instructor.

NRES 298 Undergraduate Seminar credit: 1 to 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/298/>)
Group discussion on a special topic in a field of study directly pertaining to subject matter in natural resources and environment sciences. May be repeated to a maximum of 12 hours. Prerequisite: Junior standing.

NRES 302 Dendrology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/302/>)
Emphasizes nomenclature, classification, and the distinguishing morphological characteristics of the native and naturalized tree species of North America. Introduces disciplines related to the systematics of tree species, including: morphology, physiology, phenology, ecology, soil-site relationships, silviculture, geographic range and natural distribution, wood characteristics, economic uses, and natural history (including major diseases and insect pests). Incorporates tree and forest habitats that provide cover, breeding sites, and food for a variety of wildlife species. Serves as a basis for studies in natural resources management, environmental science, and for advanced studies of botany, genetics, and tree physiology. Field trips required. Additional fees may apply. See Class Schedule. Prerequisite: IB 103.

NRES 310 Natural Resource Economics credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/310/>)
Same as ACE 310 and ENV5 310. See ACE 310.

NRES 325 Natural Resource Policy Mgmt credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/325/>)
Explores policy processes and institutions relating to allocation, utilization, and preservation of natural resources. Considers conceptual models of policy processes, and examines both historical examples and current issues. Prerequisite: ECON 102 or ACE 100.

NRES 330 Environmental Communications credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/330/>)
Same as AGCM 330 and ENV5 330. See AGCM 330.

NRES 340 Environ Social Sci Res Meth credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/340/>)
Introduction to social science research methods for addressing environmental issues. It provides basic information about social science concepts and methods (especially observation, surveys, focus groups, and interviews), helps students become informed users of social science research, and guides selection of appropriate social science tools to meet environmental challenges. A group focus on a local environmental issue offers a practical experience in which course content is applied within a specific community context. Field trips within the local community may be required. Additional fees may apply. See Class Schedule. Prerequisite: STAT 100 or equivalent.

NRES 348 Fish and Wildlife Ecology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/348/>)
Application of ecological principles and modeling to management of fish and wildlife populations; significance of abiotic and biotic factors, including life-history parameters in population growth and management; and techniques and procedures for the development of management strategies for animal populations, emphasizing vertebrates. A course in statistics is highly recommended. Same as IB 348. Prerequisite: IB 203 or NRES 219.

NRES 351 Introduction to Environmental Chemistry credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/351/>)
Introduces major inorganic and organic chemical pollutants, their sources and their fates in the atmosphere, hydrosphere and pedosphere. In particular, the course covers 1) translocation/distribution of chemicals in the environment, and 2) abiotic and biotic transformation of chemicals (e.g., photochemical reactions, hydrolysis, redox, adsorption and volatilization. Geared towards students in agricultural, natural, environmental and life science majors. Prerequisite: Successful completion of MATH 234 (or equivalent) and CHEM 104 is required. One semester of organic chemistry (CHEM 232 or CHEM 236) is recommended.

NRES 352 Plant Genetics credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/352/>)
Same as CPSC 352. See CPSC 352.

NRES 362 Ecology of Invasive Species credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/362/>)
Focused on the ecology and management of biological invasions, with an emphasis on understanding the introduction, establishment, spread and impact stages of the invasion process. Students will identify the causes and impacts of biological invasions, as well as management strategies for preventing new invasions and mitigating impacts of established invaders in freshwater, marine, and terrestrial ecosystems. No special equipment will be required, and any optional, weekend field trips will occur on campus. Prerequisite: NRES 219 or similar introductory course in ecology.

NRES 368 Vertebrate Natural History credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/368/>)
Same as IB 368. See IB 368.

NRES 370 Environmental Sustainability credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/370/>)
Same as ENSU 300 and LA 370. See ENSU 370.

NRES 396 UG Honors Research or Thesis credit: 1 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/396/>)
Individual research, special problems, thesis, development and/or design work under the direction of the Honors advisor. May be repeated in the same or separate terms to a maximum of 12 hours. Credit is not given for more than 12 hours of special problems, research, thesis and/or individual studies may be counted toward degree. Prerequisite: This course is restricted to students who have junior or senior standing, admission to the ACES Honors Program, and consent of instructor.

NRES 401 Watershed Hydrology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/401/>)
Precipitation, evapotranspiration, stream flow, and other aspects of the hydrologic cycle are studied in a watershed context. Measurement techniques, statistical analyses of hydrologic data, and simulation modeling are discussed. Case studies that quantify water movement in specific watersheds are used to integrate course topics. Same as GGIS 401. 3 undergraduate hours. 3 graduate hours. Prerequisite: CHEM 102, completion of the Quantitative Reasoning I requirement, and completion of the statistics requirement.

NRES 403 Watersheds and Water Quality credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/403/>)
Examines water quality in streams, rivers, lakes, and wetlands. The responses of watershed systems to pollution and other human impacts will be described in terms of their biological, geochemical, and physical processes. The technical analyses necessary to establish policies aimed at preserving or restoring these natural resources will be emphasized. 3 undergraduate hours. 3 graduate hours. Prerequisite: One of MATH 220, MATH 221, MATH 234.

NRES 406 Fluvial Geomorphology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/406/>)
Same as GGIS 406 and GEOL 406. See GGIS 406.

NRES 407 Wildlife Population Ecology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/407/>)
This course includes the application of principles of population biology to the analysis, management, and conservation of wildlife populations, models of population growth, spatio-temporal variation in abundances, estimation of demographic parameters and methods of decision-making. 4 undergraduate hours. 4 graduate hours. Prerequisite: NRES 348. One semester of calculus or statistics is recommended.

NRES 409 Fishery Ecol and Conservation credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/409/>)
Ecological and conservation concepts are applied to fisheries management practices. Will discuss current literature related to the interface between basic and applied aspects of fish populations, focusing on life history, conservation biology and genetics, growth and recruitment, competition, predation, trophic and community ecology, ecosystem management, and human dimensions. 4 undergraduate hours. 4 graduate hours. Prerequisite: NRES 348.

NRES 415 Native Plant ID and Floristics credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/415/>)

Focuses on gaining skills in identification of native vascular plants in the field and classroom. Methods of plot-based and plotless vegetation sampling methods will be introduced. Procedures and applications for botanical inventory and assessment will be covered. Field trips are required. Additional fees may apply. See Class Schedule. 4 undergraduate hours. 4 graduate hours. Credit is not given toward graduation for NRES 415 if credit for CPSC 416 has been earned.

NRES 416 Forest Biology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/416/>)

Interactions of biotic and abiotic components of forests as they relate to the health, structure and function of these ecosystems. The course is ecophysiological and organismic in approach, but includes biochemical concepts central to the understanding of forest biology. Lecture-discussion combined with assigned readings, field projects, and a paper. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 419 and NRES 302 or HORT 301.

NRES 417 Principles of Wetland Science and Conservation credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/417/>)

Students taking this course will gain a foundational understanding of all aspects of wetlands. In the first four weeks, students will be introduced to the major components of wetlands (hydrology, soils, and biota) and discuss their importance to ecosystem functioning and services. The second half of the course will focus on anthropogenic impacts on wetlands and the resulting conservation and restoration efforts needed for wetland ecosystems. 4 undergraduate hours. 4 graduate hours. Credit towards graduation is not given for NRES 417 and NRES 418. Prerequisite: Knowledge equivalent to completion of an introductory soils course and a course in basic ecology. Restricted to the Wetland Science and Conservation Graduate Certificate.

NRES 418 Wetland Ecology & Management credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/418/>)

Wetlands are important ecosystems that support high biodiversity and provide numerous benefits to society. This course provides a comprehensive examination of wetland science, management, and governance. Lectures, readings and class discussions will focus on the structure and processes of wetland ecosystems, wetland biota, wetland conservation and management, and U.S. and international wetland policies. Special emphasis will be placed on the application of wetland science to policy and restoration. Offered in alternate years. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 201 and NRES 219, or consent of instructor.

NRES 419 Env and Plant Ecosystems credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/419/>)

Relationships among environmental factors and plant processes and functions; impact of human activities on the environment and the structure and function of plant ecosystems. Examples will be drawn from a variety of managed and unmanaged plant ecosystems. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 219 or LA 450 or IB 103 and CHEM 104 or NRES 201.

This course satisfies the General Education Criteria for: Advanced Composition

NRES 420 Restoration Ecology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/420/>)

Historical development of ecological restoration, its philosophical foundation, multi-disciplinary borrowings from the natural, applied, and social sciences, and varied practical applications, with emphasis on the application of ecological principles. Case studies, field trips, and laboratory activities on restoration planning. Field trip required. Additional fees may apply. See Class Schedule. 4 undergraduate hours. 4 graduate hours. Prerequisite: NRES 219 or LA 450.

NRES 421 Quantitative Methods in NRES credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/421/>)

Explores the fundamental principles, procedures, and practices that underlie the most common statistical and sampling methods used in natural resources and environmental sciences. This course covers hypothesis testing, regression, and analysis of variance. There is also a strong focus on sampling theory and experimental design. Computer labs utilize the open source R statistical computing environment. 3 undergraduate hours. 3 graduate hours. Prerequisite: One of MATH 220, MATH 221, MATH 234; completion of the statistics requirement.

NRES 422 Earth Systems Modeling credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/422/>)

Same as ATMS 421, ESE 421, GGIS 421 and GEOL 481. See ATMS 421.

NRES 425 Natural Resources Law & Policy credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/425/>)

Using the case study method and discussion problems, students in this course will study how laws in the U.S. regulate the use of natural resources, including public ownership and preservation of natural resources through other federal and state public lands. Also examines major federal environmental statutes designed to protect natural resources, including the Clean Water Act, the Endangered Species Act, the National Environmental Policy Act, and federal acts related to forest, national parks, and wilderness protection. 3 undergraduate hours. 3 graduate hours. Prerequisite: Junior standing.

NRES 426 Renewable Energy Policy credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/426/>)

Considers how policies can be designed to optimize economic, environmental, and social solutions to transforming the world's unsustainable energy production, distribution, and consumption paradigm. Provides an up-front primer on climate change policy in the U.S., Europe, and internationally, which have become the primary driver of sustainability initiatives in the energy sector. Examines policies that define "renewability" within various energy sectors including fossil fuels (e.g., coal, natural gas, petroleum), biofuels, nuclear power, hydropower, wind, solar, geothermal, and wave energy. 3 undergraduate hours. 3 graduate hours. Prerequisite: Junior standing.

NRES 427 Modeling Natural Resources credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/427/>)

Examines basic modeling concepts and methods. Modeling skills, model development, and natural resource issues and problems will be emphasized. Content areas include fisheries, forests, wildlife, economics, human dimensions, groundwater and surface water. 4 undergraduate hours. 4 graduate hours. Prerequisite: One of MATH 220, MATH 221, MATH 234.

- NRES 428 Valuing Nature credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/428/>)
Building sustainable communities and ecosystems requires an understanding of how and why people make decisions about the environment. This course will explore how values, attitudes, and concepts of place relate to environmental behavior. Students will transfer theoretical knowledge of behavior change science and state-of-the-art methodologies to resource management challenges, focusing particular attention on the human dimensions of fisheries management and conservation in parks and protected areas. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 287.
- NRES 429 Aquatic Ecosystem Conservation credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/429/>)
Application of the principles of aquatic ecology to a broad range of conservation issues. The structure and function of aquatic systems are discussed from an ecosystem perspective, including the major threats and disturbances to aquatic ecosystems. 3 undergraduate hours. 3 graduate hours. Prerequisite: CHEM 102 and PHYS 101 or PHYS 140, and MATH 220 or MATH 221 or MATH 234, and IB 203 or NRES 219.
- NRES 431 Plants and Global Change credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/431/>)
Same as CPSC 431 and IB 440. See CPSC 431.
- NRES 434 Environment, Policy, and Conflict credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/434/>)
Explores the complex, dynamic relationship between environment, conflict, and conflict resolution. Students will examine definitions of (environmental) conflict, identify the pathways by which environment is linked to conflict, and explore how policymakers devise solutions to resolve environmental conflict. The course will examine conflict across multiple scales, actors, resource types, and contexts, working primarily through a lens of equity and justice. 3 undergraduate hours. No graduate credit. Prerequisite: Restricted to students with Junior or Senior standing.
- NRES 438 Soil Nutrient Cycling credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/438/>)
The ecology of decomposition and plant nutrient acquisition in terrestrial soils will be addressed using applied ecology concepts. Discussion will focus on the scientific literature addressing biological, physical, and chemical controls over nutrient availability in soils. Writing assignments will teach students to summarize scientific literature. Students will learn about analytical and quantitative methods used in this field of study and gain the interpretive and communication skills needed to assess and/or carry out applied research in plant and soil science arenas. Same as CPSC 438. 3 undergraduate hours. 3 graduate hours. Offered in alternate years. Prerequisite: IB 203 or NRES 219, and NRES 201.
- NRES 439 Env and Sustainable Dev credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/439/>)
Comprehensive overview and synthesis of global environmental problems and their relationships to human activities, with a focus on ecological and natural resource elements. Concerns include unsound ethics and concepts of development and modernization, the lack of motivation or funding to implement available technical solutions, the promotion of alternative development ethics, and a review of opportunities to maintain or improve the well-being of people, other organisms, and the environment. Same as CPSC 439. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 219 or ACE 210.
- NRES 440 Applied Statistical Methods I credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/440/>)
Same as ANSC 440, CPSC 440, FSHN 440, and NUTR 440. See CPSC 440.
- NRES 441 Biogeography credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/441/>)
Same as ANTH 436, ESE 439, GGIS 436 and IB 439. See IB 439.
- NRES 442 Mammalogy credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/442/>)
Same as IB 462. See IB 462.
- NRES 445 Statistical Methods credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/445/>)
Same as ABE 445 and ANSC 445. See ANSC 445.
- NRES 446 Sustainable Planning Seminar credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/446/>)
Same as GGIS 446, LA 446, and UP 446. See LA 446.
- NRES 452 Community Ecology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/452/>)
Same as IB 453. See IB 453.
- NRES 454 GIS in Natural Resource Mgmt credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/454/>)
Geographic Information Systems (GIS) and remote sensing for natural resource management. Personal computers and GIS software are used to demonstrate the utility of these techniques for data acquisition, image processing, and map modeling. Exercises include problems relevant to the management of natural resources such as land cover mapping, monitoring, suitability and productivity assessment, landscape pattern analysis, land use change analysis, spatial modeling, and decision making. 4 undergraduate hours. 4 graduate hours.
- NRES 455 Advanced GIS for Environmental Management credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/455/>)
Examines advanced applications of Geographic Information Systems (GIS) and remote sensing for environmental management. This course integrates current geospatial tools and methods to learn applied techniques for collecting spatial data, building spatial models and databases, analyzing spatial patterns, managing environmental issues, and communicating science through interactive mapping applications. Course exercises provide hands-on learning approaches and introduce students to programming principles for GIS. 3 undergraduate hours. 3 graduate hours. Offered in each spring Prerequisite: NRES 454 or GGIS 379.
- NRES 456 Integrative Ecosystem Management credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/456/>)
Examines ecological and human dimensions of ecosystem management, with a strong emphasis on national and international case studies. Capstone course for seniors in the NRES major. Additional fees may apply. See Class Schedule. 3 undergraduate hours. 3 graduate hours. Prerequisite: Senior standing; NRES 219 and NRES 287.
- NRES 460 Aerial Photo Analysis credit: 3 or 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/460/>)
Same as GGIS 460. See GGIS 460.
- NRES 461 Ornithology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/461/>)
Same as IB 461. See IB 461.
- NRES 462 Ecosystem Ecology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/462/>)
Same as ESE 452 and IB 452. See IB 452.
- NRES 463 Ichthyology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/463/>)
Same as IB 463. See IB 463.

NRES 464 Herpetology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/464/>)
Same as IB 464. See IB 464.

NRES 465 Landscape Ecology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/465/>)
Introduction to the theory, methods, and application of landscape ecology, with an emphasis on characterizing heterogeneity and examining its consequences for ecological processes across a variety of spatial and temporal scales. Special attention will be given to the role of natural and human disturbances in shaping spatial patterns. Laboratory exercises are computer-based and focus on concepts and tools in landscape ecology. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 219 or equivalent, NRES 454 or equivalent.

NRES 471 Pedology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/471/>)
The science of soil genesis, classification, and morphology. Includes factors of soil formation, properties and methods used in distinguishing soils, interpretation of soil profiles and soil stratigraphy, causes of soil variability, and the impact of soil properties upon soil management, land-use decisions, and the environment. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 201.

NRES 472 Environmental Psychology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/472/>)
Theory and research in environmental psychology. Topics include environmental perception, cognition, experience, values and emotion, perceived environmental quality, environmental hazards and risk perception, and conservation attitudes and behavior. Same as PSYC 472. 4 undergraduate hours. 4 graduate hours. Prerequisite: Jr. standing: PSYC 100 or PSYC 103.

NRES 473 Soil Testing Practicum credit: 2 or 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/473/>)
Chemical procedures useful in assessing soil/plant relationships for field crops. Topics include agronomic principles, field sampling, performance of soil tests, interpretation of analytical results, and formulation of nutrient management programs. 2 or 3 undergraduate hours. 2 or 3 graduate hours. Field trip required. Additional laboratory work and consent of instructor required for 3 hours. Prerequisite: NRES 201.

NRES 474 Soil and Water Conservation credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/474/>)
Application of principles of soil conservation and management to the solution of land-use problems; influence of soil characteristics on erosion control, cropping intensity, water management, and land-use planning. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 201.

NRES 475 Environmental Microbiology credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/475/>)
Introduction to the diversity of microbial populations and their important role in environmental processes in air, water, soils, and sediments. Microbial community ecology and interactions with plants and animals will also be discussed. Students will learn how microbial activities sustain natural ecosystems and contribute to environmental quality, and also how these functions are harnessed to support managed and artificial systems. Molecular biology techniques for investigating microbial communities and their activities will also be discussed. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 201 and CHEM 104.

NRES 477 Introduction to Remote Sensing credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/477/>)
Same as GGIS 477. See GGIS 477.

NRES 480 Human-Wildlife Interactions credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/480/>)
Human-wildlife interactions will increase in frequency as we continue to encroach on wildlife habitats. This lecture and discussion course will seek to describe human-wildlife interactions along a spectrum from conflict to coexistence. Students will discuss the pros and cons of various measures taken to reduce conflicts and think critically about the ways that attitudes, economics, geography, policies, and culture affect our relationships with wildlife globally. This course aims to enhance students' capacity as educators, resource managers, and conservationists to overcome negative perceptions of wildlife and to improve outcomes during human-wildlife interactions. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 348 or equivalent.

NRES 482 Aquatic Biogeochemistry credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/482/>)
Examines the transport, transformation, and retention of carbon and nutrients in aquatic ecosystems across the continuum from streams to coastal waters. In addition, the course explores how disturbance (e.g., agriculture and urbanization) and global change drivers (e.g. land use change, atmospheric deposition, and climate change) alter nutrient and carbon cycling in the context of watersheds. Emphasis will be placed on the application of biogeochemical principals for improving water quality as well as biogeochemical approaches for aquatic ecosystem protection. These ideas will be explored by a combination of lectures, literature reading, field trips to study sites, laboratory analysis, and final project. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 201, NRES 219. Junior, senior or graduate standing.

NRES 485 Stream Ecosystem Management credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/485/>)
This course relates the structure and function of streams and rivers to challenges and opportunities in their conservation, management, and restoration using a combination of readings, discussions, and field trips to study sites. Students will develop an integrative understanding of stream and river ecosystem management from the site to watershed scale on issues spanning from nutrient pollution, to the natural flow regime, to the design and implementation of freshwater protected areas. No special equipment will be required. Three required field trips will occur on or near campus. Additional fees may apply. See Class Schedule. 4 undergraduate hours. 4 graduate hours. Prerequisite: NRES 219 or similar introductory course in ecology.

NRES 487 Soil Chemistry credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/487/>)
Emphasizes inorganic reactions involved in soil development and plant nutrition in soils; topics include colloid systems, properties of water, ion exchange equilibria, plant nutrient forms, and methods of analyses. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 201 and CHEM 104.

NRES 488 Soil Fertility and Fertilizers credit: 3 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/488/>)
Provides a broad-based understanding of the basic principles of soil fertility and their application. Coverage includes the occurrence, cycling, and plant availability of the essential mineral nutrients in soils; fertilizer sources, soil reactions, and efficiency; evaluating fertilizer and lime needs; methods of fertilizer application; and the economics of fertilization. Same as CPSC 488. 3 undergraduate hours. 3 graduate hours. Prerequisite: NRES 201.

NRES 490 Surface Water System Chemistry credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/490/>)

Examines the interaction of chemical and biological processes that govern the chemistry of streams, lakes, and wetlands, and the response of aquatic organisms to pollution. Chemical equilibrium and kinetic principles are used to analyze the behavior of surface water systems through the use of models. Topics include modeling of field studies in environmental inorganic chemistry and biogeochemistry. The laboratory section will be devoted to instruction in the use of computer models and to their practical application. 4 undergraduate hours. 4 graduate hours. Credit not given for both NRES 490 and CEE 443. Prerequisite: CHEM 104; one of MATH 220, MATH 221, MATH 234.

NRES 499 Special Topics credit: 1 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/499/>)

Experimental course on a special topic in natural resources and environmental sciences. Additional fees may apply. See Class Schedule. 1 to 4 undergraduate hours. 1 to 4 graduate hours. Approved for Letter and S/U grading. May be repeated in the same or separate terms to a maximum of 12 hours as topics vary.

NRES 500 Graduate Seminar credit: 0 to 1 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/500/>)

Exposure to current research and specialized topics in natural resources and environmental sciences through attending/viewing and responding to the NRES seminar series. 0 to 1 graduate hours. No professional credit. Approved for S/U grading only. May be repeated.

NRES 501 Special Problems credit: 0 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/501/>)

Individual studies or investigations in selected branches of horticulture, natural resources, and environmental sciences. Approved for letter and S/U grading. May be repeated. No more than 8 hours may be counted toward an MS degree.

NRES 502 Research Methods in NRES credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/502/>)

Theory and practice of research methods in natural resources, ecology, and environmental sciences. Provides an overview of experimental design and sampling techniques, and includes discussions of discipline-specific statistical methods. Prerequisite: One upper division course is recommended.

NRES 503 Capstone Research Project credit: 1 to 8 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/503/>)

A supervised individual investigative study in selected areas of natural resources and environmental sciences relevant to the student's career preparation. Open only to NRES graduate students. A capstone paper and successful completion of an oral exam is required to earn credit for this course and also serves as the final requirement to complete the non-thesis master's program. 1 to 8 graduate hours. No professional credit. Approved for Letter and S/U grading. May be repeated in separate terms to a maximum of 8 hours. Credit is not given for both NRES 503 and NRES 505 or NRES 507. Prerequisite: Consent of the Academic and Research Advisors.

NRES 504 Critical Issues Recreation Mgt credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/504/>)

Same as RST 502. See RST 502.

NRES 505 Capstone Internship Experience credit: 1 to 8 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/505/>)

A formalized learning experience in an appropriate supervised internship related to the student's career preparation in natural resources and environmental sciences. Open only to NRES graduate students. A capstone paper and successful completion of an oral exam is required to earn credit for this course and also serves as the final requirement to complete the non-thesis master's program. 1 to 8 graduate hours. No professional credit. Approved for Letter and S/U grading. May be repeated in separate terms to a maximum of 8 hours. Credit is not given for both NRES 505 and either NRES 503 or NRES 507. Prerequisite: Consent of Academic Advisor.

NRES 508 Community & Natural Resources credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/508/>)

Advanced discussion and analysis of theoretical and empirical approaches to the intersection of social and ecological processes at the human community level emphasizing change, conflict, management, and decision-making. Each student will complete a project applying community-related theory to a particular natural resource or environmental problem. Prerequisite: Upper-level undergraduate course or graduate course in social science related to natural resources or environmental issues in NRES, Geography, Human and Community Development, Political Science, Psychology, Recreation Sport and Tourism, Sociology, or related field.

NRES 510 Adv Natural Resource Economics credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/510/>)

Same as ACE 510, ECON 548, and ENVS 510. See ACE 510.

NRES 511 Principles of Applied Ecology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/511/>)

Provides a thorough foundation of fundamental ecological principles that govern the distribution and abundance of organisms with extra attention to applied ecology as it pertains to current-day ecological problems. The approach will include lectures, discussions, hands-on evaluation and interpretation of data and experimental design presented in case studies, and design and implementation of an independent research project. Prerequisite: At least one undergraduate or graduate course in biology or ecology.

NRES 512 Discussions in NRES credit: 1 to 2 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/512/>)

Discussion of recent developments and current literature in natural resources and environmental sciences, with a term-long emphasis on a particular aspect of the subject matter. Approved for Letter and S/U grading. May be repeated to a maximum of 4 hours.

NRES 516 Ecosystem Biogeochemistry credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/516/>)

Biological, geological, and chemical processes of forest, agricultural, freshwater and marine ecosystems. The effects of pollutants and global change on each ecosystem are addressed along with the biogeochemical interactions among ecosystems. Each student completes a detailed biogeochemical study for a particular ecosystem. A 400-level course in two or more of the following areas are recommended: soil science, aquatic science, ecology, and hydrology. Same as IB 516.

NRES 517 Advanced Wetland Theory and Techniques credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/517/>)

Students will investigate the science behind the conservation, restoration, and monitoring of wetlands. The first part of the course will focus on the theory and techniques used during wetland delineation of hydrology, hydric soils, and vegetation. The second part of the course will focus on wetland management with a focus on best practices regarding the conservation, restoration and monitoring of wetlands. 4 graduate hours. No professional credit. Prerequisite: NRES 417. Restricted to Wetland Science and Conservation Graduate Certificate.

NRES 527 Wetland Science and Conservation in Context credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/527/>)

Deepens students' understanding of policy, economic, community, and cultural factors that empower and constrain wetland protection, conservation, and restoration. The first half explores wetland regulation and management in the U.S., in other countries, and internationally with attention to adapting to environmental change within those policy contexts. The second half focuses on competing management and conservation priorities, social aspects of wetland conservation, restoration, and management, and developing skills in the effective and culturally sensitive stakeholder engagement. 4 graduate hours. No professional credit. Prerequisite: NRES 417. Restricted to Wetland Science and Conservation Graduate Certificate.

NRES 572 Chemistry of Soil Fertility credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/572/>)

The chemistry of essential plant nutrients in soils, and their quantitative relationships to plant growth. Offered in alternate years. Prerequisite: NRES 201 and CHEM 222.

NRES 586 Soil Organic Matter credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/586/>)

Explores soil organic matter as one of the most important and integrative characteristics of terrestrial ecosystems. Topics include the nature and origin of humic and non-humic substances in soils and sediments, their critical environmental functions (chemical reactivity and role in nutrient cycling), and the primary methods (elemental analysis, spectroscopy, isotopic methods, and C and N models) used to characterize organic matter and its dynamics. Offered in alternate years. Prerequisite: CHEM 232.

NRES 592 Sustainable Urban Systems credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/592/>)

Same as CEE 592 and UP 576. See CEE 592.

NRES 593 Statistical Methods in Ecology credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/593/>)

Focuses on statistical methods used to analyze ecological data. Includes application of general and generalized linear models including use of several probability distributions such as normal, binomial, Poisson, and negative binomial. Course also focuses on mixed models and approaches for imposing structure onto the variance-covariance matrix to account for non-independence or heterogeneous variance. Emphasis throughout is on evaluating and presenting results using both traditional (p-value) and information-theoretic (AIC) approaches. 4 graduate hours. No professional credit. Prerequisite: At least one course in ecology, including basic concepts of population and community ecology, and at least one course in statistics, including basic concepts of sampling, hypothesis testing, and techniques such as t-tests, linear regression, and ANOVA (e.g., CPSC/NRES 440 or equivalent). Graduate standing or permission of instructor required.

NRES 594 NRES Professional Orientation credit: 1 Hour. (<https://courses.illinois.edu/schedule/terms/NRES/594/>)

The philosophy and components of graduate education with development of the principles useful in teaching, research, and extension in horticulture, natural resources and environmental sciences. Students will be required to develop and submit a proposal describing planned research for their M.S. or Ph.D. thesis. Approved for S/U grading only.

NRES 595 Advanced Quantitative Techniques for Ecology and Conservation credit: 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/595/>)

This course is designed to provide the tools necessary to estimate population parameters in a rigorous and robust manner. Students will learn about the tools researchers and managers use to address questions in population ecology and conservation. The course covers five major topics in the estimation and management of wildlife populations: 1) Neutral models, 2) Presence/absence, 3) Abundance estimation, 4) Survival estimation, and 5) Bayesian Methodology. Emphasis is placed on the applied nature of these tools, including model building, selection, and inference. 4 graduate hours. No professional credit. Prerequisite: Successful completion of NRES 593 is recommended, or some prior familiarity with statistical data analysis is helpful.

NRES 598 Experimental Graduate Courses credit: 1 to 4 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/598/>)

Experimental course on a special topic in natural resources and environmental sciences. May be repeated to a maximum of 12 hours.

NRES 599 Thesis Research credit: 0 to 12 Hours. (<https://courses.illinois.edu/schedule/terms/NRES/599/>)

Research conducted in various phases of horticulture, natural resources, and environmental sciences leading to a thesis in natural resources and environmental sciences. Approved for S/U grading only. May be repeated.