

ENSC - Environmental Science

ENSC 110 Land Resources and Environmental Sciences: 3 Credits (3 Lec)

Introduction to environmental science associated with managed and natural ecosystems. Students will learn how to identify scientific questions from issues, and how to develop scientifically-based objective information for answering environmental and land management questions. The class is a survey of the department's majors in agroecology, environmental biology, geospatial sciences, land rehabilitation, and soil and water science. Students must be proficient in basic algebra and have an understanding of biological principles.

ENSC 210 Role of Plants in the Environment: 3 Credits (3 Lec)

PREREQUISITE: BIOB 160 and sophomore standing. Applying the fundamentals of the scientific method to gain a basic understanding of plant ecology and physiology with an emphasis on how plants respond and adapt to abiotic and biotic factors and the consequences for community dynamics and ecosystem feedbacks

ENSC 245IN Soils: 3 Credits (2 Lec, 1 Lab)

PREREQUISITE: M 121Q or above. Soils and their properties as components of landscapes and ecosystems. Application of soils knowledge to problems in environmental sciences and management of agricultural, wildland, and urban landscapes

ENSC 260 Evolution for Env Scientists: 3 Credits (3 Lec)

PREREQUISITE: BIOB 160

Overview of the mechanisms and patterns of evolution, focusing methods in the field the role of evolutionary biology in understanding issues in environmental science.

ENSC 272CS Water Resources: 3 Credits (3 Lec)

PREREQUISITES: Sophomore Standing

An introduction to the science, uses, policy and management of fresh water resources, including hydrologic and ecologic processes, and related historic, policy, law and socioeconomic aspects. The course is intended for majors in the sciences, social sciences, and other disciplines. This course is offered face-to-face in the Fall Semester and Online in the Spring and Summer Semesters. Department of Land Resources Environmental Sciences.

ENSC 290R Undergraduate Research: 1-4 Credits (1-4 Lec)

PREREQUISITE: Sophomore standing and approval of instructor and department head. Course will address responsible conduct of research. Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or other creative project
Repeatable up to 12 credits.

ENSC 291 Special Topics: 1-4 Credits (1-4 Lec)

PREREQUISITE: None required, but some may be determined necessary by each offering department. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number

Repeatable up to 12 credits.

ENSC 292 Independent Study: 1-3 Credits (1-3 Lec)

PREREQUISITE: Consent of instructor and approval of department head. Directed research and study on an individual basis
Repeatable up to 6 credits.

ENSC 298 Internship: 2-4 Credits (2-4 Other)

PREREQUISITE: Consent of instructor and approval of department head. An individualized assignment arranged with an agency, business, or other organization to provide guided experience within the field
Repeatable up to 12 credits.

ENSC 311 Fundamentals of Environmental Data Analysis: 3 Credits (2 Lec, 1 Lab)

PREREQUISITE: STAT 216Q or BIOB 318. (Sp) Course will cover the key components of data science within the context of answering environmental science questions. The course will equip students with the foundational knowledge and programming skills necessary to work with and analyze data, including the importation and restructuring of data as well as exploratory data analysis and visualization

ENSC 353 Environmental Biogeochemistry: 3 Credits (3 Lec)

PREREQUISITE: CHMY 143, ENSC 245IN. Foundational course will cover mechanisms controlling the behavior of inorganic and organic constituents in soil and water systems. Applications will focus on integrating biological and chemical processes to understand biogeochemical cycling, nutrient bioavailability, and the fate and transport of chemicals

ENSC 391 Fundamentals of Environmental Data Analysis: 1-4 Credits (0)

PREREQUISITE: None required, but some may be determined necessary by each offering department. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number Repeatable up to 12 credits
Repeatable up to 12 credits.

ENSC 407 Environmental Risk Assessment: 3 Credits (3 Lec)

PREREQUISITE: BIOB 170IN. (Sp) Principles of risk analysis, including risk assessment, perception, communication, and management. Emphasis on human toxicology, exotoxicology, dose-response relationships, exposure analysis, environmental fate, and deterministic and probabilistic risk assessment

ENSC 410R Biodiversity Survey and Monitoring Methods: 3 Credits (2 Lec, 1 Lab)

PREREQUISITE: NRSM 240 or BIOE 370; BIOB 318 or STAT 216Q. Biodiversity survey and monitoring designs, sampling methods, and data evaluation techniques are introduced. Emphasis is on plants but other taxa are addressed for agricultural, rehabilitation and wildland systems. One week of fieldwork required prior to semester; course completion mid-October

ENSC 443 Weed Ecology and Management: 3 Credits (2 Lec, 1 Lab)

PREREQUISITE: M 121Q, STAT 216Q or BIOB 318. The principles of weed ecology including plant population demographics, biotic and abiotic regulating mechanisms, and plant community temporal and spatial dynamics in managed ecosystems. Weed population model construction, spreadsheet calculations and thorough assessment of pest threshold theory. The study of ecologically-based weed management approaches including cultural, mechanical, biological, and chemical control practices

ENSC 444 Watershed Hydrology: 3 Credits (2 Lec, 1 Lab)

PREREQUISITE: ENSC 245IN; M 151Q or M 161Q or M 165Q or M 166 or M 171Q or M 181Q or M 182; PHSX 205 or PHSX 220 or PHSX 240; or consent of instructor; RECOMMENDED
PREREQUISITE: STAT 216Q. This course provides a conceptual and quantitative introduction to the physical fundamentals of environmental and watershed hydrology. Focus is on the hydrologic processes that determine how rainfall and snowmelt ultimately become stream flow and evapotranspiration. Topics include the basics of: stream flow analysis, water balances, thermal energy balances, climate and weather, soil physics, ec hydrology, groundwater hydrology, groundwater-surface water interactions, stream flow generation, and water quality. Incoming students are advised to be proficient in algebraic and spreadsheet analyses and to be familiar with the basics of probability analysis and descriptive statistics

ENSC 445 Watershed Analysis: 3 Credits (3 Lec)

PREREQUISITE: ENSC 444 and STAT 216Q or BIOB 318 or permission of instructor. Conceptual and quantitative analysis of watershed processes with an emphasis on modeling surface water hydrology and water resources management. Watershed modeling concepts including analysis of time series, spatially variable data, model calibration, and uncertainty analysis will be studied and demonstrated. Co-convened with LRES 545

ENSC 448 Stream Restoration Ecology: 3 Credits (2 Lec, 1 Lab)

PREREQUISITE: BIOB 170IN, and either NRSM 240 or BIOE 370 or consent of instructor. Students will critically assess the definitions, assumptions, goals, appropriateness, and outcomes implicit in stream restoration projects in relation to ecosystem processes and dynamics in rivers and streams. Based on this information, students will critique an array of real-world stream restoration plans to identify implicit assumptions, goals, biases, and assess implementation strategies in the context of tenets of the conceptual underpinnings of stream ecology as a discipline

ENSC 454 Landscape Pedology: 3 Credits (2 Lec, 1 Lab)

PREREQUISITE: ENSC 245IN. Processes leading to the formation and spatial distribution of soils on the landscape. Describing, classifying, and mapping soils. We explore classical approaches to evaluating soil development using concepts of soil age and residence time, and variation of soil properties with climate, geomorphic and hydrologic context, plant communities, and parent material. The course includes a substantial hands-on field component. Land use and soil management for agriculture/range are considered in the context of larger scale controls on soil development and distribution

ENSC 458 Teaching Applications in LRES: 1-3 Credits (1-3 Lab)

Application of teaching philosophies and methods through classroom, laboratory, and field teaching experiences. Repeatable up to 3 credits.

ENSC 460 Soil Remediation: 3 Credits (3 Lec)

PREREQUISITE: ENSC 245IN. Principles of soil remediation in impacted landscapes. Soil reconstruction practices are presented for drastically disturbed lands. Treatment science is presented to repair soil systems contaminated by metals and salt as a result of resource extraction and landscape disturbance by humans. Protection of water resources are examined as related to sediment loss control, acid rock drainage science and treatment, and selective handling of geologic stratum. A field trip to a contaminated landscape will demonstrate on-going soil remediation practices

ENSC 461 Restoration Ecology: 3 Credits (3 Lec)

PREREQUISITE: BIOB 170IN, and either NRSM 240 or BIOE 370. Review of ecosystem structure and function, and community and population processes in intact systems, along with the effects of major disturbances on natural systems. Restoration amendments will be discussed in terms of their effects on ecosystem structure and function. The course includes case studies, and focuses on plant and soil systems. Co-convened with LRES 563

ENSC 462 Land Rehab Field Problem: 2 Credits (2 Lab)

PREREQUISITES: ENSC 460 and ENSC 461
Extended field trip to numerous drastically disturbed sites across the Northern Rockies and Northern Great Plains. On-site review of land rehabilitation challenges, potential solutions, and methodologies. Participation by industry, regulatory agency staff, and rehabilitation professionals will occur at most sites. Repeatable up to 12 credits.

ENSC 464 Computational Techniques Environmental Science: 1 Credits (1 Lab)

PREREQUISITE: BIOB 170IN. Computational skills are increasingly important in the Environmental Sciences. This course will focus on basic computer programming using R. No prior expertise is required and exercises will begin at a basic level

ENSC 465 Environmental Biophysics: 3 Credits (2 Lec, 1 Lab)

PREREQUISITE: BIOB 170IN. The study of physical relationships between organisms, ecosystems, and their environment. Basic principles of Micrometeorology, Biometeorology, Ecological Climatology, and Biophysical Ecology as applied to contemporary ecological challenges. Laboratory sessions will focus on computer exercises using ecosystem models and field observations. Co-convened with LRES 565

ENSC 466 Chemical Ecology: 3 Credits (3 Lec)

PREREQUISITE: BIOE 370 or NRSM 240 and CHMY 121 or CHMY 141 or CHMY 151. How organismal interactions are shaped through plant secondary metabolites emphasizing the impacts on ecosystems across multiple scales and in response to a rapidly changing climate. This course combines lectures with student led discussions on contemporary issues and developments in the field and is also designed to improve critical readings of the primary literature and effective communication in science.

ENSC 468 Ecosystem Biogeochem and Global Change: 3 Credits (3 Lec)

PREREQUISITE: ENSC 353. Introduction to the study of biogeochemistry and ecosystem dynamics from an Earth-systems perspective. Discussion will emphasize factors governing the "grand elemental cycles" of carbon, nitrogen, and phosphorus of Earth's major ecosystems and how modern human activities are affecting these cycles. Co-convened with LRES 568

ENSC 490R Undergraduate Research: 1-6 Credits (1 Other)

PREREQUISITE: Junior or Senior standing and approval of instructor. Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. USP scholarships or project support grants are available in many cases. Course will address responsible conduct of research. May be repeated Repeatable up to 12 credits.

ENSC 491 Special Topics: 1-4 Credits (4 Lec, 4 Lab, 4 Other)

PREREQUISITE: Course prerequisites as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number Repeatable up to 12 credits.

ENSC 492 Independent Study: 1-3 Credits (1 Other)

PREREQUISITE: Junior standing, consent of instructor, and approval of department head. Directed research and study on an individual basis Repeatable up to 6 credits.

ENSC 498 Internship: 2-4 Credits (2 Other)

PREREQUISITE: Junior standing, consent of instructor and approval of department head. An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field Repeatable up to 12 credits.

ENSC 499R LRES Capstone: 3 Credits (3 Lec)

PREREQUISITE: LRES major; Senior standing only. Senior capstone course. Must be graduating current or following semester. Provides disciplinary and interdisciplinary knowledge requiring integration and application of environmental science knowledge to natural resource management issues. Topic of course will change. Students will work both independently and in groups to research and critique the current literature related to science application. Course emphasizes writing and presentation skills, scientific methods, review of primary literature and critique of information from varied sources