

Environmental Science and Biology Undergraduate Courses: November 2008

ENV 201 Environmental Science (A,N). Non-majors only. Environmental science is an interdisciplinary field combining ideas and information from the natural and social sciences. The eight integrated themes of lecture and discussion are biodiversity, sustainability, connections in nature, pollution and its prevention, population growth, energy consumption and efficiency, solutions to environmental problems, and the importance of individuals changing their lifestyles and working with others to bring about environmental change. *3 Cr. Every Semester*

ENV 202 Environmental Science (A,L). Required for majors. Open to non-majors. Environmental Science is an interdisciplinary field combining ideas and information from the natural and social sciences. The eight integrated themes of lecture and discussion are biodiversity, sustainability, connections in nature, pollution and its prevention, population growth, energy consumption and efficiency, solutions to environmental problems, and the importance of individuals changing their lifestyles and working with others to bring about environmental change. Laboratory and field activities emphasize hands-on applications of environmental science methods, problem solving, and proper writing of laboratory reports. *4 Cr. Every Semester*

ENV 203 Biology of Organisms (A,N). Non-majors only. Explores basic concepts in the biological sciences from a whole organism (animals and plants) and environmental science perspective. The unifying theme for the course is evolution, and T. H. Dobzhansky's dictum that "Nothing in biology is understandable except in the light of evolution." Topics include the scientific method, molecular and population genetics, fundamentals of cell biology, diversity of life, and evolution and natural selection. *3 Cr. Spring*

ENV 204 Biology of Organisms (A,L). Required for majors. Open to non-majors. Explores basic concepts in the biological sciences from a whole organism (animals and plants) and environmental science perspective. The unifying theme for the course is evolution, and T. H. Dobzhansky's dictum that "Nothing in biology is understandable except in the light of evolution." Topics covered in lectures and laboratories include scientific method, molecular and population genetics, cell biology, diversity of life, and evolution and natural selection. *4 Cr. Spring*

ENV 303 Ecology (A). *Cross-listed as BIO 303. Prerequisites: ENV 111 or ENV 202.* Ecology addresses interrelationships among organisms and the physical environment. Considers energy flow, nutrient cycling, population and community dynamics, principles of animal behavior, and natural history in lecture, laboratory and field studies. *4 Cr. Spring*

ENV 319 Biological Oceanography (A). *Cross-listed as ESC 319.* Review of the oceans' physical, geological and chemical properties followed by study of the classification, biology and life history of marine animals and plants. Concludes with ecology of selected marine ecosystems such as intertidal, deep sea and coral reef. *3 Cr.*

ENV 400 Plant Diversity (A). *Prerequisite: ENV 303.* Introduction to the diversity of plants from an evolutionary perspective to taxonomic and botanical characteristics. Laboratory and field work surveys plant structures and principles of plant classifications and identification from the cellular to organismal level. Projects include plant collection and preservation, plant propagation, plant reproduction, and review and presentation of botanical literature. *4 Cr. Even Fall*

ENV 405 Plant Ecology (A). *Prerequisite: ENV 303.* Introduction to the relationships between plants and the environment including physiological ecology and describing the plant environment; population ecology and interactions between plants and other organisms; and community ecology including plant diversity and temporal dynamics. Field exercises explore local plant communities using experimental and quantitative techniques. Students analyze and discuss current readings in plant ecology. *4 Cr. Odd Fall*

ENV 406 Wildlife Ecology (A). *Prerequisite: ENV 303.* Introduction to the scientific study of wildlife biology. Lecture topics include population ecology, behavior, nutrition, disease, habitat management, predator prey systems, economics, and the human dimensions of wildlife management. Laboratories and field work include radio telemetry, census methods, aging white-tailed deer, and computer modeling. *4 Cr. Even Fall*

ENV 413 Topics in Plant Biology (A). Students with a substantial background in plant biology or ecology review recent scientific literature while addressing selected topics in plant biology, ecology or systematics. *3 Cr.*

ENV 419 Limnology (A). *Prerequisite: ENV 303.* Introduces students to the physical, chemical and biological characteristics of lakes and streams. Topics include top-down: bottom-up control of food webs, eutrophication, nutrient cycling, acid precipitation effects on lakes, paleolimnology, etc. Recommended for students interested in oceanography and marine biology. Required for students in the aquatic ecology track of the environmental science major. ENV 421 is the complementary laboratory. *3 Cr. Fall*

ENV 421 Limnology Laboratory (A). *Prerequisite: ENV 303.* Introduces students to the laboratory and field methods of limnology. Topics include sampling and identification of selected aquatic organisms, chemical analysis of water, and operation of physical and chemical sampling gear. Includes field exercises on lakes, using department vessels, and streams. Recommended for students interested in oceanography and marine biology. Required for students in the aquatic ecology track of the environmental science major. ENV 419 is the complementary lecture course. *2 Cr. Fall*

ENV 423 Biology of Pollution (A). *Prerequisite: ENV 303.* Introduction to the chemistry and biology of pollution. Primary focus on water pollution problems and effects of pollutants on organisms at the molecular, cellular, physiological and behavioral levels, plus effects on populations, communities and ecosystems. Overview of toxicity testing techniques and data analysis. *3 Cr. Odd Spring*

ENV 427 Animal Behavior (A). *Prerequisite: ENV 303.* Introduction to the science of animal behavior. Explores the behavior of animals in relation to adaptations and phylogenetic history. Topics include methods of studying behavior, the effects of genes and environment on behavior, relationships between neural and endocrine function and behavior, foraging strategies, mating strategies and systems, and social systems. 3 Cr. *Even Fall*

ENV 430 Ornithology (A). *Prerequisite: ENV 303.* Introduction to the scientific study of birds. Explores their form, function, ecology, and evolution. Topics include anatomy, physiology, origins and biophysics of flight, migration and annual cycle, mating systems, and population and community ecology of birds. Includes lab and field study of anatomy and flight, identification techniques, census methods, and trapping and banding. 4 Cr. *Even Spring*

ENV 435 Restoration Ecology (A). *Prerequisite: ENV 303.* Introduction to restoration of terrestrial, wetland, and aquatic ecosystems to be addressed by focusing on regulatory constraints, site characterization/evaluation, conceiving and designing restoration projects that fit within the surrounding landscape, monitoring requirements, control of invasives, and adaptive management. Students working in groups will develop conceptual restoration projects of their own choosing. 3 Cr. *Odd Spring*

ENV 436 Water Quality Analysis (A). *Prerequisite: CHM 206.* Introduces standard methods and analytical techniques associated with environmental chemistry. Students gain experience, including set up and trouble shooting, with UV-V spectrophotometry, wet chemical techniques by autoanalyser, fluorometry, gas chromatography and atomic absorption spectrophotometry, by analyzing unknowns. Although the medium for analysis is water, methods are applicable to air samples, tissues and soils. 4 Cr. *Spring*

ENV 437 Biostatistics (A). *Prerequisite: MTH 121 or higher.* Introduction to statistical analysis including descriptive statistics, test selection (including t-tests, regression, ANOVA, and nonparametric alternatives), calculation, interpretation, hypothesis formation and testing, Consideration is given to experimental design and appropriate evaluation of statistical application and interpretation. 3 Cr. *Fall*

ENV 439 Conservation Biology (A). *Prerequisite: ENV 303.* Introduction to the scientific study of conservation biology. Examines current theories and data from evolutionary biology, ecology, and genetics as they relate to the conservation of biological diversity. Topics include causes of extinction, habitat loss and fragmentation, design of nature reserves, landscape ecology, application of basic principles of population biology to species conservation, and restoration ecology. 3 Cr. *Even Fall*

ENV 440 Herpetology (A). *Prerequisite: ENV 303.* Introduction to the scientific study of reptiles and amphibians. Explores their form, function, ecology, and evolution. Topics include anatomy, physiology, mating systems, population and community ecology of herpefauna, and their conservation biology. Includes lab and field study of identification techniques and capture and census methods. 4 Cr. *Odd Spring*

ENV 444 Terrestrial Ecosystem Ecology (A). *Prerequisite: ENV 303.* Introduction to the major terrestrial ecosystems of the world and the stresses they face due to global environmental change such as rising atmospheric carbon dioxide levels, global warming, declining biodiversity, invasive species and elevated nitrogen deposition. Systems will be compared and contrasted with respect to their major characteristics, including vegetation, energy flow, and nutrient cycling and inputs. 3 Cr. *Even Spring*

ENV 446 Wetland Ecology (A). *Prerequisite: ENV 303.* Introduction to wetland science, from wetland types and functions and values to hydrology, biogeochemistry, development and succession, and plant and animal communities. Laboratory exercises consist of field trips to local wetlands of different types, field sampling experiences, practice in wetland delineation, and lab experiments. The course is directed toward practical application of knowledge gained and concludes with problems related to wetland management and restoration. 4 Cr. *Fall*

ENV 448 Northern Wetlands (A). *Prerequisite: ENV 446.* Introduction to wetlands of the northern United States – peatlands and Great Lakes coastal marshes. Wetland development will be addressed starting with underlying geology and hydrology, then proceeding to biogeochemistry and development of plant communities and faunal habitats. Human impacts on these wetland types will be assessed, along with potential means for preventing degradation and restoring wetland functions. 3 Cr. *Even Spring*

ENV 452 Environmental Laws and Regulations (A). Introduction to key federal and state environmental laws, how branches of government interact to enforce environmental laws and regulations, and the roles scientists and lawyers play in resolving environmental issues. 3 Cr. *Every Semester*

ENV 457 Marine Biology-Bahamas (A). *Cross-listed as ESC 457. Prerequisite: One laboratory science course.* Prepare in the fall semester for a two-week January intersession field experience in coral reef biology and geology on San Salvador island in the Bahamas. Study identification, behavior, and ecology of marine organisms in five habitats associated with coral reefs. Learn how to prepare a scientific field notebook and to design, conduct, and report on a personal research project. 3 Cr. *Fall*

ENV 459 Mammalogy (A). *Prerequisite: ENV 303.* Introduction to the scientific study of mammals. Explores their form, function, ecology, and evolution. Topics include origins, anatomy, physiology, diet and feeding strategies, population and community ecology, and social systems. Laboratory and field activities emphasize mammalian classification, habitat selection, and population biology. 4 Cr. *Odd Fall*

ENV 462 Aquatic Toxicology (A). Students will learn to perform aquatic tests on water and sediment using standard fish and aquatic invertebrate test species. This will be accomplished through lectures, hands-on labs, data analyses, and student presentations. 4 Cr. *Even Spring*

ENV 464 Aquaculture I (A). *Prerequisite ENV 303.* Introduction to the principles and practices of intensive and extensive aquaculture. Topics include system design and operation; water quality maintenance; diet and nutrition; reproduction, selective breeding and genetics; disease identification and treatment; and the biology of cultured organisms. *4 Cr. Odd Fall*

ENV 469 The Environmental Imagination (A). This interdisciplinary course explores American environmental writing from both scientific and literary perspectives and investigates the relationship between natural science, natural history and environmental literature. Examines how subjective and objective investigations of the natural world enrich one another and lead to a more complete sense of place. Course includes lectures, discussions, group presentations and field exercises emphasizing description, measurement and aesthetic response. *3 Cr. Odd Fall*

ENV 474 Aquaculture II (A). *Prerequisite: ENV 303.* Introduction to the business aspects of aquaculture. Topics include aquaculture inputs, aquaculture production, farm management, processing, distribution, marketing, consumer behavior, pricing, government policy, modeling, international trade, transfer of technology, international cooperation, and environmental impacts. *4 Cr. Even Fall*

ENV 476 Animal Ecophysiology (A). *Prerequisite: ENV 303.* Introduction to physiological adaptations of animals to their physical environment and the influence of these adaptations on animal distributions. Topics include temperature and energy metabolism, water and ion balance, oxygen availability, sensory and reproductive adaptations. Biochemical, cellular, and organism responses to these factors will be examined using an integrative and comparative approach. *3 Cr. Odd Fall*

ENV 477 Field Biology (A). *Prerequisite: ENV 303.* Introduction to the flora and fauna of various habitats in Western New York. Topics include structure and function of communities, species identification, qualitative and quantitative assessment of communities and ecosystems, and general conservation theory and practice. *1-4 Cr. Summer*

ENV 483 Aquatic Invertebrates (A). *Prerequisite: ENV 303.* Introduction to the scientific study of aquatic invertebrates and their importance in stream and lake ecosystems. Topics include invertebrate biology and ecology, classification and identification (insects, crustaceans, mites, annelids, mollusks, etc.), use of dichotomous keys and sampling equipment, and preparation techniques. Prepares students to predict habitat or water quality conditions based on the invertebrate fauna present. *4 Cr. Odd Spring*

ENV 484 Fish Ecology. *Prerequisite: ENV 303.* Introduction to the scientific study of fish and fisheries. Topics include fish anatomy and physiology in relation to fish behavior and ecology, classification to the ordinal level, population dynamics (recruitment, growth, mortality, environment) and fishery management. ENV 490 is the complementary laboratory. *3 Cr. Even Spring*

ENV 488 Environmental Impact Analysis (A). *Prerequisite: ENV 303.* Introduction to the process of preparing an environmental impact statement (EIS) for a realistic local development project. Topics include the National Environmental Policy Act, the NY State Environmental Quality Review Act, relevant regulations and permit requirements (federal, state, local), and analysis of environmental impacts and alternatives. Depending on the number of credits and session offered, may include field work. *4-6 Cr. Summer*

ENV 490 Fishery Techniques and Fish Identification (A). *Prerequisite: ENV 303.* Introduction to laboratory and field techniques used by fisheries scientists. Hands-on activities include fish collection methods (electrofishing, nets) fish anatomy, fish identification, and quantitative analysis of fisheries data. ENV 484 is the complementary lecture course. *2 Cr. Fall*

ENV 492 Global Environmental Issues (A). This capstone course for senior environmental science majors will explore one or more major global environmental issues during the semester. Students will research the topic, analyze primary literature, engage in class discussion and formal speaking, and write a paper critically evaluating the issue and what should be done about it. *3 Cr. Spring*

ENV 495 Topics in Environmental Science (A). Introduces a special field of study in the environmental sciences not offered in the regular curriculum. Details reflect student demand, needs, topics of interest, and instructor availability. *3-4 Cr. By Arrangement*

ENV 498 Collaborative Research (A). In collaboration with a faculty mentor, the student designs, conducts and prepares a scientific report on a research project in the field or laboratory. A total of three credits from ENV 498 and ENV 499 (Independent Study) combined can be applied toward the Environmental Science major. *1-3 Cr. By Arrangement*

ENV 499 Independent Study (A). In collaboration with a faculty mentor, the student reviews literature and prepares a report on a topic of interest in the environmental sciences. A total of three credits from ENV 499 and ENV 498 (Collaborative Research) combined can be applied toward the Environmental Science major. *1-3 Cr. By Arrangement*