

ZOOLOGY (ZOOL)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ZOOL 400 - Professional Perspectives in Zoology

Credits: 1

Presentations by departmental faculty provide an informal overview of various zoological topics and professional opportunities. The course acquaints students with faculty, provides information on departmental research projects, and facilitates early research involvement for students. Required for all first-year zoology majors. (Fall only). Cr/F.

ZOOL 401 - Human Biology

Credits: 4

Elementary study of structure, function, and development of all systems of the body. No credit toward major or minor. Cannot be taken for credit after BMS 507 and BMS 508. Special fee. Lab.

Attributes: Biological Science(Discovery); Discovery Lab Course; Biological Science GP 3B

ZOOL 406 - Evolution of Human Behavior

Credits: 4

All species are subject to evolutionary forces and humans, including our vast array of behaviors, are no exception. We therefore explore human behavior in the context of evolution by natural selection, with a focus on current research in this field. By understanding the behavioral adaptations that allowed our human ancestors to better navigate the challenges of survival and reproduction, we can hope to understand our own actions on a more integrative, comprehensive level.

Attributes: Biological Science(Discovery); Biological Science GP 3B

ZOOL 412 - Biology of Animals

Credits: 4

Fundamentals of modern animal biology from cells to organisms, including structure, function, genetics, development, ecology, and the diversity produced by animal evolution. Weekly demonstrations and virtual e-labs provide a hands-on introduction to the animal kingdom. Special fee. Lab. (Fall semester only.)

Attributes: Biological Science(Discovery); Discovery Lab Course; Biological Science GP 3B

ZOOL #444 - Dogs to Dragons: Origins of Species

Credits: 4

A freshman "inquiry" seminar introducing fundamental evolutionary concepts and mechanisms, as well as examining the nature of science, and the ways in which scientists use imagination and inference to better understand the natural world. Through evolutionary case studies ranging from the very real to the purely imaginary, students learn to compare and assess explanatory hypotheses, and to use creative, scientifically-disciplined inference as working scientists do. They also develop their abilities to decide what is or isn't science, and to judge the relevance and adequacy of evidence claimed to support hypotheses. The course begins by introducing the mechanism of natural selection through the engaging example of dog domestication, move from there to broader discussions of speciation (including species definitions, and case studies of speciation in progress). The central portion of the course focuses on issues of definitions (what is a "hypothesis" anyway?), and developing increasingly sophisticated and well-informed judgments about different sorts of biological information. In the final section, we explore proper and improper roles of imagination and creativity in science: how (and why) real scientists use fictional species, and how to tell the difference between fictions and frauds while leaving room for humor and invention. Writing intensive.

Attributes: Biological Science(Discovery); Technology GP 3T; Inquiry (Discovery); Writing Intensive Course

ZOOL 518 - Vertebrate Morphology

Credits: 5

Evolutionary and comparative examination of vertebrate anatomy. Covers the structure of the major systems at both the macroscopic and microscopic levels. Prereq: BIOL 411 and BIOL 412 or equivalent. Special fee. Lab.

ZOOL 529 - Developmental Biology

Credits: 4

Introduces developmental biology, examining basic developmental mechanisms and their evolutionary contexts. Principles and tools of the trade, overview of major developmental events in various phyla, current areas of research and other special topics. Labs include different ways to observe development (from low- to high-tech), and work with selected live material. Prereq: BIOL 411 and BIOL 412 or equivalent. No credit if credit earned for ZOOL 729. Special fee. Lab.

ZOOL 542 - Ornithology

Credits: 4

Identification and biology of birds, especially those of northeastern United States. Involves field trips, laboratory work, and lectures. Prereq: one semester of biology. (Spring semester only.)

ZOOL 600 - Field Experience

Credits: 1-4

A supervised experience providing the opportunity to apply academic experience in settings associated with future professional employment and/or related graduate opportunities. Must be approved by a faculty advisor selected by the student. May be repeated to a maximum of 8 credit hours. Prereq: permission. Cr/F.

ZOOL 610 - Principles of Aquaculture

Credits: 4

Introduces the culture practices employed for production of aquatic organisms. Topics include ecological and environmental considerations, selective breeding, nutrition, diseases, processing, and marketing. Emphasis on finfish. Prereq: BIOL 411 and BIOL 412 or equivalent.

ZOOL 611 - Principles of Aquaculture Lab

Credits: 2

Laboratory exercises in aquaculture covering the use of chemical reagents to monitor water quality; brood stock feeding and management; use of anesthesia and fish handling; spawning marine finfish; culturing algae, rotifers and *Artemia* for marine larviculture; larviculture of marine finfish; assessing fish growth; hatchery hygiene. Includes site visits to local production facilities. Prereq: BIOL 411 and BIOL 412 or equivalent. Coreq: ZOOL 610.

ZOOL 613 - Animal Behavior

Credits: 5

Introduces the naturalistic study of animal behavior. Emphasizes the evolution, development, physiology, and ecology of behavior. Topics include the genetic and acquired bases of behavior, neuroethology and behavioral endocrinology, communication, orientation, foraging strategies, reproductive ecology, and the evolution of altruistic behavior. Prereq: BIOL 412 or equivalent. Lab. Writing intensive. Special fee.

Attributes: Writing Intensive Course

ZOOL 625 - Principles of Animal Physiology

Credits: 3

Introduces the principles of animal function. The major systems (digestion, metabolism, respiration, circulation, osmotic and ionic regulation, nerve-muscle function, endocrine control) are covered with emphasis on functional mechanisms at the cell and tissue levels. Prereq: one year of introductory biology is required.

ZOOL 626 - Animal Physiology Laboratory

Credits: 2

Basic training in the measurement of function in animals, data analysis and expression, and the development of scientific communication skills. Special fee. Writing intensive.

Attributes: Writing Intensive Course

ZOOL 628 - Marine Invertebrate Evolution and Ecology

Credits: 5

Stresses the rich diversity of marine invertebrates by integrating phylogenetic trends with physiological and behavioral adaptation, and with ecological and symbiotic interactions. Offers a comparative survey of invertebrates from protozoans to protochordates; deals with aspects of form and function, development, evolution, classification, ecology, and natural history. Students work with live and preserved animals. Extensive dissections and a field component are required. Prereq: BIOL 411 and BIOL 412. Special fee. Lab. (Not offered every year.)

ZOOL 690 - Evolution

Credits: 4

Biological evolution is the changes within populations of organisms that extend beyond the lifetime of individuals. Darwin's mechanism of evolution by natural selection, and other evolutionary forces, explain the diverse adaptations of organisms to different environments. Topics include principles of heredity, sources and maintenance of variation, adaptation, speciation, classification, development, the history of life and the earth, and current controversies. Prereq: BIOL 411 and BIOL 412 or equivalent. Writing intensive.

Attributes: Writing Intensive Course

ZOOL 710 - Ichthyology

Credits: 4

Introduces the evolution, systematics, anatomy, physiology, and ecology of fishes, with emphasis on New England species. Prereq: principles of biology or equivalent. Lab. (Offered in alternate years.) Special fee.

ZOOL 721 - Aquatic Invasive Species

Credits: 4

Capstone course for a limited number of biological science majors to work closely with and help teach a Discovery course for non-majors in biology. Involves lectures, discussions, and laboratory and field exercises and write-ups focusing on managing aquatic invasive species based on an understanding of their ecology. Special fee.

ZOOL 726 - Conservation Behavior

Credits: 4

Conservation biology is well established as a crucial bridge between basic biology and resource management. Recently, biologists have begun to recognize the importance of the link between conservation and animal behavior. Management strategies can have very real impacts on the behavior of animals; likewise, animal behavior (in captivity and the wild) should inform our approach to conservation in a variety of contexts. This interdisciplinary course explores the causes and consequences of this relationship. Prereq: at least one of the following ZOOL 713, NR 650, or permission. Writing intensive.

Attributes: Writing Intensive Course

ZOOL 733 - Behavioral Ecology

Credits: 4

Behavioral adaptations of animals to their environment, including the evolution of behavior and behavioral genetics; foraging and competition for resources; reproductive ecology, mating systems and parental care; and the evolution of cooperative behavior. Examples include both vertebrates and invertebrates. Emphasizes critical understanding of concepts as exhibited in oral and written exercises. Students conduct independent investigations. Prereq: ZOOL 713 or permission. Lab. (Offered in alternate years.) Writing intensive.

Attributes: Writing Intensive Course

ZOOL 736 - Genes and Behavior

Credits: 4

Genes and behavior examines the genetic underpinnings of animal behavior, and how behavior evolves on a genetic level. The course primarily relies on readings from the primary literature, using examples from laboratory model organisms, animals in their natural habitats, and humans. Topics include aggressiveness, social behavior, personality, parental care, communication, mating behavior, novelty seeking behavior, and foraging. This interdisciplinary course examines these behaviors at multiple levels, including genomics, population genetics, molecular genetics, epigenetics, endocrinology, and neurobiology. Prereq: GEN 604 and ZOOL 713 or equivalent.

ZOOL 745 - Biology and Diversity of Insects

Credits: 4

The lecture examines the unique biology and structure of insects, the most diverse group of organisms. The laboratory project is based on past public requests for an understanding of aquatic insect biodiversity in streams. Experience in sampling, sorting, and identifying aquatic insects is developed, and an understanding of biodiversity indices is developed for a formal report and presentation. Prereq: BIOL 411 and 412 or equivalent. Special fee. (Not offered every year.)

ZOOL 750 - Biological Oceanography

Credits: 4

Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton ecology, ecosystems and global ocean dynamics. Field trips on R/V Gulf Challenger and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of the instructor. (Also offered as ESCI 750.) Special fee. Lab. (Not offered every year.)

ZOOL 772 - Fisheries Biology**Credits: 3**

Principles of fisheries science, with emphasis on techniques used to assess the biological characteristics of exploited fish populations, and the use of such information for fisheries management. Prereq: ZOOL 710 or equivalent; permission. (Not offered every year.)

ZOOL 773 - Physiology of Fish**Credits: 4**

Investigates the physiological processes responsible for maintaining homeostasis in fishes. Focuses on the function and regulation of the major organ systems during stress and environmental adaptation. Topics include reproduction, osmoregulation, digestion, endocrinology, and sensory perception.

ZOOL 777 - Neurobiology and Behavior**Credits: 3**

Survey of fundamental concepts and recent discoveries in neurobiology. Topics include structure and function of neurons, development, cellular basis of behavior (sensory and motor systems), neuropharmacology, and neural plasticity (learning). Prereq: BIOL 411 and BIOL 412 or permission. Physiology (ZOOL 625) also desirable.

ZOOL 795 - Special Investigations**Credits: 1-4**

Independent study in various areas including but not limited to animal behavior, developmental biology, ecology, endocrinology, evolution, ichthyology, genetics, history of biology, invertebrate biology, neurobiology and behavior, protozoology, teaching practices, underwater research, vertebrate biology, and biological techniques. Course sections for advanced work, individual or group seminar. May include reading, laboratory work, organized seminars, and conferences. Prereq: permission of instructor needed.

ZOOL 795W - Special Investigations**Credits: 1-4**

Independent study in various areas including but not limited to animal behavior, developmental biology, ecology, endocrinology, evolution, ichthyology, genetics, history of biology, invertebrate biology, neurobiology and behavior, protozoology, teaching practices, underwater research, vertebrate biology, and biological techniques. Course sections for advanced work, individual or group seminar. May include reading, laboratory work, organized seminars, and conferences. Prereq: permission of instructor needed. Writing intensive.

Attributes: Writing Intensive Course

ZOOL 799 - Honors Senior Thesis**Credits: 1-4**

Working under the direction of a faculty sponsor, the student plans and carries out independent research resulting in a written thesis. Limited to students entering their senior year; required for students in the honors program or working toward honors-in-major. Prereq: permission. A two-semester sequence. 2-4 credits each semester; 8 credits maximum. IA (continuous grading) given at the end of the first semester. Writing intensive.

Attributes: Writing Intensive Course