**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  
How does the human body function in the face of constant flux? In this introductory biology course you will explore the molecules, cells, and organ systems that keep you healthy though the multidisciplinary lenses of chemistry, genetics, and homeostasis. Hands-on experimentation allows you to investigate common health-related questions such as the effects of caffeine on reaction time and the effects of handwashing on bacterial growth and transmission. Cannot be taken for credit after BMS 507 and BMS 508. Special Fee. Lab.  
**Attributes:** Biological Science(Discovery); Inquiry (Discovery); Writing Intensive Course

**ZOOL 406 - Evolution of Human Behavior**  
**Credits:** 4  
Have you ever wondered why women and men often have different criteria when looking for sexual partners? Why do we feel compelled to help people in some situations, but not others? This course explores the evolutionary effects on our most basic impulses, abilities, and failings, and illuminates the social and ecological pressures that made us who we are. Fair warning: this course may forever change how you think about your friends, your dates, and yourself!  
**Attributes:** Biological Science(Discovery)

**ZOOL 406H - Honors/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 will 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)

**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); Inquiry (Discovery); Writing Intensive Course

**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); Inquiry (Discovery); Writing Intensive Course

**ZOOL 518 - Vertebrate Morphology**  
**Credits:** 5  
Why are vertebrates so successful on Earth? In this hands-on comparative biology course you will systematically examine the evolutionary history of form and function by exploring key adaptations that allowed vertebrates to diversify and thrive in the aquatic, terrestrial, and arboreal habitats they occupy today. In lab you will hone your dissection skills as you track ancestral and derived characteristics in 5 representative species on the vertebrate tree of life. Prereq: BIOL 411 and BIOL 412 or equivalent. Special fee. Lab.  
**Equivalent(s):** ANSC 511, ANSC 512

**ZOOL 529 - Developmental Biology**  
**Credits:** 4  
Developmental biology explores how organisms construct themselves in each generation, and how those processes interact with ecological and evolutionary forces. The course examines development in various phyla, with an overarching focus on the design and interpretation of experiments using both classical and modern techniques. Labs include student-designed experiments and observation of development in several species of vertebrate embryos. Special fee. Lab. Prereq: BIOL 411 & BIOL 412, or equivalent.  
**Equivalent(s):** ZOOL 629

**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 555 - Introduction to Entomology  
**Credits:** 4  
This course is about insects, the animal taxon that represents 50% of all life forms on Earth. During this course students will explore the incredible diversity by studying insects from inside out and learning about major evolutionary events in the last 500 million years that shaped this incredible diversity. This course will also highlight the beneficial and detrimental roles insects play in human society. Students will gain insights into medical and veterinary entomology, coastal entomology, principles of sustainable pest management and insect conservation. Throughout the course, students will broadly apply online tools for insect identification and will be exposed to community driven nature conservation and monitoring efforts using online applications, such as inaturalist and bugguide. Prereq: BIOL 412.

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. Prereq: permission. Cr/F.  
**Repeat Rule:** May be repeated for a maximum of 8 credits.

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.  
**Corequisite:** ZOOL 610  
**Co-requisite:** ZOOL 610

ZOOL 613 - Animal Behavior  
**Credits:** 5  
In this course we will first investigate the mechanisms of behavior—how do animals behave the way they do? We’ll then spend the bulk of the semester exploring the ecology and evolution of behavior—why do animals behave the way they do? In lab, we will use hands-on activities to complement material from class, and you’ll gain first-hand research experience when you design and conduct your own animal behavior study. Special fee. Lab. Prereq: BIOL 412 or equivalent.  
**Attributes:** Writing Intensive Course  
**Equivalent(s):** ZOOL 713

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.  
**Equivalent(s):** ANSC 627, ANSC 717, ZOOL 519, ZOOL 627

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.  
**Co-requisite:** ZOOL 625  
**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 protostomes; 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.)  
**Equivalent(s):** ZOOL 528

ZOOL 690 - Evolution  
**Credits:** 4  
Evolutionary biology is about uncovering the past, understanding the present, and predicting the future of animals, plants, and microbes. It also offers insight into how scientific ideas change through time. This course covers natural selection and adaptation, phylogeny, population genetics and structure, origins and extinction of species, domestication, and evolutionary medicine. Additional topics may include human evolution and evolutionary impacts, biogeography, and social evolution, as well as the intersections between evolution, ecology and development.  
**Attributes:** Writing Intensive Course

ZOOL 708 - Stream Ecology  
**Credits:** 4  
Ecological relationships of organisms in flowing water; streams as ecosystems. Lectures on physical and chemical features of streams, floral and faunal communities, and factors controlling populations and behavior of stream organisms. Lab exercises employ both field and laboratory experimental techniques. Special fee. Lab. (Not offered every year.)

ZOOL 710 - Elasmobranchs and Bony Fishes  
**Credits:** 4  
Some fish swimming today are hundreds of years old, whereas others complete their life cycle in two months! This course provides an introduction to the diversity of fishes found across the globe, including elasmobranchs (sharks, skates, and rays) and teleosts (bony fishes). Particular attention will be paid to fishes local to New Hampshire and New England. Students will learn about fish anatomy, physiology, and ecology. Prereq: BIOL 411, BIOL 412, or equivalent. Lab. (Offered in alternating years.) Special Fee.  
**Equivalent(s):** ZOOL 734

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
What's the best way to deter an elephant from raiding crops? Is it with chili peppers? Bees? This is one example from the new interdisciplinary field of “conservation behavior,” which uses the study of animal behavior to inform how we manage wildlife populations. This course targets students well-versed in either animal behavior or wildlife ecology who wish to learn more about the other side. We will focus heavily on reading, writing, discussion, and career preparation. Prereq: ZOOL 613, NR 433, or NR 640.
Attributes: Writing Intensive Course

ZOOL 733 - Behavioral Ecology
Credits: 4
Behavioral ecology is the evolution of animal behavior played out on the stage of ecology—why might a certain behavior be adaptive in a certain context? In this course, we will pursue in-depth, high-level explorations of the central topics of animal behavior, all through the lens of evolution. We will also focus heavily on improving reading, writing, and presentation skills. Prereq: ZOOL 613.
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 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.)
Equivalent(s): ESCI 750

ZOOL 772 - Fisheries Biology: Conservation and Management
Credits: 3
Globally, many fished populations are declining, but 3.2 billion people eat fish and the average human eats >40 pounds of fish a year. This course identifies what biological characteristics are important to management and how they are measured. The course also explores quantitative methods describing fishery-population interactions and other management tools. Lastly, students will learn about the impacts of fishing on ecosystems. Prereq: ZOOL 710 or equivalent; permission. (Not offered every year.)

ZOOL 777 - Neuroethology: The Neural Basis of Animal Behavior
Credits: 3
The focus of this course is on the neural basis of animal behavior, with a focus on the most recent discoveries in the field. Topics include animal communication, navigation, sensory physiology, pharmacology and learning. Prereq: BIOL 411 and BIOL 412, or permission. Physiology (ZOOL 625), or another introductory neurobiology course, 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.
Repeat Rule: May be repeated for a maximum of 12 credits.

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.
Attributes: Writing Intensive Course
Repeat Rule: May be repeated for a maximum of 12 credits.

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. IA (continuous grading) given at the end of the first semester.
Attributes: Writing Intensive Course
Repeat Rule: May be repeated for a maximum of 8 credits.