BIOLOGICAL SCIENCES

The Department of Biological Sciences embraces all areas of biology in its diverse teaching and research programs. Majors target the areas of Biology (BIOL), Marine, Estuarine and Freshwater Biology (MEFB), Neuroscience and Behavior (NSB), and Zoology (ZOOL). All of these offer a Bachelor of Science degree, with Zoology also offering a Bachelor of Arts. Minors provide a focus on special areas of the biological sciences for students within and outside the College of Life Sciences and Agriculture. Minors are: Animal Behavior, Biology, Marine Biology, Plant Biology, and Zoology. Our course offerings provide a wide selection of both field and lab-based courses, that provide opportunities and experiences appropriate for the diverse array of positions that are available in the broad area of Biology. There is a common set of core or foundation courses for the majors that allow a simple transfer between them up to the end of the second year, and each major has a set of topical categories with options that lead to a more focused exposure to the breadth of biology, while allowing for personal interests to be developed in the major.

Our focus is on organismal biology in the basic and applied sciences, encompassing physiology, behavior, ecology, and evolutionary biology. Faculty in our department study a wide range of organisms from freshwater, marine, and terrestrial ecosystems. Our location near the Atlantic coastline and the White Mountains provides numerous opportunities for field-based research. The Jackson Estuarine Laboratory, located nearby on Great Bay, and Shoals Marine Laboratory, located on the Isles of Shoals, are valuable resources for students in the Marine and Freshwater Biology program. Collaboration with Cooperative Extension and the Agricultural Experiment Station allows for terrestrial ecological research within farm and forest systems.

Students in the DBS majors find it easy to integrate the biology core courses with those recommended for establishment of the background appropriate for application to the professional biomedical and health-care programs, as well as to schools with graduate programs.

https://colsa.unh.edu/biological-sciences

Programs

- Biology (BIOL)
- Marine, Estuarine, and Freshwater Biology (MEFB)
- Neuroscience and Behavior (NSB)
- Zoology (ZOOL)

Courses

Biology (BIOL)

BIOL 400 - Professional Perspectives on Biology
Credits: 1
Where can a degree in biology take me? This course views the scope of biology and explores professional opportunities for biological science majors. Guest speakers from on- and off-campus present seminars and lead discussions on contemporary issues in biology. This course will help you learn the skills required to succeed in biology and develop strategies for college success. Today, the field is multidimensional, offering many career opportunities for the future. Required for all first semester biology majors.
Grade Mode: Credit/Fail Grading

BIOL 402 - Biology in our Daily Lives
Credits: 4
Students will learn about the nature and practice of science as it relates to biology, and the ways in which our activities have a biological impact on the world around us. Throughout the course, the students will examine the biological messages with which we are constantly bombarded, and by linking background scientific principles to those messages, practice distinguishing science from pseudoscience.
Attributes: Biological Science(Discovery)
Grade Mode: Letter Grading

BIOL 408 - Plants and Civilization
Credits: 4
Global experience of human interactions with plants, and the ways in which plants have contributed to the development and the flourishing of human societies. Includes role of plants in providing sustenance, clothing and shelter, quest for spices, the historical consequences of plant explorations and exploitations, the power to heal or kill, plants in mythology and spiritual endeavors, plants that alter consciousness, plant diseases and human history, plants as energy for society, and the Green Revolution in global change and feeding the world in the future.
Attributes: Biological Science(Discovery); Discovery Lab Course
Equivalent(s): PBIO 400
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 409 - Green Life: Introducing the Botanical Sciences
Credits: 0 or 4
All human and other animal life on earth depends upon green life: i.s., the plant world. In its diverse forms, green life is the ultimate source of our food, and of the atmospheric breath of life: oxygen. This course explores the structure, function, growth, reproduction, and remarkable evolutionary diversity of plants in their natural and human-influenced environments. Lab.
Attributes: Biological Science(Discovery); Discovery Lab Course
Equivalent(s): BOT 412, PBIO 412
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 411 - Introductory Biology: Molecular and Cellular
Credits: 0 or 4
Introduction to structure and function of cells; tissues and organs; physiological processes; genes and heredity. Required for majors in the biological sciences. Lab. Students not permitted to enroll in BIOL 411 and BIOL 412 in the same semester.
Attributes: Biological Science(Discovery); Discovery Lab Course; Inquiry (Discovery)
Equivalent(s): BIOL 411H
Mutual Exclusion: No credit for students who have taken BIOL 413.
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 411H - Honors/Introductory Biology: Molecular and Cellular
Credits: 0 or 4
Introduction to structure and function of cells, tissues and organs, physiological processes and genes and heredity. Required for majors in the biological sciences. Lab.
Attributes: Biological Science(Discovery); Discovery Lab Course; Honors course; Inquiry (Discovery)
Equivalent(s): BIOL 411
Mutual Exclusion: No credit for students who have taken BIOL 413.
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 412 - Introductory Biology: Evolution, Biodiversity and Ecology
Credits: 0 or 4
Evolution is the paradigm through which we understand Biology. This course will introduce students to evolutionary concepts that underlie the tremendous biodiversity present on Earth, and explore the ecological interactions that occur among individuals and species. Indoor and outdoor lab activities. Required for majors in the biological sciences. Students are not permitted to enroll in BIOL 411 and BIOL 412 in the same semester. Lab.
Attributes: Biological Science(Discovery); Discovery Lab Course; Inquiry (Discovery)
Equivalent(s): BIOL 412H
Mutual Exclusion: No credit for students who have taken BIOL 414.
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 412H - Honors/Introductory Biology: Evolution, Biodiversity, and Ecology
Credits: 0 or 4
Evolution is the paradigm through which we understand Biology. This course will introduce students to evolutionary concepts that underlie the tremendous biodiversity present on Earth, and explore the ecological interactions that occur among individuals and species. Indoor and outdoor lab activities. Required for majors in the biological sciences. Students are not permitted to enroll in BIOL 411 and BIOL 412 in the same semester. Lab.
Attributes: Biological Science(Discovery); Discovery Lab Course; Honors course; Inquiry (Discovery)
Equivalent(s): BIOL 412
Mutual Exclusion: No credit for students who have taken BIOL 414.
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 413 - Principles of Biology I
Credits: 0 or 4
Lecture and Laboratory introduction to biological principles; cell structure, function, replication, energetics and transport mechanisms; physiological processes; Mendelian, molecular genetics and gene technology. Required for students majoring in the life sciences. Lab.
Attributes: Biological Science(Discovery); Discovery Lab Course; Inquiry (Discovery)
Mutual Exclusion: No credit for students who have taken BIOL 411, BIOL 411H.
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 414 - Principles of Biology II
Credits: 0 or 4
Lecture and laboratory survey of the five kingdoms of life; physiology of cells, tissues, organs, and organ systems; evolution; human impact on the biosphere. Required for students majoring in the life sciences. Cannot be taken for credit after BIOL 412 or equivalent. Lab.
Attributes: Biological Science(Discovery); Discovery Lab Course
Mutual Exclusion: No credit for students who have taken BIOL 412, BIOL 412H.
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 420 - Introduction to Forensic Sciences
Credits: 0 or 4
Explore the forensic sciences! How do you collect, preserve, and analyze evidence related to a crime scene investigation? Hear from the experts and apply scientific principles and techniques in laboratory exercises that follow a crime scene scenario. The goal of this class will be to provide students with an understanding of what criminalistics entails and to prepare them for additional, more in-depth classes in criminalistics or forensic science.
Attributes: Biological Science(Discovery); Discovery Lab Course
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 428 - Quantitative Biosciences
Credits: 4
Quantitative Biosciences introduces first and second-year students in the life sciences to the quantitative approaches used in molecular biology, behavior/physiology, and ecology. Through lectures (e.g., focused on quantitative concepts and biological material) and recitations (e.g., focused on applying quantitative concepts to biological case studies), students will learn to apply mathematical models, perform data analysis, and use computational tools to address biological questions. This course emphasizes the integration of quantitative methods across multiple biological scales—from molecules to ecosystems. Students are expected to have had high school biology. Previous undergraduate coursework in biology in helpful, but not required.
Attributes: Quantitative Reasoning(Disc)
Grade Mode: Letter Grading

BIOL 430 - Biology of the City
Credits: 4
This course explores biological systems, functions, and interaction of organisms in an urban environment. Using the campus as our laboratory, the course will progress from exploring the effects of urbanization on biodiversity, biological responses to urbanization, urban forestry, urban agriculture, and conclude with topics in sustainable urban development and conservation. Students in the course will develop an understanding of ecological concepts, problems, and solutions to improving ecological systems of urban areas.
Attributes: Biological Science(Discovery); Discovery Lab Course
Grade Mode: Letter Grading

BIOL 444B - Current Controversial Issues in Biology
Credits: 4
An inquiry into current controversial issues in biology and their scientific and technical bases, but with an emphasis on exploring the various perspectives or beliefs related to each topic and their social and environmental implications.
Attributes: Biological Science(Discovery); Inquiry (Discovery)
Grade Mode: Letter Grading

BIOL 510 - Mushrooms, Molds, and Mildews: Introduction to the Fungal Kingdom
Credits: 4
Fungi are a fascinating group of organisms that occupy nearly every habitat on the planet. We encounter fungi in everyday life from the dangerous to the delicious. This course is a fun, approachable introduction to the world of fungi. Students will learn about the role fungi play in human society, review basic concepts of fungal biology and discuss important issues of our time: how we use fungi to make medicines, how fungi feed us, how plant diseases and food spoilage affect food supply, and how fungi contribute to ecosystem functioning.
Grade Mode: Letter Grading

BIOL 520 - Our Changing Planet
Credits: 4
Ecosystem interrelations and factors critical to maintain sustainability will be addressed in this course. Environmental issues such as water usage, pollution, and treatment; air and soil quality; fossil fuels and alternative energy sources will be presented. Not for credit if credit earned for ENE 520.
Attributes: Environment,TechSociety(Disc)
Equivalent(s): CIE 520, ENCV 520, ENE 520
Grade Mode: Letter Grading

BIOL 528 - Applied Biostatistics I
Credits: 4
Knowledge of biostatistics is essential to understanding our observations of life on Earth and properly design and conduct scientific research. Students develop skills in organizing data and performing, presenting, and interpreting statistical analyses. Theoretical concepts are applied using statistical software(s) and prepared biological data. Topics include descriptive statistics, continuous and discrete probability distributions, inferential statistics, confidence intervals, hypothesis testing for a difference of means and proportions, linear regression, non-parametric hypothesis testing, and graphing.
Attributes: Quantitative Reasoning(Disc)
Mutual Exclusion: No credit for students who have taken ADM 430, ADMN 420, ADMN 510, EREC 525, HHS 540, HMP 540, MATH 439, MATH 539, MATH 644, PSYC 402, PSYC 402H, SOC 402, SOC 402H, SOC 502, SOC 502H.
Grade Mode: Letter Grading

BIOL 541W - Ecology
Credits: 0 or 4
Physical and biological factors affecting distribution, abundance, and adaptations of organisms. Population, community, and ecosystem structure and function. Lab.
Attributes: Writing Intensive Course
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D- or NR 439 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Equivalent(s): BIOL 541
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 566 - Systematic Botany
Credits: 0 or 4
Scientific basis of plant taxonomy and the identification and classification of major plant families, native trees, shrubs, and wildflowers. Field trips, plant collection. Lab.
Prerequisite(s): (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D- or BIOL 409 with a minimum grade of D-).
Equivalent(s): PBIO 566
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 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 adviser selected by the student.
Repeat Rule: May be repeated for a maximum of 8 credits.
Grade Mode: Credit/Fail Grading

BIOL 633 - Data Analysis for Life Science
Credits: 4
Expand your statistical knowledge and resume by learning R. Use project-based learning to explore topics such as inequalities of life expectancy, heart disease and risk behaviors, biomagnification of ecotoxins, and impacts of ticks on wildlife populations while learning statistical skills and R. In this course students will learn to become proficient in R (data manipulation, graphing, hypothesis testing, importing and cleaning data) and learn to effectively communicate statistical results.
Prerequisite(s): BIOL 528 with a minimum grade of D- or ADMN 510 with a minimum grade of D- or EREC 525 with a minimum grade of D- or HHS 540 with a minimum grade of D- or MATH 439 with a minimum grade of D- or MATH 539 with a minimum grade of D- or MATH 644 with a minimum grade of D- or PSYC 402 with a minimum grade of D- or PSYC 402H with a minimum grade of D- or SOC 402 with a minimum grade of D- or SOC 402H with a minimum grade of D- or SOC 502 with a minimum grade of D- or SOC 502H with a minimum grade of D-.
Grade Mode: Letter Grading

BIOL 695 - Biology Teaching Practices
Credits: 1-4
Students assist instructor in biology course labs. Responsibilities may include assisting instructors with field trips, lab set-up and clean-up, helping students during lab and field exercises, presenting material, and creating a project that enhances the curriculum. You may be expected to present material or create a project that enhances the curriculum. This course is by invitation only.
Repeat Rule: May be repeated for a maximum of 4 credits.
Equivalent(s): BSCI 695
Grade Mode: Letter Grading

BIOL 700 - Current and Controversial Issues in Biology
Credits: 4
This course explores current issues in the biological sciences that are controversial and have a significant impact on individuals and society. Issues related to human population growth, evolution, cloning, synthetic biology, genetically modified organisms, free will, etc. Biology capstone. Only open to Animal Science, Zoology, Neuroscience and Behavior, Biology, Marine & Freshwater Biology, and Sust Agriculture& Food Systems majors.
Grade Mode: Letter Grading

BIOL 701 - Plant Physiology
Credits: 4
This course covers general principles of plant physiology relating plant structure to function and introduce basic physiological processes underlying plant growth and development and plant responses to the environment. Course topics include plant cell structure, plant water relations, plant mineral nutrition, metabolism, photosynthesis, plant respiration, signal transduction, plant growth regulators, photomorphogenesis, plant development, reproduction, senescence, and stress physiology. Course format consists of lectures and laboratory session. The laboratory session is designed to accompany lectures in plant physiology. The laboratories' core objective is to help students visualize main basic concepts and common techniques in plant physiology by running basic experiments, analyze data, and present results.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 704 - Plant-Microbe Interactions
Credits: 3
Microbes and plants have developed intriguing strategies to encourage, resist or profit from their coexistence. The primary objective of the course is to provide students with a comprehensive overview of the various ways in which microbes interacts with plants, the outcomes of that interplay, and applications of these interactions and explore how these interactions impact ecosystem function.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-) and (GEN 604 with a minimum grade of D- or (BMS 503 with a minimum grade of D- and BMS 504 with a minimum grade of D-)).
Grade Mode: Letter Grading

BIOL 706 - Data Science with R for the Life Sciences
Credits: 4
Introduces students to the basic data analysis and programming tools commonly used throughout the life sciences. Students will become proficient in R programming, data wrangling and cleaning, the principles of open and reproducible science, SQL database management, version control via Git/Github, building maps, and Bash command lines. Data sets and case studies from across the life sciences will be used throughout the course. The class culminates with an small group project.
Grade Mode: Letter Grading

BIOL 711 - Experimental Design & Analysis
Credits: 4
Design and analysis of biological and ecological research experiments. "Real world" studies used to discuss the identification of hypotheses, appropriate experimental design, and the application of statistical analyses including ANOVA, ANCOVA, correlation and regression, cluster analysis, classification and ordination techniques. Theoretical statistical concepts tailored to consider students' own thesis and dissertation research, allowing statistical problems to be addressed at various stages of the research process. Common computer packages used for analyses include Excel, JMP, Systat, and R.
Grade Mode: Letter Grading

BIOL 714W - Model Organisms in Biological and Medical Research
Credits: 2
Animals, plants, and microbes serve as powerful tools for both basic and biomedical research. This course integrates historical, philosophical, sociological, and biological perspectives to examine how models are chosen and used. and how to evaluate their strengths and weaknesses. Students will study particular model species in depth, and address general epistemological questions about the choice and use of model organisms. This course is designed for graduate students and advanced undergraduates interested in research. 58 hours of Undergrad Coursework, including advanced study in at least one specified area required.
Attributes: Writing Intensive Course
Equivalent(s): BIOL 714
Grade Mode: Letter Grading

BIOL 720 - Plant-Animal Interactions
Credits: 4
Animals and plants engage in a range of interactions, from plant-pollinator and plant-ant mutualisms to plant-herbivore and carnivorous plant antagonisms. This course will explore the consequences of a variety of interactions on the evolution of traits in both animals and plants, considering implications for both conservation and agriculture. Weekly recitation.
Prerequisite(s): (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Grade Mode: Letter Grading

BIOL 752 - New England Mushrooms: a Field and Lab Exploration
Credits: 4
This is a hands-on field, lab and lecture course in the identification, classification, life histories, and ecology of mushrooms and other macrofungi. Lectures focus on macrofungal ecology and systematics. Laboratory instruction emphasizes morphological, microscopic, and molecular identification techniques, plus the use of smart-phone field note recording and on-line resources. Several field trips are required in addition to the weekly laboratory. Previous experience with fungi is not required. Grades are based on a collection, a project, and presentations.
Prerequisite(s): ((BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) or (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-)) or BIOL 409 with a minimum grade of D-.
Equivalent(s): BOT 752, PBIO 752
Grade Mode: Letter Grading
Special Fee: Yes

BIOL 775 - Plant Rx
Credits: 3
This course will explore the biomedical and neuroscientific applications of plants. Through lectures, discussions and readings, the centuries old reliance of humans on plants to treat basic ailments, as well as how plants and their metabolites have catalyzed countless advances and inspired major discoveries in neuroscience, pharmacology, and medicine will be examined. The focus of the course will be split between understanding the biology of how and why plants produce secondary metabolites with medicinal properties and understanding how these signaling molecules have been used by humans to treat various ailments and expand the mind.
Prerequisite(s): BMCB 658 with a minimum grade of D- or BMCB 658A with a minimum grade of D-.
Grade Mode: Letter Grading

BIOL 780 - Capstone Companion Course
Credits: 1
This course is the required companion course to a student's individual capstone experience. It must be taken during the same semester as the individual experience, or in the fall immediately following a summer experience. This course will help connect a student's individual capstone experience to their broader academic program, and will be a forum for sharing individual experiences with peers. Thesis students should enroll in BIOL 780 during the second semester of the thesis. Should also be taken with a pre-approved individual capstone experience.
Grade Mode: Credit/Fail Grading

BIOL 795 - Independent Investigations in Biology
Credits: 1-4
Independent study in a topic related ot Biology, arranged by the student with a faculty sponsor. Enrollment by permission only.
Repeat Rule: May be repeated for a maximum of 8 credits. May be repeated up to 5 times.
Equivalent(s): BIOL 795W
Grade Mode: Letter Grading

BIOL 795W - Independent Investigations
Credits: 1-4
Topics may include teaching or research practicum in a biological science, supervised by a faculty member.
Attributes: Writing Intensive Course
Repeat Rule: May be repeated for a maximum of 4 credits.
Equivalent(s): BIOL 795
Grade Mode: Letter Grading

BIOL 799H - Honors Senior Thesis
Credits: 2-8
Independent research requiring a written proposal, a thesis, and a final public presentation (e.g. the Undergraduate Research Conference). Intended for biology majors completing biology Honors-in-major requirements. Contact biology program coordinator prior to senior year to arrange supervision and obtain permission. Two consecutive semesters. (4 credit minimum total; 8 credits maximum).
Attributes: Honors course; Writing Intensive Course
Repeat Rule: May be repeated for a maximum of 8 credits.
Equivalent(s): BIOL 799
Grade Mode: Letter Grading

Marine, Estuarine, and Freshwater Biology (MEFB)

MEFB 401 - Marine Estuarine and Freshwater Biology: Freshmen Seminar
Credits: 1
The purpose of this course is threefold: First to acquaint freshmen MEFB majors to the wide range of topics that are included in the broad area of marine, estuarine and freshwater biology. Second, to introduce new UNH students to many of the MEFB faculty at UNH and give them the opportunity to become aware of the types of research that is being conducted at UNH. Finally, to begin teaching freshmen how to read the primary literature, write concise summaries of papers they read, give oral presentations to their peers, and understand how scientific knowledge is acquired and disseminated. Students attend a series of seminars presented by a wide range of MEFB faculty. The topics presented vary from year to year depending on the faculty that agree to participate. In addition students are required to read the current literature, write short papers and give presentations to the class.
Grade Mode: Credit/Fail Grading

MEFB 403 - Investigative Marine Biology Laboratory
Credits: 2-4
This course in an intensive marine-based introduction to the scientific method and experimental biology taught a Shoals Marine Laboratory. The course takes advantage of the unique learning opportunities afforded by the pristine marine environment (especially the intertidal) around Appledore Island. The overall course philosophy is to allow students to learn the scientific method by doing it themselves under the guidance of veteran marine biologists. The course is structured around two class projects that are designed to expose students to concepts and techniques in marine ecophysiology and biomechanics. (Summers only at Shoals Marine Lab.)
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 410 - Marine Immersion
Credits: 2
An intensive 2-credit course for incoming freshmen, surveying a range of marine-related fields (with an emphasis on biology and ecology), research approaches, and organisms. The course is based at the Shoals Marine Laboratory on Appledore Island, where students, and some faculty, will be in residence. "Marine Immersion" introduces students to the breadth, excitement, and challenges of marine sciences through lectures, demonstrations, and field experiences offered by a cohort of UNH faculty, and through short research projects carried out on the island. It also introduces them to resources and opportunities available at UNH, provides an opportunity to get to know some of their professors, and lets them begin building a network among their peers even before they arrive in Durham. (Summers only at Shoals Marine Lab.)
Equivalent(s): ZOOL 410
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 460 - Biological Illustration
Credits: 4
In this course, students build a foundation of skills needed for biological illustration using the many visual opportunities that Appledore Island offers for natural science subjects. Lectures and demos introduce each of five projects using a variety of media including graphite and graphite dust, pen & ink, watercolor, and colored pencil. Basic standards needed in the creation of professional work are covered, include observational drawing, attention to detail and accuracy, composition, color, tonal values, and perspective. The class will visit many locations on the island for inspiration and visual reference. Students will create a final project demonstrating skills they have developed with one of the media covered in the course. (Summers only at Shoals Marine Lab.)
Equivalent(s): ZOOL 460
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 503 - Introduction to Marine Biology
Credits: 3
Emphasizes the organization of marine biological communities. Various marine environments pelagic, benthic, temperate, tropical, and their characteristic communities. Major emphasis on the approaches (e.g., analysis of energy flow and predator-prey interactions) used to analyze marine communities as well as the sampling techniques employed for each approach and the characteristic habitat type.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Grade Mode: Letter Grading

MEFB 505 - Introduction to Applied Science Communication
Credits: 4
In this course students develop the capacity to solve increasingly challenging problems with greater independence. Students fill their science communication "tool box," learning how to engage a nonscientist audience. They will be introduced to video production, podcasts, Wikipedia editing, public science events, social media platforms, blogging and press release writing. After gaining basic skills with these communication platforms and tools, students will apply their skills to a topic of their own research interest on the island. Students will actively participate in a local public science event (Rock talks) and learn how to start a science cafe on their own. Students will receive feedback from their peers and their instructors, and by the end of this course they will become more effective science communicators. Skills gained in this course in this unique environment can be applied to any research field and are essential for every scientist. (Summers only at Shoals Marine Lab.)
Prerequisite(s): BIOL 411 with a minimum grade of D- and BIOL 412 with a minimum grade of D-.
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 506 - Marine Parasitology and Disease
Credits: 4
This course will focus on one of the most diverse and fascinating groups of marine organisms: parasites. The course will explore marine parasites and pathogens at multiple levels, including: (1) the evolutionary perspective with an emphasis on coevolutionary relationships; (2) parasitic diseases and life cycles (from simple to complex); (3) taxonomic and phylogenetic understanding of parasite and host groups (with a focus on metazoan parasites and hosts); (4) ecological implications of parasitism in marine systems at the population, community, and ecosystem levels; and (5) the effects of human induced global change on parasitism in marine communities. (Summers only at Shoals Marine Lab.)
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 508 - Marine Ecosystem Research and Management
Credits: 4
This course challenges students with real-world problems in the Gulf of Maine related to ecosystem research and management. Students learn the tools to conduct field and laboratory research and how to apply these tools in a real-world conservation management problem. Students work in small groups to design and implement and short research project. Results are presented to local and regional conservation practitioners in the Gulf of Maine. One semester of college biology should be taken prior to this course.
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 510 - Field Ornithology
Credits: 4
Introduces field ornithology focusing on the biology, ecology, and behavior of avifauna on the Isles of Shoals. Includes such ornithological field methods as censuring techniques, territory mapping, banding, behavioral observation, and creating a field notebook. Fieldwork is designed to supplement many classroom concepts, including territoriality, breeding biology, and survivorship. One year of college level biology required. Lab. (Summers only at Shoals Marine Lab.)
Equivalent(s): ZOOL 510
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 530 - Evolution and Marine Diversity
Credits: 5
Patterns of diversity and processes of evolution. Topics include the diversity of life, the fossil record, macro-evolutionary patterns, the genetics and developmental basis of evolutionary change, processes at the population level, evolution by natural selection, modes of speciation, long-term trends in evolution, and human evolution. (Summers only at Shoals Marine Lab.)
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 535 - Marine Mammal Biology
Credits: 4
This course explores the biology and conservation of the whales and seals, with a particular focus on species of the Gulf of Maine. Lectures examine many facets of marine mammal science including: taxonomy and species diversity, morphological and physiological adaptations for life in the sea, foraging ecology and behavior, reproductive cycles, bio-acoustics, anthropogenic interactions, and management of threatened species. Land and open water observations of whale and seal behavior give students hands on opportunities to study marine mammals in the field. (Summers only at Shoals Marine Lab.)
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 545 - Field Bioacoustics and Soundscape Ecology
Credits: 4
In this course students will gain hands-on introductory experience in bioacoustics and soundscape ecology research, including biological concepts behind animals' sound production and hearing, skills for deploying acoustic sensors in terrestrial and underwater habitats, and acoustic data analysis methods. The course will consist of several lectures covering fundamental concepts in acoustics, soundscapes, and digital sound signal processing. The majority of class time will be spent deploying and recovering acoustic sensors and conducting experiments in the field, as well as in computer-lab sessions to analyze and summarize collected data. We will primarily focus on "Passive Acoustic Monitoring (PAM)" which involves non-invasive recording of sounds present in an environment (i.e., soundscapes) with microphones (when deployed on land) or hydrophones (when deployed underwater). Gulls and other seabird residents of the Isles of Shoals will be the main focal animals for terrestrial field work, and opportunistic recordings may be made of other vocalizing animal inhabitants including mammals, fishes, and invertebrates. Students will further learn how to study the contributions of anthropogenic sounds (i.e., from human-made sources) to natural soundscapes. Students will also conduct field-based acoustic playback experiments to study how different properties of gull vocalizations influence gull behavior.
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 590 - Coastlines in Crisis
Credits: 4
Pairing students from coastal geographies through synchronous online and in-person lecture, we'll explore trends threatening resilience of our coasts and their inhabitants. The science and public perception of coastal threats, sea level rise, and climate related issues will build a baseline for understanding the issues coastal communities face, including contributing factors, and the role of science, technology, and environmental policy in the delicate balancing act between nature and infrastructure.
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 625 - Introduction to Marine Botany
Credits: 5
Life history, classification, and ecology of micro- and macroscopic marine plants, including phytoplankton, seaweed, and salt marsh plants, and the interactions between humans and marine plant communities. Occasional Saturday morning field trips. Lab. Offered alternating years only.
Prerequisite(s): BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D- or BIOL 409 with a minimum grade of D-.
Equivalent(s): PBIO 625
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 628 - Marine Invertebrate Evolution and Ecology
Credits: 4
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.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 633 - Quantitative Reasoning and Analysis for Marine Sciences
Credits: 4
Expand your statistical knowledge and resume by learning R. Use project-based learning to explore marine mammal populations, intertidal systems, and fisheries while learning statistical skills and R. In this course students will learn to become proficient in R (data manipulation, graphing, hypothesis testing, importing and cleaning data) and learn to effectively communicate statistical results. (Summers only at Shoals Marine Lab.)
Mutual Exclusion: No credit for students who have taken BIOL 633.
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 674 - Ecology and Marine Environment
Credits: 4
Introduces the marine sciences with an emphasis on field work in natural habitats. Examines aspects of the systematics, morphology, physiology, behavior, and ecology of marine organisms, including intertidal plants and invertebrates, fishes, marine mammals and birds; fisheries biology; oceanography, marine geology; and human impacts on the marine environment. Sessions include lectures, discussions, field work, experience aboard a coastal research vessel, and excursions to distinctive habitats. Offered in cooperation with Cornell University. Students may not take Field Marine Science after taking Field Marine Biology and Ecology. One year of college level biology required. (Summers only at Shoals Marine Lab.)
Equivalent(s): ZOOL 674, ZOOL 675
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 675 - Marine Mammal Biology and Conservation
Credits: 3
This course is designed to be a detailed investigation into the biology of cetaceans, pinnipeds, and other marine mammals. In this course we will learn about the evolution of marine mammals, general adaptations to a marine existence, morphology, systematics and biogeography, reproduction, diving physiology, communication and echolocation, feeding and migratory behavior, and marine mammal/human interactions. The course will include a survey of major conservation concerns and potential management solutions, as well as a unit on cultural competencies and the historic relationship between humans and marine mammals.
Prerequisite(s): BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-.
Equivalent(s): MEFB 535
Grade Mode: Letter Grading

MEFB 702 - Sustainable Marine Fisheries
Credits: 4
An intensive course for undergraduate students that introduces students to the complex challenges facing today's fishing industry, which is being asked to simultaneously sustain the livelihood of fishermen while meeting long-term conservation goals. The course is held both at the UNH Campus and at the Shoals Marine Laboratory. New England fisheries are used as a case-study for this course through global fishing management, trends, and issues are also discussed. (Summers only at Shoals Marine Lab.)
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 714 - Field Animal Behavior
Credits: 4
An animal's behavioral patterns represent its abilities to deal with the environment dynamically. Course focuses on ecological and evolutionary significance of behavioral patterns found in all organisms, particularly those animals that inhabit coastal marine environments. Strong emphasis on methods of behavioral research and interpretation of behavioral patterns using field observations of diverse fauna of Appledore Island and surrounding waters. One year of college level biology required. (Summers only at Shoals Marine Lab.)
Equivalent(s): ZOOL 714
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 717 - Lake Ecology
Credits: 4
Introduces the ecology of freshwater systems with emphasis on lakes. Origins of lakes and the effects of watersheds on lake chemistry and nutrient cycling are explored. Other topics include the impact of human disturbances on productivity and aquatic food webs and methods used for the management and restoration of lakes. Comparisons are made of the structure and functions of lake ecosystems found in temperate, tropical and arctic regions. General biology required prior to taking this course.
Equivalent(s): BOT 717, PBIO 717, ZOOL 717
Grade Mode: Letter Grading

MEFB 719W - Field Studies in Lake Ecology
Credits: 4
Ecology of lakes and other freshwater habitats examined through field studies. Emphasizes modern methods for studying lakes; analysis and interpretation of data; and writing of scientific papers. Seminars on research papers and student presentations of class studies. Field trips to a variety of lakes, from the coastal plain to White Mountains; investigate problems, such as eutrophication, acidification, biodiversity and biotoxins. Capstone experiences include interaction with state agencies, lake stakeholders and the submission of written manuscripts for publication. Introductory Biology required prior to taking this one.
Attributes: Writing Intensive Course
Equivalent(s): MEFB 719, PBIO 719, ZOOL 719
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 720 - Marine Invasive Species: Ecology, Evolution and Management
Credits: 4
This course explores the spread, establishment, and impact of invasive species. Students will become familiar with ecological and evolutionary theories pertaining to species invasions, and methods for assessing their spread and impact at local and global scales. The course examines: (1) ecological impacts and predictors of invasive species; (2) evolutionary insights of invasions; (3) taxonomic identification and survey techniques; (4) management implications of invasive species; and (5) the effects of global change on their spread. One semester of college biology or equivalent should be taken prior to this course. Summers only at Shoals Marine Lab.
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 725 - Marine Ecology
Credits: 3
This course is an exploration of marine ecology principles. Students will engage in field-based research projects to investigate ecological processes in marine environments. Emphasis will be placed on the structure and function of temperate rocky intertidal systems, the drivers of ecological change, statistical analysis of ecological data, and the influence of human activities on marine benthic systems. Key topics include recruitment ecology, physiological stress, competition, disturbance, trophic ecology, facilitation, and positive interactions.
Prerequisite(s): (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D-) and MEFB 503 with a minimum grade of D-.
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 730 - Underwater Research
Credits: 4
Hypothesis testing and experimental design, theoretical and practical aspects of sampling, and critiques of current research papers. Includes special problems of conducting research underwater (diving physics and physiology, theory and use of diving tables, hyperbaric medicine) and underwater techniques (underwater photography and video, photo quadrates, tagging and marking, cages and enclosures). Students must supply their own equipment. Students with special research interests are encouraged to enroll in an additional third week of independent underwater research. Required prior to taking this course: recognized scuba certification, a medical examination, one year of biology or other supporting science. (Summers only at Shoals Marine Lab.)
Equivalent(s): KIN 730, MARI 730, ZOOL 730
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 741 - Sharks: Biology and Conservation
Credits: 4
The last 30 years have produced an explosion of new information on the biology of the approximately 1,000 living species of sharks, skates, rays, and chimaeras, which collectively make up the group Chondrichthyes. This course will cover advanced topics in the evolution, diversity, anatomy, functional morphology, physiology, sensory systems, behavior, reproduction, development, and conservation of cartilaginous fishes. (Summers only at Shoals Marine Lab.)
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 747 - Aquatic Plants in Restoration/Management
Credits: 4
A field-intensive class focusing upon freshwater and marine vascular plants with an emphasis on species commonly associated with ecological restoration, the identification and conservation of rare species, and the adaptations and management of invasive species of aquatic habitats in New England. Field trips emphasize the flora of various wetland habitats, including open water and vegetated fresh water wetlands, as well as coastal and estuarine habitats. Lectures and readings examine the current trends in research and management focusing upon specific taxa and pertinent facets of their taxonomy, physiology, and natural history. Offered alternating years only.
Equivalent(s): BOT 747, PBIO 747
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 751 - Research in Biology at the Shoals Marine Lab
Credits: 4
Introduces the adaptations of organisms to marine environments and the role these adaptations have in structuring marine communities using an experimental approach. Emphasizes experimental design, implementation, data analysis, and scientific presentations. Prereq: one year of college-level biology or permission. Additional experience in biology, ecology or physiology is recommended. (Summers only at Shoals Marine Lab.)
Equivalent(s): ZOOL 751
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 754 - Anatomy and Function of Marine Vertebrates
Credits: 4
The course is designed to introduce students to a comparative study of the principal organ systems of vertebrates (i.e., fishes, sea turtles, marine birds, marine mammals) that are specifically adapted to the marine environment. Rather than focusing only on description of anatomical structure, the anatomy of structures are investigated with function, biological role, and evolutionary relationships. Laboratory exercises cover osteology, dissection, behavior and biomechanics. One year of college biology required prior to taking this course. (Summers only at Shoals Marine Lab.)
Equivalent(s): ZOOL 753, ZOOL 754
Grade Mode: Letter Grading
Special Fee: Yes

MEFB 755 - Biological Oceanography
Credits: 3
Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton ecology, ecosystems and global ocean dynamics.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Equivalent(s): ESCI 750, ZOOL 750
Grade Mode: Letter Grading

MEFB 772 - Fisheries Biology: Conservation and Management
Credits: 4
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.
Prerequisite(s): BIOL 411 with a minimum grade of D- and BIOL 412 with a minimum grade of D-.
Equivalent(s): ZOOL 772
Grade Mode: Letter Grading

MEFB 773 - Physiology of Fishes
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.
Grade Mode: Letter Grading

MEFB 795 - Independent Investigations in Marine, Estuarine, and Freshwater Biology
Credits: 1-4
Independent study in a topic related to Marine, Estuarine, or Freshwater Biology, arranged by the student with a faculty sponsor. Enrollment by permission only.
Repeat Rule: May be repeated for a maximum of 8 credits. May be repeated up to 5 times.
Grade Mode: Letter Grading

MEFB 796 - Shoals Undergraduate Research
Credits: 1
This course is for students who are participating in the Shoals Undergraduate Research Group and conducting independent research at the Isles of Shoals arranged by the student with a faculty sponsor. This course emphasizes hypothesis design, experimental design, implementation, data analysis, and scientific presentations. One year of college-level biology required prior to taking this course. (Summers only at Shoals Marine Lab.)
Repeat Rule: May be repeated for a maximum of 3 credits. May be repeated up to 3 times.
Grade Mode: Letter Grading

MEFB 799H - Honors Senior Thesis in Marine, Estuarine, and Freshwater Biology
Credits: 2-4
Independent research requiring a written proposal, a thesis, and a final public presentation (e.g. the Undergraduate Research Conference). Intended for MEFB majors completing Honors-in-major requirements. Contact MEFB program coordinator prior to senior year to arrange supervision and obtain permission. Two consecutive semesters. (4 credit minimum total; 8 credits maximum).
Attributes: Honors course
Repeat Rule: May be repeated for a maximum of 8 credits.
Grade Mode: Letter Grading

Neuroscience and behavior (NSB)

NSB 400 - Topics Neuroscience & Behavior
Credits: 1
This seminar type course is designed as an introductory experience for incoming first-year students, although it may be taken by students transferring into the major. Topics covered will include sensory biology, learning and memory, homing and navigation, neuromodulators and stress, reproductive behaviors. The format will rely heavily on discussion, prompted either by assigned readings or presentations by program faculty on their areas of expertise.
Grade Mode: Credit/Fail Grading

NSB 500 - Fundamentals of Neuroscience and Behavior I
Credits: 3
The course will introduce students to the fundamental neural processes underlying behavior. It will begin with a detailed examination of the properties of individual neurons and then move on to demonstrate how neurons can communicate together to produce complex behaviors. Some of the basic concepts that will be covered will include: the molecular basis of electrical and chemical communication, sensory transduction and processing, neuropharmacology, the neural basis of reflexes and simple behavior, development of the nervous system and the influence of external stimuli on neural processing.
Co-requisite: NSB 501
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-) and CHEM 403 with a minimum grade of D- and (CHEM 404 with a minimum grade of D- or CHEM 404H with a minimum grade of D-).
Grade Mode: Letter Grading

NSB 501 - Fundamentals of Neuroscience and Behavior I Laboratory
Credits: 2
The course is designed to expose students to some of the classic experiments in cellular and molecular Neurobiology. They will record from sensory and motor neurons, stain and view neurons, carry out simple behavior experiments and record from muscles in freely behaving animals. The laboratory exercises will run parallel with the concepts taught in lecture and complement the lecture material in many ways. Students will conduct actual experiments, analyze the results and write lab reports as well.
Co-requisite: NSB 500
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-) and CHEM 403 with a minimum grade of D- and (CHEM 404 with a minimum grade of D- or CHEM 404H with a minimum grade of D-).
Grade Mode: Letter Grading
Special Fee: Yes

NSB 502 - Fundamentals of Neuroscience and Behavior II/Systems Neuroscience
Credits: 3
This course is an introduction to the questions addressed by scientists who aim to understand the biological basis of behavior and cognition. This semester we will review the major organization of the central nervous system and how these systems interact with each other to produce behavior and cognition. Major topics will include: the development and emergence of behavior; movement; the neural basis of cognition, and language, thought, affect and learning.
Co-requisite: NSB 503
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D-) and CHEM 403 with a minimum grade of D- and CHEM 404 with a minimum grade of D- and NSB 500 with a minimum grade of D- and NSB 501 with a minimum grade of D-.
Grade Mode: Letter Grading

NSB 503 - Fundamentals of Neuroscience and Behavior II Laboratory
Credits: 2
This laboratory class with compliment the material being taught in NSB 502. The laboratory will focus on behavioral and cognitive neuroscience experiments. Students will learn about neuroanatomy and neuroscience research methods, including experimental design, data collection, statistical analysis, data interpretation, and manuscript preparation through conducting actual experiments. Students will write research reports describing their experiments and will receive some basic computer programming and research ethics training.
Co-requisite: NSB 502
Prerequisite(s): NSB 500 with a minimum grade of D- and NSB 501 with a minimum grade of D-.
Grade Mode: Letter Grading
Special Fee: Yes

NSB 600 - Field Experience in Neuroscience and Behavior
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 relevant to neuroscience and behavior. Must be approved by a faculty advisor selected by the student.
Repeat Rule: May be repeated for a maximum of 8 credits.
Grade Mode: Credit/Fail Grading

NSB 727 - Animal Communication
Credits: 4
This course examines the principles underlying how animals communicate with each other and why they communicate the way they do by using perspectives drawn from a broad range of disciplines including physics, chemistry, ecology, psychology, economics, and behavioral ecology. Students will explore the primary literature, and work in teams to conduct independent research. The course is intended for advanced undergraduate or graduate students interested in neuroscience and behavior, evolution, wildlife and conservation biology, or zoology.
Prerequisite(s): BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-.
Grade Mode: Letter Grading

NSB 795 - Special Investigations
Credits: 1-4
Independent research with any member of the NSB faculty in various areas including, but not limited to, neuroscience, neuroendocrinology, animal behavior.
Repeat Rule: May be repeated for a maximum of 8 credits.
Equivalent(s): NSB 795W
Grade Mode: Letter Grading

NSB 798 - Capstone
Credits: 0
This is a 0 credit course to indicate on the transcript that capstone requirement is fulfilled.
Grade Mode: Credit/Fail Grading

NSB 799 - NSB Senior Thesis
Credits: 2-4
Working under the direction of a faculty sponsor, the student plans and executes independent research resulting in a written thesis and public presentation. Limited to students entering their senior year. A two-semester sequence 2-4 credits each semester. IA (continuous grading) given first semester.
Repeat Rule: May be repeated for a maximum of 8 credits.
Grade Mode: Letter Grading

NSB 799H - Honors Senior Thesis
Credits: 2-4
Working under the direction of a faculty sponsor, the student plans and executes independent research resulting in a written thesis and public presentation. Limited to student entering their senior year or under exceptional circumstances their junior year. Required for students working toward University Honors or Honors-in-Major. A two-semester sequence 2-4 credits each semester. IA (continuous grading) given first semester.
Attributes: Honors course; Writing Intensive Course
Repeat Rule: May be repeated for a maximum of 8 credits.
Grade Mode: Letter Grading

Zoology (ZOOL)

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.
Grade Mode: Credit/Fail Grading

ZOOL 401 - Human Biology
Credits: 0 or 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 multidisciplinay lenses of chemistry, genetics, and homeostatis. 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. Lab.
Attributes: Biological Science(Discovery); Discovery Lab Course
Equivalent(s): ZOOL 507, ZOOL 508
Grade Mode: Letter Grading
Special Fee: Yes

ZOOL 518 - Comparative Morphology and Biology of Vertebrates
Credits: 0 or 4
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. Lab.
Prerequisite(s): BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or NR 439 with a minimum grade of D- or BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D-.
Grade Mode: Letter Grading
Special Fee: Yes

ZOOL 529 - Developmental Biology
Credits: 0 or 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. Lab.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Grade Mode: Letter Grading
Special Fee: Yes

ZOOL 542 - Ornithology
Credits: 4
Students explore the biology, behavior and biodiversity of birds in this animal survey course. Ethical birdwatching, census techniques, and identification skills will be developed by observing resident and migrant species throughout the semester. Avian diversity across the UNH campus will be documented and compared at multiple time points and locations. Lecture, Lab, and Optional off-campus field trips.
Prerequisite(s): BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-.
Grade Mode: Letter Grading

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 this 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. Lab.
Prerequisite(s): BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D-.
Grade Mode: Letter Grading
Special Fee: Yes

ZOOL 566 - Herpetology
Credits: 4
This course will serve as an introduction to the morphology, behavior, and evolutionary ecology of reptiles (tuataras, turtles, snakes, lizards, and crocodilians) and amphibians (frogs, salamanders, and caecilians), with a special emphasis on New England taxa. The course will include field excursions, short-term research projects, and the comparative examination of specimens.
Prerequisite(s): BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-.
Grade Mode: Letter Grading
Special Fee: Yes

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.
Repeat Rule: May be repeated for a maximum of 8 credits.
Grade Mode: Credit/Fail Grading

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.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Grade Mode: Letter Grading

ZOOL 613W - 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. Lab.
Attributes: Writing Intensive Course
Prerequisite(s): BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-.
Equivalent(s): ZOOL 613, ZOOL 713
Grade Mode: Letter Grading
Special Fee: Yes

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.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Equivalent(s): ANSC 627
Grade Mode: Letter Grading

ZOOL 626W - 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.
Co-requisite: ZOOL 625
Attributes: Writing Intensive Course
Equivalent(s): ZOOL 626
Grade Mode: Letter Grading
Special Fee: Yes

ZOOL 690 - Evolution
Credits: 4
Evolutionary biology is about uncovering the past, understanding the present, and predicting the future of animals, plants, and microbes. Is 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.
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Equivalent(s): ZOOL 690W
Grade Mode: Letter Grading

ZOOL 690W - Evolution
Credits: 4
Evolutionary biology is about uncovering the past, understanding the present, and predicting the future of animals, plants, and microbes. Is 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
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Equivalent(s): ZOOL 690
Grade Mode: Letter Grading

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. Lab. (Not offered every year.)
Grade Mode: Letter Grading
Special Fee: Yes

ZOOL 710 - Sharks and Bony Fishes
Credits: 0 or 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. Lab. (Offered in alternative years.)
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Grade Mode: Letter Grading
Special Fee: Yes

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.
Prerequisite(s): ZOOL 613 with a minimum grade of D- or ZOOL 613W with a minimum grade of D- or NR 433 with a minimum grade of D- or NR 650 with a minimum grade of D-.
Grade Mode: Letter Grading

ZOOL 733W - Behavioral Ecology
Credits: 0 or 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.
Attributes: Writing Intensive Course
Prerequisite(s): ZOOL 613 with a minimum grade of D- or ZOOL 613W with a minimum grade of D-.
Equivalent(s): ZOOL 733
Grade Mode: Letter Grading

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.
Prerequisite(s): (GEN 604 with a minimum grade of D- or ANSC 612 with a minimum grade of D-) and (ZOOL 613 with a minimum grade of D- or ZOOL 613W with a minimum grade of D-).
Grade Mode: Letter Grading

ZOOL 740 - Acoustic Ecology
Credits: 4
This course examines the acoustic environment and how alterations to the acoustic environment from human activities and climate change result in permanent changes to animal behavior and the resulting soundscape. Focusing on using acoustics as a tool to monitor species and habitats, students will learn quantitative approaches and best practices for acoustic ecology investigations. Students will explore the emerging field of ecological acoustics through primary literature and hands-on, independent research in habitats surrounding UNH campus. This course is intended for advanced undergraduate or graduate students interested in animal behavior, ecology, wildlife and conservation biology, or zoology.
Prerequisite(s): BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-.
Grade Mode: Letter Grading
Special Fee: Yes

ZOOL 777W - Neuroethology
Credits: 4
Students taking this course will discover how some of the most remarkable behavioral adaptations in animals can be understood by examining specialized sensory systems and neural circuits. By exploring the complex interactions between animal behavior, neural systems, evolutionary relationships, anatomy, physiology and ecology, students will be better equipped to understand the neural basis of behavior. A culminating writing project will help sharpen students' scientific writing skills, and the ability to understand the primary neuroethology literature.
Attributes: Writing Intensive Course
Prerequisite(s): (BIOL 411 with a minimum grade of D- or BIOL 411H with a minimum grade of D- or BIOL 413 with a minimum grade of D-) and (BIOL 412 with a minimum grade of D- or BIOL 412H with a minimum grade of D- or BIOL 414 with a minimum grade of D-).
Equivalent(s): ZOOL 777
Grade Mode: Letter Grading

ZOOL 795 - Independent Investigations in Zoology
Credits: 1-4
Independent study in a topic related to Zoology, arranged by the student with a faculty sponsor. Enrollment by permission only.
Repeat Rule: May be repeated for a maximum of 8 credits. May be repeated up to 5 times.
Grade Mode: Letter Grading

ZOOL 799H - 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. A two-semester sequence. 2-4 credits each semester. IA (continuous grading) given at the end of the first semester.
Attributes: Honors course; Writing Intensive Course
Repeat Rule: May be repeated for a maximum of 8 credits.
Equivalent(s): ZOOL 799
Grade Mode: Letter Grading

Faculty

Biological Sciences Department Faculty