

BIOLOGY (BIOL)

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

BIOL 801 - Plant Physiology

Credits: 4

Knowledge about principles of plant physiology is critical to understand how plants work and what happens between planting a seed and picking up a flower or a fruit. This course focuses on fundamentals of plant physiology and metabolism using lecture and laboratory investigations. Lecture topics include: plant-water relations, mineral nutrition, photosynthesis and respiration, plant metabolism, signaling and hormones, growth and development, and plant-environment interactions. Labs will be project-based and students will conduct experiments to explore basic plant processes.

Prerequisite(s): (BIOL 411 with a minimum grade of D- and BIOL 412 with a minimum grade of D-) or BIOL 409 with a minimum grade of D-.

Equivalent(s): PBIO 801

Grade Mode: Letter Grading

BIOL 804 - 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 interact with plants, the outcomes of that interplay, and applications of these interactions and explore how these interactions impact ecosystem function. One year of general biology and a semester of Microbiology or Genetics recommended.

Grade Mode: Letter Grading

BIOL 805 - Molecular and Cellular Neurobiology

Credits: 4

The overarching goal of this course is to examine the molecular and cellular mechanisms underlying neuronal function. This course builds on fundamental knowledge in neuroscience. Students will be exposed to primary literature regarding the most advanced techniques in neuroscience, with emphasis in cellular and molecular processes. Students will learn how different model organisms have been used to understand neurons. Graduate students should have a strong background in chemistry, biochemistry and cell biology, and must obtain permission to register.

Grade Mode: Letter Grading

BIOL 806 - 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 809 - Plant Stress Physiology

Credits: 3

Plants cannot move in order to avoid challenging environmental conditions. Hence, plants developed other mechanisms that allow them to cope with stress. This course focuses on the mechanisms deployed by plants to respond to stressful conditions, some responses being nothing short of chemical and biological warfare. Biotic and abiotic stresses covered include pathogens, herbivores, drought, salinity, temperature, UV radiation, and heavy metals. Agricultural and ecological implications are discussed.

Equivalent(s): PBIO 809

Grade Mode: Letter Grading

BIOL 811 - 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 812 - Experimental Design Seminar

Credits: 2

Explore the experimental design of your own and your classmates' current or proposed graduate research projects. Learn to recognize the difference between good and bad experimental designs by analyzing recently published studies in your field of interest. Learn the secrets of statistical reviewers and how to avoid mistakes that will prevent your work from being published.

Prerequisite(s): BIOL 811 with a minimum grade of D- or ANFS 933 with a minimum grade of D-.

Grade Mode: Letter Grading

BIOL 814 - 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.

Grade Mode: Letter Grading

BIOL 820 - 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. One year of general biology recommended.

Grade Mode: Letter Grading

BIOL 827 - 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. One year of general biology recommended.

Grade Mode: Letter Grading**BIOL 828 - Marine Bioacoustics****Credits:** 3

Marine bioacoustics is a highly interdisciplinary field of science that requires knowledge of marine biology, oceanography, physics, and engineering. This course provides an introduction to the role of acoustics in aquatic biological systems and how acoustics is used to study biological processes and ecosystem dynamics. Topics include: marine animal hearing; sound production; behavior; echolocation; remote sensing; research methods; and the impacts of sounds on marine animals. It is suggested that students have a strong background in biology. College level physics and calculus is suggested.

Grade Mode: Letter Grading**BIOL 840 - 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. Two semesters of college-level biology required prior to taking this course.

Grade Mode: Letter Grading**Special Fee:** Yes**BIOL 852 - 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. Intro course in Biology or Plant Biology, recommended.

Equivalent(s): PBIO 852**Grade Mode:** Letter Grading**Special Fee:** Yes**BIOL 855 - Biological Oceanography****Credits:** 3

Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton ecology, ecosystems and global ocean dynamics. One year of general biology recommended.

Equivalent(s): ESCI 850, ZOO 850**Grade Mode:** Letter Grading**BIOL 873 - 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.

Equivalent(s): ZOO 873**Grade Mode:** Letter Grading**Special Fee:** Yes**BIOL 895 - Advanced Studies****Credits:** 1-4

Advanced research or seminar, supervised by a faculty member.

Grade Mode: Letter Grading**BIOL 899 - Master's Thesis****Credits:** 1-10

Master's thesis research.

Repeat Rule: May be repeated for a maximum of 10 credits.**Grade Mode:** Graduate Credit/Fail grading**BIOL 901 - Introductory Graduate Seminar****Credits:** 2

This seminar provides an introduction to the Biological Sciences Graduate Program, offering students an overview of program structure and requirements, introducing faculty research and campus resources, and helping participants develop skills and strategies useful in graduate school. Requirements include preparation of a written research proposal and a brief oral presentation.

Equivalent(s): ZOO 901**Grade Mode:** Graduate Credit/Fail grading**BIOL 902 - Writing and Publishing Science****Credits:** 2

Participants in this seminar (1) make significant progress on one or more of their current academic writing projects; (2) increase their understanding of the genres, protocols, and mechanisms of scientific writing and publishing; and (3) develop strategies and skills for getting professional writing done efficiently and well, in graduate school and beyond.

Repeat Rule: May be repeated for a maximum of 6 credits.**Grade Mode:** Graduate Credit/Fail grading**BIOL 950 - Scientific Communication****Credits:** 2

Professional success in science depends on the ability to communicate, both by publishing in professional journals and by explaining the implications of research to a broad audience. This course covers a wide range of topics related to scientific communication. Students work on multiple forms of communication, practice communicating science to the public, strengthen peer reviewing skills, explore online scientific communities, and enhance awareness of relevant economic, legal, and ethical issues.

Equivalent(s): LSA 950**Grade Mode:** Graduate Credit/Fail grading

BIOL 999 - Doctoral Dissertation Research

Credits: 0

Doctoral dissertation research.

Grade Mode: Graduate Credit/Fail grading

Special Fee: Yes