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. Prereq: Knowledge of plant biology and chemistry (introductory plant biology and college level general or organic chemistry); or permission.
Equivalent(s): PBIO 801

BIOL 802 - Lab Techniques in Plant Physiology and Biochemistry
Credits: 4
The course provides a hands-on experience with instrumentation and experimental procedures for analysis of plant growth and metabolism. Experiments demonstrate the regulation of plant growth and development in response to environmental and chemical factors, analysis of cellular contents and processes, and use of modern instrumentation and analytical tools for physiological and biochemical studies. Experiments deal with plant water relations, photosynthesis, plant hormones, enzyme kinetics, use of spectrophotometry and fluorometry, aseptic procedures, and liquid and thin-layer chromatography. Special lab fee. Prereq: BIOL 411, BIOL 412, BIOL 701/801 or permission of instructor.
Equivalent(s): GEN 802

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. Prereq: BIOL 411 and BIOL 412, BMS 503 and BMS 504 or GEN 604.

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.

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

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.

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. Prereq: BIOL 412.

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. Prereq: BIOL 412.

BIOL 829 - Agricultural Waste Management
Credits: 4
The management of agricultural wastes is crucial in the development of sustainable agricultural practices. This course covers principles of managing, handling, treating, and applying animal manures and organic byproducts from an agricultural system perspective. Topics include waste characterization, descriptions of systems and technology, utilization of wastes as resources (land application, composting electricity generation, fertilization, etc.), land application principles, preparations of waste management plans, and potential impacts to the environment. Prereq: SAFS 502 or permission of instructor.
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. Prereq: Intro course in Biology or Plant Biology, or permission. Equivalent(s): PBIO 852

BIOL 895 - Advanced Studies
Credits: 1-4
Advanced research or seminar, supervised by a faculty member.

BIOL 899 - Master's Thesis
Credits: 1-10
Master's thesis research. Cr/F. Repeat Rule: May be repeated for a maximum of 10 credits.

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. Cr/F. Equivalent(s): ZOOL 901

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. Cr/F. Repeat Rule: May be repeated for a maximum of 6 credits.

BIOL 903 - Graduate Research Techniques
Credits: 2
Introduction to a range of research approaches in biology and to research skills needed for success in graduate school and beyond. Topics include scientific methods and experimental design, research techniques, and instrumentation available for graduate research. Cr/F. Offered every spring.

BIOL 933 - Design, Analysis, and Interpretation of Experiments
Credits: 4
Through in-depth consideration of common general linear models used in the analysis of variance, this course introduces graduate students to the fundamental concepts and statistical methods necessary to plan, conduct, and interpret effective experiments. The course provides an opportunity for graduate students to receive critical input on the experimental design and analysis of their individual graduate research projects. All analysis is conducted using the open-source package R; no previous coding experience is required.

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

BIOL 997 - Graduate Seminar in Biology
Credits: 1-2
Current topics in biological sciences; discussion of literature in the field, and student research. Topics span a wide range of biological disciplines (agricultural sciences, marine biology, integrative and organismal biology, etc.), and vary to reflect the faculty and student interests. Repeat Rule: May be repeated for a maximum of 8 credits.

BIOL 999 - Doctoral Dissertation Research
Credits: 0
Doctoral dissertation research. Cr/F.