# BIOLOGY

## Courses

**BIOL 1111 Introductory Biology Laboratory (LN)**
**Prerequisites:** BIOL 1113 or concurrent.
**Description:** Provides students with authentic research experiences in which they design, conduct, and report on the results of extended investigations over topics introduced in BIOL 1113. Recommended for science and non-science majors.
**Credit hours:** 1
**Contact hours:** Lab: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lab
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Laboratory-Based Inquiry, Natural Science Reasoning

**BIOL 1113 Introductory Biology (N)**
**Description:** Introduction to the integration between structure and function among all levels of biological organization. Application of principles of evolution, genetics, physiology and ecology to understanding the integrated and interdependent nature of living systems through discussions emphasizing the process of science. Discussions include current issues, local research, observations, and investigations. Recommended for science and non-science majors. Concurrent enrollment in BIOL 1111 Introductory Biology Laboratory is highly recommended. May not be used for degree credit with BIOL 1114.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Natural Science Reasoning

**BIOL 1114 Introductory Biology (LN)**
**Description:** Introduction to the integration between structure and function among all levels of biological organization. Application of principles of evolution, genetics, physiology and ecology to understanding the integrated and interdependent nature of living systems through discussions emphasizing the process of science. Current issues and local research and observation and investigation in both lecture and lab. Recommended for non-science and science majors. Course previously offered as BISC 1114.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Laboratory-Based Inquiry, Natural Science Reasoning

**BIOL 1604 Animal Biology**
**Prerequisites:** Completion of BIOL 1114 or BIOL 1113 and (BIOL 1111 or concurrent enrollment), or acceptable AP credit.
**Description:** Morphology, physiology, ecology, life histories and importance of representatives of major groups to humans. Evolution of systems and mechanisms which have allowed animals to survive and adapt to diverse habitats. Previously offered as ZOOL 1604.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 2003 Biology for the Informed Citizen (N)**
**Description:** This course teaches students how to find reliable answers to biological questions and arrive at informed decisions in their everyday lives. The course will use current issues (e.g., cancer, pollution) to convey fundamental biological concepts. Performance will be assessed via exams, and students will complete a small independent research project on a topic of their choice for a hands-on experience of the scientific process (study design to presentation). Brief lectures interspersed with short discussions or documentaries encompass a typical class meeting. Not an alternative to Introductory Biology.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Natural Science Reasoning

**BIOL 2890 Honors Experience in Integrative Biology**
**Prerequisites:** Honors Program participation and concurrent enrollment in a designated BIOL course.
**Description:** A supplemental Honors experience in Integrative Biology to partner concurrently with designated BIOL course(s). This course adds a different intellectual dimension to the designated course(s). Offered for fixed credit, 1 credit hour, maximum of 6 credit hours.
**Credit hours:** 1
**Contact hours:** Lecture: 1 Contact: 1
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Honors Credit

**BIOL 3023 General Genetics**
**Prerequisites:** "C" or better in CHEM 3013 or CHEM 3053 or MICR 2123 or MICR 3033 or PBIO 2403.
**Description:** Inheritance in plants, animals, and microorganisms; molecular and classical aspects. Previously offered as BIOL 3024 and BISC 3024.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 3034 General Ecology**
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) or equivalent and (PBIO 1404 or BIOL 1604 or equivalent) and MATH 1513 or higher.
**Description:** An overview of the study of organisms interacting with each other and their environment at individual, population, community, and ecosystem levels of organization. Includes human interaction with ecological systems.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 3053 Freshwater: Concepts, Threats and Management (N)**
**Description:** Freshwater is a critical, non-substitutable resource. Do we have enough? How are we going to manage it? This course will introduce non-biology majors to the concepts, threats, and policy relevant to freshwaters using information published in the popular science press. Issues directly relevant to Oklahoma, and the U.S. will be discussed. Debates modeled using the legal system of policy formulation will promote critical thought and communication skills in an exciting real-world milieu. ZOOL and PHSL majors may count as elective hours only. Previously offered as ZOOL 3023.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Natural Science Reasoning

**BIOL 3104 Invertebrate Zoology**
**Prerequisites:** BIOL 1604.
**Description:** Morphology, physiology, reproduction and ecology of major invertebrate groups. Previously offered as ZOOL 3104.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 3113 Human Evolution (N)**
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) strongly recommended.
**Description:** Overview of how evolution shapes human biology. Topics include evolutionary mechanisms, human genetic variation and health, primate diversity, the fossil record, and the origins, dispersal, and behavior of anatomically modern humans. ZOOL and PHSL majors may count as elective hours only. Previously offered as ZOOL 3113.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Natural Science Reasoning

**BIOL 3114 Vertebrate Zoology**
**Prerequisites:** BIOL 1604.
**Description:** Comparative morphology of representative vertebrates with emphasis on phylogeny and ontogeny and consideration of histology and function. Previously offered as ZOOL 3114.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 3123 Human Heredity (N)**
**Description:** The impact of genetics on human endeavor. Not recommended for students with prior credit in BIOL 3023. BIO, PHSL and ZOOL majors may count as elective hours only. Previously offered as ZOOL 3123.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Natural Science Reasoning

**BIOL 3153 Animal Behavior**
**Prerequisites:** Junior standing.
**Description:** Survey of theory and application in basic and applied animal behavior. Interdisciplinary analysis of animal behavior in the field, captive settings and laboratories. Previously offered as ZOOL 3153.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 3163 Environmental Biology**
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) and (CHEM 1215 or CHEM 1314).
**Description:** Overview of how organisms are influenced by the environment in which they live and how anthropogenic activities impact their environment. Topics include impacts of disturbing energy and material cycles, toxicological disease, and infectious disease. Previously offered as ZOOL 3163.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 3204 Physiology**
**Prerequisites:** "C" or better in both BIOL 1114 or (BIOL 1113 and BIOL 1111) and (CHEM 1215 or CHEM 1314 or CHEM 1414).
**Description:** Anatomy and function of the human body. Human and domestic animal physiology considered in laboratories. Previously offered as ZOOL 3204.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 3214 Human Anatomy**
**Prerequisites:** "C" or better in either BIOL 1604 or BIOL 3204.
**Description:** Gross anatomy of the human body and its systems with a minor emphasis on histology. Laboratory based on human models and comparisons with dissections of nonhuman mammals. Previously offered as ZOOL 3214.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 3233 Human Reproduction**
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) or consent of instructor.
**Description:** Overview of human reproduction, including conception, pregnancy, childbirth, sexual maturation, and parental investment in offspring. Draws from multiple fields such as genetics, anatomy and physiology, developmental biology and evolutionary theory. Previously offered as ZOOL 3233.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 3513 Principles of Conservation Biology**
**Prerequisites:** Sophomore standing and BIOL 1604 or PBIO 1404.
**Description:** A scientific foundation of conservation biology through the study of the importance of conservation in society, the role of conservation policy, protected areas, and planning, and the future of conservation biology. Topics covered include Ecology, Evolution, and Genetics. Previously offered as ZOOL 3513.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 3604 Biological Principles for Teachers**
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) and BIOL 3204 and CHEM 1314.
**Description:** Capstone course in biology for potential science teachers. Review of biological phenomena and principles as related to the curriculum. Course previously offered as BISC 3604.
**Credit hours:** 4
**Contact hours:** Lecture: 4 Contact: 4
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 3700 Readings and Special Studies in Integrative Biology**
**Prerequisites:** BIOL 1604 and consent of instructor.
**Description:** Discussion of selected readings. Previously offered as ZOOL 3700. Offered for variable credit, 1-3 credit hours, maximum of 6 credit hours.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Integrative Biology

**BIOL 3890 Advanced Honors Experience in Integrative Biology**
**Prerequisites:** Honors Program participation and concurrent enrollment in a designated BIOL course.
**Description:** A supplemental Honors experience in Integrative Biology to partner concurrently with designated upper-division BIOL course(s). This course adds a different intellectual dimension to the designated course(s). Offered for fixed credit, 1 credit hour, maximum of 6 credit hours.
**Credit hours:** 1
**Contact hours:** Lecture: 1 Contact: 1
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Honors Credit

**BIOL 3933 Research Methods**
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) and (MATH 1613 or higher) and (STAT 2013 or STAT 4013).
**Description:** Students perform independent inquiries and learn to use skills from science to solve research problems. Students will design experiments, collect and analyze data, formulate hypotheses, justify conclusions, create models, read and evaluate the research literature, and write and present research reports.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4024 Histology**
**Prerequisites:** BIOL 3114, BIOL 3204, or BIOL 3214.
**Description:** The study of cellular composition and functional components of tissues. With an emphasis in vertebrates, the course is a survey of the microanatomy and function of tissues such as epithelial, connective, muscular, and nervous. May not be used for degree credit with BIOL 5024.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4073 Principles of Neuroscience**
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) and either (CHEM 1215, CHEM 1314, or CHEM 1414).
**Description:** Neuroscience is an interdisciplinary field focused on understanding the structure and function of the brain, spinal cord, and peripheral nervous system. This course examines foundational theories and principles related to the neural mechanisms controlling physiological processes and behavior. Topics covered include cellular neurobiology, neuronal signaling, neural development and plasticity, comparative neuroanatomy, and neurobiology of complex brain functions such as sensory processing, arousal, emotions, learning, and memory. Previous coursework in physiology recommended. Same course as PSYC 4073. May not be used for degree credit with BIOL 5073 or PSYC 5073.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4104 General Parasitology**
**Prerequisites:** BIOL 1604.
**Description:** Fundamentals of parasitism with emphasis on: life cycles, disease conditions, epidemiology, diagnosis, treatment, historical significance, terminology, taxonomy, and parasitological techniques. Previously offered as ZOOL 4104. May not be used for degree credit with BIOL 5104.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4113 Conservation Genetics**
**Prerequisites:** (BIOL 3023 or equivalent) and MATH 1513.
**Description:** Principles of population genetics as they pertain to issues in conservation biology. Evolutionary relationships, hybridization, natural selection, factors affecting small populations, gene flow, captive populations, and metapopulations. No credit for students with credit in BIOL 5113. Previously offered as ZOOL 4113.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4133 Evolution**
**Prerequisites:** BIOL 3023.
**Description:** Development of the evolutionary concept; speciation evolutionary mechanisms and phylogenetic concepts. May not be used for degree credit with BIOL 5033. Previously offered as ZOOL 4133.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4134 Embryology**
**Prerequisites:** BIOL 1604 and CHEM 1515.
**Description:** Biochemical basis of development with emphasis on gene regulation. Comparative development of sea urchin, frog, chick and pig. Experiments using frog and mouse, including the molecular level. Previously offered as ZOOL 4134. May not be used for degree credit with BIOL 5134.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4174 Mammalogy**
**Prerequisites:** "C" or better in BIOL 1604 and (BIOL 3034 or NREM 3013).
**Description:** Taxonomy, identification, evolution, zoogeography, life history traits, and techniques of study of wild mammals. Weekend field trips required. May not be used for degree credit with BIOL 5174. Previously offered as ZOOL 4174.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4184 Herpetology**
**Prerequisites:** BIOL 1604.
**Description:** The biology of amphibians and reptiles with an emphasis on evolutionary relationships and comparative morphology, physiology, ecology, and natural history; laboratory emphasis on Oklahoma species. Offered spring semester of even-numbered years. Weekend field trips required. May not be used for degree credit with BIOL 5184.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4215 Mammalian Physiology**
**Prerequisites:** "C" or better in both BIOL 3204 and (CHEM 3013 or CHEM 3053).
**Description:** Descriptive and functional analysis of the mammalian nervous, cardiovascular, musculoskeletal, respiratory, renal, endocrine, and digestive organ systems. For majors in human and animal sciences, particularly pre-medical, pre-dental, and pre-veterinary tracks. May not be used for degree credit with BIOL 5215. Previously offered as ZOOL 4215.
**Credit hours:** 5
**Contact hours:** Lecture: 5 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4223 Mammalian Physiology Capstone Laboratory**
**Prerequisites:** "C" or better in BIOL 4215 or ZOOL 4215.
**Description:** Laboratory experiments that illustrate functions of organs, organ systems or mechanisms of whole body physiological control. A unique Capstone Experience for Physiology majors. Restricted to declared Physiology majors in the Department of Integrative Biology. Previously offered as ZOOL 4223.
**Credit hours:** 3
**Contact hours:** Lecture: 1 Lab: 4 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4253 Pharmacology**
**Prerequisites:** "C" or better in either BIOL 3204 or BIOL 4215; Biochemistry strongly suggested.
**Description:** Major drug classes based on their predominant use or principal activity in the body; basis for drug action; and modification of drugs and their action by physiological processes. May not be used for degree credit with BIOL 5253. Previously offered as ZOOL 4243 and BIOL 4243.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4273 Environmental Physiology**
**Prerequisites:** BIOL 3204 or BIOL 4215.
**Description:** The study of animal adaptation and responses to natural environments. Topics include marine, shoreline, freshwater, and terrestrial habitats as well as anthropogenic problems specific to these habitats. No credit for students with credit in BIOL 5273. Previously offered as ZOOL 4273.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4283 Endocrinology**
**Prerequisites:** "C" or better in (BIOL 3204 or BIOL 4215) and credit in (CHEM 3013 or CHEM 3053 or consent of instructor).
**Description:** Examination of the hormonal control and regulation of physiological processes in vertebrates. Function of the hypothalamus, pituitary, adrenal, thyroid, pancreas, ovary and testes. May not be used for degree credit with BIOL 5283. Previously offered as ZOOL 4283.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4293 Behavioral Neuroendocrinology**
**Prerequisites:** BIOL 3204 or BIOL 4215.
**Description:** Examination of the influences of nervous and endocrine systems on behavior, and vice-versa, in vertebrates, including humans. Historical roots and current techniques relating to topics, including male and female reproductive behavior patterns, sex differences in behavior and neuroendocrine causation. No credit for students with credit in BIOL 5293. Previously offered as ZOOL 4293.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4303 Organismal Ecotoxicology**
**Prerequisites:** Junior standing and BIOL 1114 or (BIOL 1113 and BIOL 1111) or equivalent and (CHEM 1215 or CHEM 1314).
**Description:** Comparative study of the major groups of environmental contaminants (e.g. heavy metals, PCB's, insecticides) and an introduction to the basic theories, principles and techniques associated with the study of contaminant fate and effects on organisms. No credit for students with credit in BIOL 5303. Same course as BIOL 5303 and ITOX 5303. Previously offered as ZOOL 4303.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4313 Animal Communication**
**Prerequisites:** Junior standing.
**Description:** Mechanisms, function and evolution of animal communication systems. Emphasis on the function of sensory systems, signal production mechanisms, theories of signal design and optimal signaling strategies, and current research on signaling behavior and its evolution in wild animals. A course in animal behavior or evolution recommended. May not be used for degree credit with BIOL 5313.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4333 Disease Ecology**
**Prerequisites:** BIOL 1113 or BIOL 1114 and junior standing.
**Description:** Understanding the ecology and evolution of pathogens and host-parasite relationships. This course will cover topics from the evolution of virulence and antibiotic resistance to globalization, emerging infectious diseases, and the factors driving increased pandemic risk. May not be used for degree credit with BIOL 5333.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4363 Principles of Toxicology**
**Prerequisites:** BIOL 3204 and (CHEM 1215 or CHEM 1314).
**Description:** Basic concepts in toxicology such as chemical partitioning, dose response, toxicokinetics, toxicodynamics, and bioavailability. It will focus on the molecular and cellular mechanisms of toxicity of a few representative natural and man-made compounds. Case studies used to understand real-life scenarios. No credit for students with credit in BIOL 5363.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 4413 Biology of Fishes**
**Prerequisites:** BIOL 1604.
**Description:** Ecology and evolution of fishes with particular emphasis on physiology, morphology, behavior, and taxonomy; laboratory emphasis on Oklahoma species. Weekend field trips required. May not be used for degree credit with BIOL 4413.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4434 Limnology**
**Prerequisites:** BIOL 3034 or (NREM 3012 and NREM 3013).
**Description:** This course provides an overview of the physical, chemical, and biological characteristics of inland habitats including lakes, reservoirs, streams, and wetlands. Field trips required. May not be used for degree credit with BIOL 5434. Previously offered as ZOOL 4434.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4464 Ornithology**
**Prerequisites:** BIOL 1604.
**Description:** Classification, evolution, distribution, identification, life histories, and morphological, ecological, and behavioral adaptations of birds. Two weekend field trips required. Same course as NREM 4464. May not be used for degree credit with BIOL 5464 or NREM 5464. Previously offered as ZOOL 4464.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4484 Animal Locomotion**
**Prerequisites:** BIOL 1604.
**Description:** How do animals move? How does this motion change based on environment? How has such motion evolved across groups? This course will explore the relationship of body form to locomotion. We will focus on all types of animals, which represent a broad diversity of types of locomotion (e.g. flying, swimming, jumping), environments (e.g. air, land, water), and scales of body size (i.e. from single cells to whales). A laboratory will serve to introduce students to the methods and technology used in studying locomotion. May not be used for degree credit with BIOL 5484.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4524 Biological Laboratory Instrumentation**
**Prerequisites:** CHEM 1515 and PBIO 1404 or MICR 2123 or BIOL 1604 or equivalents or consent of instructor.
**Description:** Lecture and laboratory course in biological instrumentation use, theory, experimental design, maintenance, and troubleshooting. Topics include liquid handling systems, pH/ISE meters, electrophoresis, spectrophotometers, centrifuges, chromatography, thermocylers, and DNA sequencers. No credit for students with credit in BIOL 5524, MICR 5524, PBIO 5524. Same course as PBIO 4524 and MICR 4524.
**Credit hours:** 4
**Contact hours:** Lecture: 2 Lab: 4 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 4700 Undergraduate Research Problems**
**Prerequisites:** Consent of instructor.
**Description:** Participation in faculty research or execution of a problem formulated by the student. Project will include the communication of research results in written and/or oral form. Previously offered as ZOOL 4700. Offered for variable credit, 1-4 credit hours, maximum of 4 credit hours.
**Credit hours:** 1-4
**Contact hours:** Contact: 1-4 Other: 1-4
**Levels:** Undergraduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology

**BIOL 4710 Internships in Integrative Biology**
**Prerequisites:** Consent of instructor.
**Description:** Student participation in a research project during an internship in a Life Sciences related professional work setting. Graded on a pass-fail basis. Previously offered as ZOOL 4710. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Undergraduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology

**BIOL 4730 Collaborative Research in Integrative Biology**
**Prerequisites:** BIOL 1604.
**Description:** Small teams of students work closely with faculty to design, develop, implement, and present authentic research projects. Topics of research will vary each semester based on the research interests of faculty leading the course.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Undergraduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology

**BIOL 4750 Honors Study in Integrative Biology**
**Prerequisites:** Honors Program participation.
**Description:** Individual study in the development of biological concepts. Extensive reading, literature search and special experimentation. An individual problems course for the gifted student. Previously offered as ZOOL 4750. Offered for variable credit, 1-5 credit hours, maximum of 5 credit hours.
**Credit hours:** 1-5
**Contact hours:** Contact: 1-5 Other: 1-5
**Levels:** Undergraduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology
**General Education and other Course Attributes:** Honors Credit

**BIOL 5000 Research for Master's Thesis**
**Description:** Independent research for the MS Thesis under the supervision of graduate faculty member. Previously offered as ZOOL 5000. Offered for variable credit, 1-3 credit hours, maximum of 6 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Graduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology

**BIOL 5003 Graduate Orientation and Academic Development**
**Prerequisites:** Admission to Integrative Biology graduate program or instructor approval.
**Description:** Prepare first year Integrative Biology graduate students for success. We address departmental expectations and standards by providing: an introduction to departmental expertise and capabilities, exposure to available tools and resources, a forum for research conceptualization and formulation, instruction on finding and securing funding, guidance on how to convert questions into grant proposals, and a milieu for preparation, submission and peer review of external grant/fellowships. Previously offered as ZOOL 5003.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5010 Graduate Seminar**
**Description:** Discussion of selected topics. Previously offered as ZOOL 5010. Offered for variable credit, 1-3 credit hours, maximum of 10 credit hours.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Graduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology

**BIOL 5011 Current, Historical, and Integrative Principles in Integrative Biology**
**Prerequisites:** Admission to Integrative Biology graduate program or instructor approval.
**Description:** This course will furnish fundamental concepts in ecology, evolution, and environmental stress for first-year graduate students in Integrative Biology (and related departments). More importantly, this course is organized as modules that bring together various elements from the three broadly defined, and fundamentally related disciplines (i.e., ecology, evolution, and environmental stress), that our department views as our core strengths. Previously offered as ZOOL 5011.
**Credit hours:** 1
**Contact hours:** Lecture: 1 Contact: 1
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5020 Special Problems**
**Prerequisites:** Graduate standing and consent of instructor.
**Description:** Discussions of selected readings and topics. Previously offered as ZOOL 5020. Offered for variable credit, 1-4 credit hours, maximum of 10 credit hours.
**Credit hours:** 1-4
**Contact hours:** Contact: 1-4 Other: 1-4
**Levels:** Graduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology

**BIOL 5024 Histology**
**Prerequisites:** Consent of Instructor.
**Description:** The study of cellular composition and functional components of tissues. With an emphasis in vertebrates, the course is a survey of the microanatomy and function of tissues such as epithelial, connective, muscular, and nervous. May not be used for degree credit with BIOL 4024.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5030 Teaching Integrative Biology**
**Prerequisites:** Consent of instructor.
**Description:** Supervised teaching in the department. Attendance at seminar on problems involved in teaching Integrative Biology in college. Previously offered as ZOOL 5030. Offered for variable credit, 1-3 credit hours, maximum of 4 credit hours.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Graduate, Undergraduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology

**BIOL 5033 Evolution**
**Description:** Development of the evolutionary concept; speciation evolutionary mechanisms and phylogenetic concepts. May not be used for degree credit with BIOL 4133.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5073 Principles of Neuroscience**
**Description:** This course examines foundational theories and principles related to the neural mechanisms controlling physiological processes and behavior. Topics covered include cellular neurobiology, neuronal signaling, neural development and plasticity, comparative neuroanatomy, and neurobiology of complex brain functions such as sensory processing, arousal, emotions, learning, and memory. Previous coursework in physiology recommended. Same course as PSYC 5073 and BIOM 5983. May not be used for degree credit with BIOL 4073 or PSYC 4073.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5100 Current Topics in Biology for Teachers**
**Prerequisites:** Approval of instructor.
**Description:** Acquaints the primary or secondary teacher with recent advances in biology. May include lecture, laboratory or field work. Offered for variable credit, 1-4 credit hours, maximum of 4 credit hours.
**Credit hours:** 1-4
**Contact hours:** Lecture: 1-4 Contact: 1-4
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5104 General Parasitology**
**Prerequisites:** BIOL 1604.
**Description:** Fundamentals of parasitism with emphasis on: life cycles, disease conditions, epidemiology, diagnosis, treatment, historical significance, terminology, taxonomy, and parasitological techniques. May not be used for degree credit with BIOL 4104.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5113 Conservation Genetics**
**Prerequisites:** Course in genetics strongly recommended.
**Description:** Principles of population genetics as they pertain to issues in conservation biology. Evolutionary relationships, hybridization, natural selection, factors affecting small populations, gene flow, captive populations, and META populations. No credit for students with credit in BIOL 4113. Previously offered as ZOOL 5113.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5123 Behavioral Ecology**
**Prerequisites:** Course in ecology strongly recommended.
**Description:** Analysis and description of the behavior of animals in their natural environment, especially in terms of natural selection and adaptation. A synthesis of ethology, population genetics, sociobiology, and evolutionary theory. Largely descriptive and generalized with limited emphasis on mathematical theory. Previously offered as ZOOL 5123.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5133 Evolutionary Ecology**
**Description:** This course is intended to inform students about the traditional breadth of evolutionary ecology, and its impacts on contemporary ecological and evolutionary theories. Study will include both broad historical precedent and the far-reaching importance of current research in evolutionary ecology. This course will develop skills in written and oral communication and critical/synthetic thought. Previously offered as ZOOL 5133.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5134 Embryology**
**Prerequisites:** BIOL 1604 and CHEM 1515.
**Description:** Biochemical basis of development with emphasis on gene regulation. Comparative development of sea urchin, frog, chick and pig. Experiments using frog and mouse, including the molecular level. May not be used for degree credit with BIOL 4134.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5174 Mammalogy**
**Prerequisites:** College level ecology or Natural History course.
**Description:** Taxonomy, identification, evolution, zoogeography, life history traits, and techniques of study of wild mammals. Weekend field trips required. May not be used for degree credit with BIOL 4174.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5184 Advanced Herpetology**
**Description:** The biology of amphibians and reptiles with an emphasis on evolutionary relationships and comparative morphology, physiology, ecology, and natural history; laboratory emphasis on Oklahoma species. Offered spring semester of even-numbered years. Weekend field trips required. May not be used for degree credit with BIOL 4184.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5215 Mammalian Physiology**
**Description:** Descriptive and functional analysis of the mammalian nervous, cardiovascular, musculoskeletal, respiratory, renal, endocrine and digestive organ systems. For majors in human and animal sciences, particular pre-medical, pre-dental, and pre-veterinary tracks. Upper-division physiology course required. May not be used for degree credit with BIOL 4215. Previously offered as ZOOL 4215.
**Credit hours:** 5
**Contact hours:** Lecture: 5 Contact: 5
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5243 Ecological Immunology**
**Description:** The causes and consequences of variation in immunity studied within the context of evolution and ecology. A combination of lectures and student-led presentations intended for graduate students and advanced undergraduates. Previously offered as ZOOL 5243.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5253 Pharmacology**
**Description:** Major drug classes based on their predominant use or principal activity in the body; basis for drug action; and modification of drugs and their action by physiological processes. Upper-division Physiology and Organic Chemistry required. May not be used for degree credit with BIOL 4243 or BIOL 4253.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5273 Environmental Physiology**
**Prerequisites:** BIOL 3204 or BIOL 4215 or equivalent.
**Description:** The study of animal adaptation and responses to natural freshwater, and terrestrial habitats as well as anthropogenic problems specific to these habitats. No credit for students with credit in BIOL 4273. Previously offered as ZOOL 5273.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5283 Endocrinology**
**Prerequisites:** A course in physiology and chemistry or consent of instructor.
**Description:** Examination of the hormonal control and regulation of physiological processes in vertebrates. Function of the hypothalamus, pituitary, adrenal, thyroid, pancreas, ovary and testes. No credit for students with credit in BIOL 4283. Previously offered as ZOOL 5283.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5293 Behavioral Neuroendocrinology**
**Prerequisites:** BIOL 3204 or BIOL 4215.
**Description:** Examination of the influences of nervous and endocrine systems on behavior and vice-versa, in vertebrates including humans. Historical roots and current techniques relating to topics, including male and female reproductive behavior patterns, sex differences in behavior and neuroendocrine causation. No credit for students with credit in BIOL 4293. Previously offered as ZOOL 5293.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5303 Organismal Ecotoxicology**
**Description:** Comparative study of the major groups of environmental contaminants (e.g. heavy metals, PCB's, insecticides) and an introduction to the basic theories, principles and techniques associated with the study of contaminant fate and effects on organisms. No credit for students with credit in BIOL 4303. Same course as ITOX 5303. Previously offered as ZOOL 5303.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5313 Animal Communication**
**Prerequisites:** Graduate standing.
**Description:** Mechanisms, function and evolution of animal communication systems. Emphasis on the function of sensory systems, signal production mechanisms, theories of signal design and optimal signaling strategies, and current research on signaling behavior and its evolution in wild animals. A course in animal behavior or evolution recommended. May not be used for degree credit with BIOL 4313.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5333 Disease Ecology**
**Description:** Understanding the ecology and evolution of pathogens and host-parasite relationships. This course will cover topics from the evolution of virulence and antibiotic resistance to globalization, emerging infectious diseases, and the factors driving increased pandemic risk. A class in Introductory Biology recommended. May not be used for degree credit with BIOL 4333.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5343 Population and Community Ecotoxicology**
**Prerequisites:** Course in ecology strongly recommended.
**Description:** Examines the exposure of animals to environmental contaminants and resulting effects at the individual through community level. The dynamic nature of exposure to contaminants will be of particular interest in this course. For example, how do the natural history traits of a species either protect it from exposure, or enhance its potential for exposure to contaminants? Topics will range from the historical perspectives to ecotoxicology to study design and risk assessment. Same course as ITOX 5343. Previously offered as ZOOL 5343.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5363 Principles of Toxicology**
**Prerequisites:** Course in chemistry and physiology strongly recommended.
**Description:** Basic concepts in toxicology such as chemical partitioning, dose response, toxicokinetics, toxicodynamics, and bioavailability. It will focus on the molecular and cellular mechanisms of toxicity of a few representative natural and man-made compounds. Case studies used to understand real-life scenarios. No credit for students with credit in BIOL 4363.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5403 Advanced Wetland Ecology**
**Prerequisites:** A course in aquatic ecology or wetland management recommended.
**Description:** Principles and theory of wetland ecology with a focus on wetland processes, function, and services. Topics include wetland geomorphology, biogeochemistry and hydrology of wetlands, wetland functions and services, wetland development, wetland restoration, water issues, wetland policy, philosophy of wetland management, and educating society about wetlands. Same course as NREM 5403. Previously offered as ZOOL 5403.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5413 Biology of Fishes**
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5423 Techniques in Environmental Toxicology**
**Prerequisites:** Organic chemistry or instructor consent.
**Description:** Practical understanding of modern techniques used to quantify exposure and effects of environmental toxicants. Laboratory topics include gas chromatography, HPLC, atomic absorption spectroscopy, immunoassay, and toxicity testing. Same course as ITOX 5423. Previously offered as ZOOL 5423.
**Credit hours:** 3
**Contact hours:** Lecture: 1 Lab: 4 Contact: 5
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5434 Limnology**
**Description:** This course provides an overview of the physical, chemical, and biological characteristics of inland habitats including lakes, reservoirs, streams, and wetlands. Field trips required. May not be used for degree credit with BIOL 4434.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5464 Ornithology**
**Description:** Classification, evolution, distribution, identification, life histories, and morphological, ecological, and behavioral adaptations of birds. Two weekend field trips required. May not be used for degree credit with BIOL 4464, NREM 4464. Previously offered as NREM 5564.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5484 Animal Locomotion**
**Description:** How do animals move? How does this motion change based on environment? How has such motion evolved across groups? This course will explore the relationship of body form to locomotion. We will focus on all types of animals, which represent a broad diversity of types of locomotion (e.g. flying, swimming, jumping), environments (e.g. air, land, water), and scales of body size (i.e. from single cells to whales). A laboratory will serve to introduce students to the methods and technology used in studying locomotion. May not be used for degree credit with BIOL 4484.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology

**BIOL 5503 Spatial Ecology and Analysis**
**Prerequisites:** Course in ecology strongly recommended.
**Description:** Theory, methods, and models for identifying and quantifying spatial patterns and processes, with a focus on implications for ecological relationships. Previously offered as ZOOL 5503.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5523 Population Ecology**
**Prerequisites:** BIOL 3034 and MATH 1513.
**Description:** Theory and principles of predicting and analyzing population abundance and dynamics. Life history theory, foraging theory, habitat selection, population genetics, and species interactions. Previously offered as ZOOL 5523.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5524 Biological Laboratory Instrumentation**
**Prerequisites:** CHEM 1515 and PBIO 1404 or MICR 2123 or BIOL 1604 or equivalents or consent of instructor.
**Description:** Lecture and laboratory course in biological instrumentation use, theory, experimental design, maintenance, and troubleshooting. Topics include liquid handling systems, pH/ISE meters, electrophoresis, spectrophotometers, centrifuges, chromatography, thermocylers, and DNA sequencers. May not be used for degree credit in BIOL 4524, MICR 4524, PBIO 4524. Same course as PBIO 5524 and MICR 5524.
**Credit hours:** 4
**Contact hours:** Lecture: 2 Lab: 4 Contact: 6
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Integrative Biology
**Additional Fees:** Biology Consummable Material fee of $50 applies.

**BIOL 5623 Ecological Data and Alternative Hypothesis**
**Prerequisites:** Course in statistics strongly recommended.
**Description:** Emphasizes statistical analyses that start with a set of plausible alternative hypotheses and use likelihoods to quantify the relative support the hypotheses receive from empirical data. Instruction will be done with lectures, computer lab exercises, and in-class presentations. Previously offered as ZOOL 5623.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5633 Ecological and Behavioral Modeling**
**Prerequisites:** Course in ecology strongly recommended.
**Description:** This course will provide a general overview of modeling approaches for studying a variety of ecological and environmental problems. It will provide students with a toolbox of techniques, and discuss how they can be used to address questions and generate testable predictions. The course will emphasize modeling individual behavior and population dynamics. Previously offered as ZOOL 5633.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 5643 Ecological Niche Modeling and Species Distributions**
**Prerequisites:** Course in ecology strongly recommended.
**Description:** Ecological niche modeling theory and practice. Generation of niche models and distribution predictions to address questions on species' ecology, conservation, biogeography, and phylogeography. Familiarization with ESRI ArcGIS software, as well as environmental GIS data sources. Previously offered as ZOOL 5643.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Integrative Biology

**BIOL 6000 Research for PhD Dissertation**
**Description:** Independent research for the PhD dissertation under the supervision of a graduate faculty member. Previously offered as ZOOL 6000. Offered for variable credit, 1-15 credit hours, maximum of 60 credit hours.
**Credit hours:** 1-15
**Contact hours:** Contact: 1-15 Other: 1-15
**Levels:** Graduate
**Schedule types:** Independent Study
**Department/School:** Integrative Biology

**PBIO 1052 How Plants Shaped Our World (LN)**
**Description:** Experience the connections between plants and everything in our world - from food and clothing to history and art. Learn why the first physicians were botanists. See how the search for black pepper led to the discovery of a new world and to masterpieces by Dutch painters. Discover how plants work by growing and experimenting with them.
**Credit hours:** 2
**Contact hours:** Lecture: 1 Lab: 2 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology
**General Education and other Course Attributes:** Laboratory-Based Inquiry, Natural Science Reasoning

**PBIO 1404 Plant Biology (LN)**
**Description:** Basic concepts in the biology of plants from the perspective of structure and function, ecology and evolution, and diversity. Students gain experience with the process of science by proposing hypotheses, designing and conducting experiments and interpreting data. Previously offered as BOT 1404, BIOL 1404, BIOL 1403, and BISC 1403.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology
**General Education and other Course Attributes:** Laboratory-Based Inquiry, Natural Science Reasoning

**PBIO 2110 Special Topics in Plant Biology**
**Prerequisites:** Consent of instructor.
**Description:** Special studies in any area of plant biology. Offered for variable credit, 1-6 credit hours, maximum of 15 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 2200 Undergraduate Research**
**Prerequisites:** Consent of instructor.
**Description:** Undergraduate research problems in plant biology. Graded on a pass/fail basis. Offered for variable credit, 1-6 credit hours, maximum of 15 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 2403 Introduction to Plant Molecular Biology**
**Prerequisites:** CHEM 1314 with a "C" or better; and PBIO 1404 or (BIOL 1113 and BIOL 1111) or BIOL 1114.
**Description:** Concepts, principles, and themes in plant molecular biology, including structures and functions of biomolecules, representative molecular reactions, and regulations of such reactions in everyday plant life.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Biology

**PBIO 2890 Honors Experience in Plant Biology**
**Prerequisites:** Honors Program participation and concurrent enrollment in a designated BIOL or PBIO course.
**Description:** A supplemental Honors experience in Plant Biology to partner concurrently with designated upper-division BIOL or PBIO course(s). The course adds a different intellectual dimension to the designated course. Same course as PBIO 3890. Offered for fixed credit, 1 credit hour, maximum of 6 credit hours.
**Credit hours:** 1
**Contact hours:** Lecture: 1 Contact: 1
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Biology
**General Education and other Course Attributes:** Honors Credit

**PBIO 3024 Plant Diversity**
**Prerequisites:** BOT 1404 or equivalent.
**Description:** Forms and life histories of selected plants with emphasis on some of the less familiar forms. The diversity of plant forms as well as basic similarities in life histories; importance of each form to humans and their environment. Previously offered as BOT 3024.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 3110 Special Topics in Plant Biology**
**Prerequisites:** Consent of instructor.
**Description:** Special studies in any area of plant biology. Offered for variable credit, 1-6 credit hours, maximum of 15 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 3114 Plant Taxonomy**
**Prerequisites:** PBIO 1404 or equivalent.
**Description:** Survey of vascular plant families in a phylogenetic framework, and the morphological characters that define them. Principles and practice of plant classification theory and methods. Lab focuses on the identification of species that comprise the Oklahoma flora. Previously offered as BOT 3114.
**Credit hours:** 4
**Contact hours:** Lecture: 2 Lab: 4 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 3253 Environment and Society (N)**
**Prerequisites:** At least one college level science course strongly recommended.
**Description:** The environmental impacts of human activities and population growth on the natural world, and possible solutions. Previously offered as BOT 3253.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Biology
**General Education and other Course Attributes:** Natural Science Reasoning

**PBIO 3263 Plants and People (N)**
**Description:** Study of how plant use has changed the course of world history. This includes the uses of plants and plant products for food and beverages, shelter, fiber, and medicinal and pharmaceutical purposes. Previously offered as BOT 3263.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Biology
**General Education and other Course Attributes:** Natural Science Reasoning

**PBIO 3273 Medical Botany (N)**
**Description:** Study of plants as a source of medicines, psychoactive compounds and poisons. These topics will be explored in the context of modern western medicine as well as traditional health systems and complementary alternative medicine. Previously offered as BOT 3273.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Biology
**General Education and other Course Attributes:** Natural Science Reasoning

**PBIO 3403 Hopeful Monsters: Laboratory Analysis of Plant Mutants**
**Prerequisites:** PBIO 1404 or BIOL 1113.
**Description:** The course will focus on the analysis of selected mutants of the model plant Arabidopsis thaliana. The mutations affect different parts of the plant, including altered cell types, organ identity changes, malformed tissues and organs, unusual organ or seed sizes, and altered fertility. There are seven modules, each consisting of directed and independent analyses of mutations. Light microscopy will be the primary method for the analysis of the mutations.
**Credit hours:** 3
**Contact hours:** Lecture: 1 Lab: 4 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 3553 Fungi: Myths and More**
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111).
**Description:** This course explores fungal biology and its roles in the environment and impacts on the health and nutrition of plants, animals and humans. Topics include the ethnomycological and industrial uses of fungi in foods, fermentations, medicines, and intoxicants, and the colorful folklore and myths associated with these diverse, enigmatic organisms. Laboratory instruction includes microscopy, microbiological methods, mushroom cultivation, and identification of microfungi and wild mushrooms. Same course as PLP 3553. Previously offered as BOT 3553.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 3890 Advanced Honors Experience in Plant Biology**
**Prerequisites:** Honors Program participation and concurrent enrollment in a designated BIOL or PBIO course.
**Description:** A supplemental Honors experience in Plant Biology to partner concurrently with designated upper-division BIOL or PBIO course(s). The course adds a different intellectual dimension to the designated course. Same course as PBIO 2890. Offered for fixed credit, 1 credit hour, maximum of 6 credit hours.
**Credit hours:** 1
**Contact hours:** Lecture: 1 Contact: 1
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Biology
**General Education and other Course Attributes:** Honors Credit

**PBIO 4005 Field Botany**
**Prerequisites:** PBIO 1404 or equivalent.
**Description:** Botanical field techniques, the vegetation of North America, and the flora of Oklahoma. Terminology of description, use of taxonomic keys, techniques of specimen preservation, field recognition of plant taxa and communities and controlling ecological factors, economic and wildlife significance of dominant taxa, principles of classification and nomenclature. Three weekend field trips required. May not be used for degree credit with PBIO 5003. Previously offered as BOT 3005.
**Credit hours:** 5
**Contact hours:** Lecture: 3 Lab: 4 Contact: 7
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 4013 Biological Microtechnique**
**Prerequisites:** PBIO 1404 or BIOL 1604.
**Description:** Theories, principles, and methods related to the usage of the light microscope and to the preparation of biological materials for light microscopic examination. May not be used for degree credit with PBIO 5013. Previously offered as BOT 3013.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 3 Contact: 5
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 4110 Special Topics in Plant Biology**
**Prerequisites:** Consent of instructor.
**Description:** Special studies in any area of plant biology. Offered for variable credit, 1-6 credit hours, maximum of 15 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 4233 Plant Anatomy**
**Prerequisites:** BOT 1404 or equivalent.
**Description:** Structures of cells, tissues and organs of plants and the developmental, phylogenetic, and functional contexts of the structures. May not be used for degree credit with PBIO 5233. Previously offered as BOT 3233.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 4400 Undergraduate Research**
**Prerequisites:** Consent of instructor.
**Description:** Undergraduate research problems in plant biology. Previously offered as BOT 4400. Offered for variable credit, 1-6 credit hours, maximum of 15 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 4423 Plant Mineral Nutrition**
**Prerequisites:** PBIO 4463 or concurrent enrollment.
**Description:** Uptake, translocation, metabolism, and biochemical function of mineral nutrients in higher plants. May not be used for degree credit with PBIO 5423. Previously offered as BOT 4423.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Biology

**PBIO 4462 Plant Physiology Laboratory**
**Prerequisites:** PBIO 4463 or PBIO 5463 or concurrent enrollment.
**Description:** Skills in techniques for working with plants, experiments involving nutrition, respiration, photosynthesis, water relations, translocation, hormones, growth and development. Previously offered as BOT 3460 and BOT 3462.
**Credit hours:** 2
**Contact hours:** Lab: 4 Contact: 4
**Levels:** Undergraduate
**Schedule types:** Lab
**Department/School:** Biology

**PBIO 4463 Plant Physiology**
**Prerequisites:** BOT 1404 or equivalent.
**Description:** Plant subcellular structure, water relations, water absorption and ascent of sap, translocation, gaseous exchange, nutrition, enzymes, respiration, photosynthesis, growth, development, reproduction, tropisms, hormones, dormancy and seed germination. May not be used for degree credit with PBIO 5463. Previously offered as BOT 3463.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Undergraduate
**Schedule types:** Lecture
**Department/School:** Biology

**PBIO 4524 Biological Laboratory Instrumentation**
**Prerequisites:** CHEM 1515 or equivalent and (BOT 1404 or MICR 2123 or BIOL 1604 or equivalents or consent of instructor).
**Description:** Lecture and laboratory course in biological instrumentation use, theory, experimental design, maintenance, and troubleshooting. Topics include liquid handling systems, pH/ISE meters, electrophoresis, microcontrollers, spectrophotometers, centrifuges, chromatography, thermacylers, and DNA sequencers. Same course as BIOL 4524, MICR 4524.
**Credit hours:** 4
**Contact hours:** Lecture: 2 Lab: 4 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 4553 Molecular Phylogenectic Analysis**
**Prerequisites:** Undergraduate genetics strongly recommended.
**Description:** Covers the use of molecular sequence data to construct evolutionary trees. It integrates theory and computer applications to answer questions involving species relationships, gene evolution, molecular evolution and morphological change, co-evolution, and biogeographic relationships. May not be used for degree credit with PBIO 5553.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 4654 Plant Secondary Metabolism**
**Prerequisites:** PBIO 1404.
**Description:** This course describes the biochemical pathways and functions of plant secondary metabolites, and how they have been used for medical, pharmaceutical, and agricultural research and industry. Same course as PBIO 5654.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Undergraduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 4800 Senior Honors Thesis**
**Prerequisites:** Departmental invitation, senior standing, Honors Program participation.
**Description:** A research project under the direction of a faculty member resulting in a written report to be judged by a second faculty member as well. An oral presentation made at a departmental seminar. Required for graduation with departmental honors in plant biology. Previously offered as BOT 4993. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Biology
**General Education and other Course Attributes:** Honors Credit

**PBIO 4910 Internship in Plant Biology**
**Prerequisites:** Specified hours of documented plant biology work experience.
**Description:** Supervised experience in an approved work situation related to future career in the plant biology field. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 4990 Independent Study in Plant Biology**
**Prerequisites:** Consent of instructor.
**Description:** Independent study under the supervision of a faculty member. This will include readings and discussion on a selected topic agreed upon between the student and instructor. Previously offered as BOT 4990. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Undergraduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 5000 Master's Thesis**
**Description:** Thesis work for the MS degree. Previously offered as BOT 5000. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Graduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 5003 Field Botany**
**Prerequisites:** PBIO 1404 or equivalent.
**Description:** Botanical field techniques, the vegetation of North America, and the flora of Oklahoma. Terminology of description, use of taxonomic keys, techniques of specimen preservation, field recognition of plant taxa and communities and controlling ecological factors, economic and wildlife significance of dominant taxa, principles of classification and nomenclature. Three weekend field trips required. May not be used for degree credit with PBIO 4005.
**Credit hours:** 3
**Contact hours:** Lecture: 1 Lab: 4 Contact: 5
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 5013 Biological Microtechnique**
**Prerequisites:** PBIO 1404 or BIOL 1604.
**Description:** Theories, principles, and methods related to the usage of the light microscope and to the preparation of biological materials for light microscopic examination. May not be used for degree credit with PBIO 4013.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 5104 Mycology**
**Prerequisites:** Graduate standing.
**Description:** A systematic study of the fungi, with emphasis on taxonomy, comparative morphology, and fungal biology. Same course as PLP 5104. Previously offered as BOT 5104.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 5110 Special Topics in Plant Biology**
**Prerequisites:** Consent of instructor.
**Description:** Special studies in any area of plant biology. Previously offered as BOT 5110. Offered for variable credit, 1-5 credit hours, maximum of 24 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Graduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 5210 Research in Plant Biology**
**Prerequisites:** Consent of instructor.
**Description:** Independent research in any area of plant biology. Previously offered as BOT 5210. Offered for variable credit, 1-6 credit hours, maximum of 15 credit hours.
**Credit hours:** 1-6
**Contact hours:** Contact: 1-6 Other: 1-6
**Levels:** Graduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 5233 Plant Anatomy**
**Prerequisites:** PBIO 1404.
**Description:** Structures of cells, tissues and organs of plants and the developmental, phylogenetic, and functional contexts of the structures. May not be used for degree credit with PBIO 4233.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 5423 Plant Mineral Nutrition**
**Prerequisites:** BOT 4463 or concurrent enrollment.
**Description:** Uptake, translocation, metabolism, and biochemical function of mineral nutrients in higher plants. May not be used for degree credit with PBIO 4423. Previously offered as BOT 5423.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Biology

**PBIO 5463 Plant Physiology**
**Prerequisites:** PBIO 1404 or equivalent.
**Description:** Plant subcellular structure, water relations, water absorption and ascent of sap, translocation, gaseous exchange, nutrition, enzymes, respiration, photosynthesis, growth, development, reproduction, tropisms, hormones, dormancy and seed germination. Previously offered as BOT 3463. May not be used for degree credit with PBIO 4463.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Biology

**PBIO 5524 Biological Instrumentation**
**Prerequisites:** CHEM 1515 or equivalent and (BOT 1404 or MICR 2123 or BIOL 1604 or equivalents or consent of instructor).
**Description:** Lecture and laboratory course in biological instrumentation use, theory, experimental design, maintenance, and troubleshooting. Topics include liquid handling systems, pH/ISE meters, electrophoresis, spectrophotometers, centrifuges, chromatography, thermocylers, and DNA sequencers. Same course as BIOL 5524 and MICR 5524.
**Credit hours:** 4
**Contact hours:** Lecture: 2 Lab: 4 Contact: 6
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 5541 Phylogenomics**
**Description:** Current topics in the theory and application of genome and transcriptome sequencing to phylogenetics, prediction of gene function, and evolution of genes. Previously offered as BOT 5541.
**Credit hours:** 1
**Contact hours:** Contact: 1 Other: 1
**Levels:** Graduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 5553 Molecular Phylogenectic Analysis**
**Prerequisites:** Undergraduate genetics strongly recommended.
**Description:** Covers the use of molecular sequence data to construct evolutionary trees. It integrates theory and computer applications to answer questions involving species relationships, gene evolution, molecular evolution and morphological change, co-evolution, and biogeographic relationships. May not be used for degree credit with PBIO 4553. Previously offered as BOT 5553.
**Credit hours:** 3
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 5563 Plant Ecological Genetics**
**Prerequisites:** Two of the following courses or their equivalent: BIOL 3023, BIOL 3034, and BIOL 4133.
**Description:** Basic concepts in plant population and quantitative genetics, focusing on techniques that reveal the genetic structure and the adaptive value of ecologically relevant traits. Previously offered as BOT 5563.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Biology

**PBIO 5654 Plant Secondary Metabolism**
**Prerequisites:** PBIO 1404.
**Description:** This course describes the biochemical pathways and functions of plant secondary metabolites, and how they have been used for medical, pharmaceutical, and agricultural research and industry. Same course as PBIO 4654.
**Credit hours:** 4
**Contact hours:** Lecture: 3 Lab: 3 Contact: 6
**Levels:** Graduate
**Schedule types:** Lab, Lecture, Combined lecture and lab
**Department/School:** Biology

**PBIO 5813 Plant Developmental Genetics**
**Prerequisites:** BIOL 3023 or equivalent.
**Description:** Discussion of the genetic and molecular factors that regulate reproductive and vegetative development in flowering plants. Emphasis on recent publications that deal with model genetic systems and plants of economic significance. Previously offered as BOT 5813.
**Credit hours:** 3
**Contact hours:** Lecture: 3 Contact: 3
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Biology

**PBIO 5850 Plant Biology Seminar**
**Description:** Weekly one-hour seminar series of invited and internal speakers. Plant Sciences MS and Plant Sciences (Plant Biology) PhD students are required to present a minimum of two seminars, including one on thesis or dissertation results. Previously offered as BOT 5850. Offered for fixed credit, 1 credit hour, maximum of 6 credit hours.
**Credit hours:** 1
**Contact hours:** Lecture: 1 Contact: 1
**Levels:** Graduate
**Schedule types:** Lecture
**Department/School:** Biology

**PBIO 5910 Internship in Plant Biology**
**Prerequisites:** Specified hours of documented plant biology work experience.
**Description:** Supervised experience in an approved work situation related to future career in the plant biology field. Graded on a pass/fail basis. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.
**Credit hours:** 1-3
**Contact hours:** Contact: 1-3 Other: 1-3
**Levels:** Graduate
**Schedule types:** Discussion
**Department/School:** Biology

**PBIO 6000 Doctoral Research**
**Description:** Independent research for the doctoral dissertation. Previously offered as BOT 6000. Offered for variable credit, 1-15 credit hours, maximum of 60 credit hours.
**Credit hours:** 1-15
**Contact hours:** Contact: 1-15 Other: 1-15
**Levels:** Graduate
**Schedule types:** Discussion
**Department/School:** Biology