

# BIOLOGY (BIO)

The department offers programs leading to Bachelor of Arts and Bachelor of Science degrees in biology. Students electing to major in biology should consult with their major adviser to determine which degree program is most appropriate for their current career objectives. The requirements for completion of Biology degree programs are those in effect at the time of the declaration of the major, as the curriculum and the departmental requirements may change slightly during the student's period of residence.

**Special Note.** Students enrolled at Wake Forest may not take courses in biology at other institutions to satisfy the divisional requirement.

## Contact Information

Department of Biology (<http://college.wfu.edu/biology/>)  
Winston Hall 226, Box 7325  
Phone 336-758-5322

## Programs

### Majors

- B.A. in Biology (<https://bulletin.wfu.edu/courses-instruction/biology/ba-biology/>)
- B.S. in Biology (<https://bulletin.wfu.edu/courses-instruction/biology/bs-biology/>)

### Minor

- Minor in Biology (<https://bulletin.wfu.edu/courses-instruction/biology/minor-biology/>)

## Courses

### Biology (BIO)

All BIO courses numbered 211 through 399 require BIO 150, BIO 150L, BIO 160, and BIO 160L as prerequisites with the exception of BIO 213 and BIO 214. Additional prerequisites may be required and are noted in individual course descriptions.

Under special circumstances, an exceptional student lacking a prerequisite for a particular course may be allowed to enroll in that course by receiving a POI (permission of instructor) from the instructor.

The same numbered course cannot be repeated unless it is a topics course (BIO 301-BIO 306) with a different title.

A maximum of four hours of research in biology (BIO 390, BIO 391, and/or BIO 392) may be applied toward the major, but an additional four hours in research (BIO 392, BIO 393, and/or BIO 394) may be taken and applied as elective hours towards graduation. Research courses should be taken in consecutive order. Only BIO major and minors are eligible to receive BIO credit for research. Only BA majors are eligible to take BIO 399.

#### BIO 101. Biology and the Human Condition. (4 h)

Introduction to basic principles in biology, emphasizing recent advances in biology in the context of their ethical, social, political, and economic considerations. Intended for students with little or no previous experience in biology. BIO 101 is not recommended for those pursuing a career in the health professions or who are planning to continue in biology. Does NOT count toward the biology major or minor. Credit not given for both BIO 101 and BIO 111. C-BIO 101L. (D)

#### BIO 101L. Biology and the Human Condition-Lab. (0 h)

Lab only. No credit.

#### BIO 105. Plants and People. (4 h)

Explores the numerous associations between plants and people, the fundamental importance of plant diversity to humans and their role in the sustainability of the biosphere. This course is intended for students with little or no previous experience in biology and does NOT count toward the major or minor in Biology. (D)

#### BIO 111. Biological Principles. (4 h)

Study of the general principles of living things with focus on the cellular, organismal, and population levels of biological organization, emphasizing the role of heredity and evolution in these systems. Used as equivalent credit for prior college level or transfer course work only. Does NOT count toward the major or minor in biology. Credit not given for both BIO 101 and BIO 111. (D)

#### BIO 111L. Biological Principles Lab. (0 h)

Lab only. No credit.

#### BIO 150. Biology I. (3 h)

Introduction to biological principles and concepts I. Both BIO 150 and 150L must be taken to meet the divisional requirement. (D)

#### BIO 150L. Biology I Lab. (1 h)

P or C-BIO 150.

#### BIO 160. Biology II. (3 h)

Introduction to biological principles and concepts II. P-BIO 150 and 150L.

#### BIO 160L. Biology II Lab. (1 h)

P-BIO 150 and 150L. P or C-BIO 160.

#### BIO 202. Bird Taxonomy (Florida). (2 h)

Immersion in bird taxonomy and ecology, conducted in southern Florida during six days of Spring Break. Two on-campus meetings are followed by a trip to top birding sites in North America, viewing over 100 species and covering most of the world's orders of birds. Out-of-pocket costs for food, transportation, and lodging expected to be \$200 or less. P-POI required.

#### BIO 208. Understanding Climate Change. (1.5 h)

Introduction to the scientific evidence for climate change.

#### BIO 210. Ethical Decision-Making in Biology and Medicine. (3 h)

Examines contemporary issues in bioethics, including responsible conduct in research, implications of technological advances in biology, environmental issues, and controversies in health care and medical practice.

#### BIO 212. Biodiversity. (4 h)

Investigates the history of life on earth and examines its diversification in an evolutionary and ecological context. Lectures cover the mechanisms of biological diversification and survey life on earth. Labs introduce students to the broad diversity of life through exercises with living organisms. P-BIO 150, 150L, 160, and BIO 160L. (D)

**BIO 213. Genetics and Molecular Biology. (4 h)**

Introduction to the principles and processes of heredity, information flow, and gene function. Topics covered include Mendelian genetics, molecular genetics, and the origin of genetic variation. This course will be offered for the last time Spring 2021. C-BIO 213L.

**BIO 213L. Genetics and Molecular Biology Lab. (0 h)**

Lab only. No credit.

**BIO 214. Cellular Biology. (4 h)**

Introduction to the principles and processes of cellular biology and their impact on organismal function. Topics include molecular organization of cellular structures, regulations of cellular functions, bioenergetics, and metabolism. Introduces cancer, immunology, and developmental biology. This course will be offered for the last time in Spring 2021. P-BIO 114 and CHM 111.

**BIO 214L. Cellular Biology Lab. (0 h)**

Lab only. No credit.

**BIO 220. Introduction to Earth Science. (3 h)**

Oceans, weather, climate, earthquakes, volcanoes, soil, and space all play important roles in our dynamic planet. Students will explore the lithosphere, hydrosphere, atmosphere, and biosphere, and gain a deeper understanding of how the Earth operates as a whole. Also listed as ENV 220. P-requires BIO 150, 150L, 160, and BIO 160L if taken as BIO 220.

**BIO 225. Field Biology and Natural History. (3 h)**

Provides a hands-on study of organisms in their natural habitats with an emphasis on local North Carolina biodiversity. Well-established sampling methods in field biology are blended with emerging technologies. P-BIO 150, 150L, 160, and BIO 160L.

**BIO 235. Genetics and Evolution. (3 h)**

Exploration of genetic evolution, biodiversity, adaptation, and genomics. Intended as an intermediate course for developing skills towards advanced studies in genetics, evolution, ecology, and molecular biology. P-BIO 150, 150L, 160, and BIO 160L.

**BIO 245. Comparative Animal Physiology. (3 h)**

Introduction to animal physiology in the context of animal diversity and evolution. P-BIO 150, 150L, 160, and BIO 160L.

**BIO 265. Cellular and Molecular Biology. (3 h)**

Exploration of the molecular mechanisms of cellular functions. P-BIO 150, 150L, 160, and BIO 160L.

**BIO 301. Topics in Biology. (1-4 h)**

Seminar and/or lecture courses in selected topics, some involving laboratory instruction. May be repeated if the course title differs.

**BIO 302. Topics in Biology. (1-4 h)**

Seminar and/or lecture courses in selected topics, some involving laboratory instruction. May be repeated if the course title differs.

**BIO 303. Topics in Biology. (1-4 h)**

Seminar and/or lecture courses in selected topics, some involving laboratory instruction. May be repeated if the course title differs.

**BIO 304. Topics in Biology. (1-4 h)**

Seminar and/or lecture courses in selected topics, some involving laboratory instruction. May be repeated if the course title differs.

**BIO 305. Topics in Biology. (1-4 h)**

Seminar and/or lecture courses in selected topics, some involving laboratory instruction. May be repeated if the course title differs.

**BIO 306. Topics in Biology. (1-4 h)**

Seminar and/or lecture courses in selected topics, some involving laboratory instruction. May be repeated if the course title differs.

**BIO 307. Biophysics. (3 h)**

Introduction to the structure, dynamic behavior, and function of DNA and proteins, and a survey of membrane biophysics. The physical principles of structure determination by X-ray, NMR, and optical methods are emphasized. Also listed as PHY 307. P-BIO 114 or 214, PHY 113 or 123, PHY 114 or 124, or POI. BIO 150, 150L, 160, and BIO 160L may be substituted for BIO 114 and 214.

**BIO 308. Biomechanics. (3 h)**

Analyzes the relationship between organismal form and function using principles from physics and engineering. Solid and fluid mechanics are employed to study design in living systems. P-BIO 114 or BIO 150, 150L, 160, and BIO 160L.

**BIO 308L. Biomechanics Lab. (1 h)**

Laboratory study of biomechanics. P or C-BIO 308.

**BIO 309. Comparative Anatomy. (4 h)**

Study of the vertebrate body from an evolutionary, functional, and developmental perspective. Labs emphasize structure and function, primarily through the dissection of representative vertebrates. P-BIO 113 and 114 or BIO 245.

**BIO 310. Community Ecology and Global Change. (4 h)**

An advanced ecology course covering mechanisms that determine the dynamics and distribution of plant and animal assemblages and their responses to and roles in global change. Lectures focus on ecological principles and theory. Lab includes local field trips and discussion of the primary literature. Weekend field trips to Outer Banks and mountains. P-BIO 113 and 114 or BIO 150, 150L, 160, and BIO 160L.

**BIO 311. Ecology and Conservation Biology of Coral Reefs. (4 h)**

In-depth study of the various biotic and abiotic components that come together to structure ecosystem function and biodiversity at all spatial scales in one of Earth's most productive and diverse environments, yet one most threatened by human use and climate change. Lab component is a one-week field trip over Spring Break. P-BIO 113 or BIO 150, 150L, 160, and BIO 160L.

**BIO 313. Herpetology. (4 h)**

Explores the biology of reptiles and amphibians, emphasizing their unique morphological, physiological, behavioral and life-history adaptations, and their evolutionary relationships. The lab consists mostly of field trips. P-BIO 113, 114 and 213 or BIO 150, 150L, 160, and BIO 160L.

**BIO 315. Population Genetics. (3 h)**

Study of the amount and distribution of genetic variation in populations of organisms and of how processes such as mutation, recombination, and selection affect genetic variation. Lectures introduce theoretical studies and include discussion of molecular and phenotypic variation in natural populations. P-BIO 113 and 213 or BIO 150, 150L, 160, and BIO 160L. (QR)

**BIO 315L. Population Genetics Lab. (1 h)**

Uses computer modeling and simulation, and experiments using populations of fruit flies and other model organisms as appropriate. P or C-BIO 315.

**BIO 316. Biology of Birds. (4 h)**

Lecture plus lab course emphasizing ecological and evolutionary influences on the physiology, behavior, diversity, and population biology of birds, and case studies in conservation biology. P-BIO 113 and 114 or BIO 150, 150L, 160, and BIO 160L.

**BIO 317. Plant Physiology and Development. (3 h)**

Examines the growth, development, and physiological processes of plants. Control of these processes is examined on genetic, biochemical, and whole plant levels. P-BIO 114, 213 and 214 or BIO 265.

**BIO 317L. Plant Physiology and Development Lab. (1 h)**

Consists of structured experiments and an independently designed research project. P or C-BIO 317.

**BIO 323. Animal Behavior. (3 h)**

A survey of laboratory and field research on animal behavior. P-BIO 113 and 114 or BIO 150, 150L, 160, or BIO 160L.

**BIO 323L. Animal Behavior Lab. (1 h)**

Laboratory study of animal behavior. P or C-BIO 323.

**BIO 324. Hormones and Behavior. (3 h)**

Explores the mechanisms of hormonal influences on behavior in a broad range of animals, including humans. P-BIO 114 or BIO 245.

**BIO 327. Mycology: Biology of Fungi. (4 h)**

Introduces fungi, their evolution and natural taxonomy; cell and molecular biology; genetics, mating, and development; primary and secondary biochemistry; and their interactions with other organisms and the environment. Lab introduces culturing, microscopic and molecular techniques. P-BIO 113, 114, 213 and 214 or BIO 150, 150L, 160, and BIO 160L.

**BIO 328. Biology of Aging. (3 h)**

Explores mechanisms of aging, and effects of aging on cellular and physiological processes in a range of organisms. P-BIO 113, 114 and 214; or BIO 235 or BIO 245 or BIO 265.

**BIO 329. Conservation Biology. (3 h)**

Lectures, readings, and discussions examining biological resources, their limitations and methods for sustainability. Genetic, aquatic, terrestrial, and ecosystem resources will be examined. P-BIO 113 or BIO 150, 150L, 160, and BIO 160L.

**BIO 330. Land and Natural Resource Management. (3 h)**

Provides a fundamental understanding of land and resource management. The major focus is on federal oversight and policies but state, local, non-profit, and international aspects are included. P-BIO 113 or BIO 150, 150L, 160, and BIO 160L.

**BIO 332. Microbiology. (4 h)**

Structure, function, and taxonomy of microorganisms with emphasis on bacteria. Topics include microbial ecology, industrial microbiology, and medical microbiology. Lab emphasizes microbial diversity through characterizations of isolates from nature. P-CHM 122 and BIO 213 and 214 or CHM 122 and BIO 150, 150L, 160, and BIO 160L.

**BIO 333. Vertebrates. (4 h)**

Systematic study of vertebrates, with emphasis on evolution, physiology, behavior, and ecology. Laboratory devoted to systematic, field, and experimental studies. P-BIO 113 and 114 or BIO 150, 150L, 160, and BIO 160L.

**BIO 334. Parasitology. (4 h)**

Survey of protozoan, helminth, and arthropod parasites with a focus on cellular biology, life cycles, host-parasite relationships, and public health implications. Laboratory emphasizes microscopy-based techniques for examining parasite morphology and intracellular structures. P- BIO 113 and 114 or BIO 265.

**BIO 335. Insect Biology. (4 h)**

Introduction to the diversity, structure, development, physiology, behavior, and ecology of insects. P-BIO 113 and 114 or BIO 150, 150L, 160, and BIO 160L.

**BIO 336. Development. (3 h)**

Study of the molecular, cellular, and anatomical aspects of embryonic development of invertebrate and vertebrate animals. P-BIO 114, 213 and 214, or BIO 150, 150L, 160, or BIO 160L.

**BIO 336L. Development Lab. (1 h)**

Laboratory study of the molecular, cellular, and anatomical aspects of embryonic development of invertebrate and vertebrate animals. P or C-BIO 336.

**BIO 338. Plant Diversity. (3 h)**

Explores the diversification of plants in the context of convergent evolution, functional processes and ecological importance. P-BIO 113 or BIO 150, 150L, 160, and BIO 160L.

**BIO 338L. Plant Diversity. (1 h)**

Plant diversity lab. P or C-BIO 338.

**BIO 340. Ecology. (4 h)**

Introduction to the interrelationships among living systems and their environments; structure and dynamics of major ecosystem types; contemporary problems in ecology. P-BIO 113 and 114 or BIO 150, 150L, 160, and BIO 160L. (QR)

**BIO 341. Marine Biology. (3 h)**

An introduction to the physical, chemical, and biological parameters affecting the distribution of marine organisms. P-BIO 113 and 114 or BIO 150, 150L, 160, and BIO 160L.

**BIO 341L. Marine Biology. (1 h)**

Marine biology lab. P or C-BIO 341.

**BIO 342. Oceanography. (4 h)**

Introduces the geological, physical, chemical, and biological processes that govern the global oceans and their role in climate change. Lab focus is on tools and research questions pertinent to the field of biological oceanography. P-CHM 111 and BIO 113 or CHM 111 and BIO 150, 150L, 160, and BIO 160L.

**BIO 346. Neurobiology. (3 h)**

Introduces the structure and function of the nervous system including the neural basis of behavior. P-BIO 114 and 214 or BIO 150, 150L, 160, and BIO 160L.

**BIO 346L. Neurobiology Lab. (1 h)**

Laboratory emphasizing electrophysiological techniques with experiments from the cellular to the behavioral level. Students will design and complete their own projects. P or C-BIO 346.

**BIO 348. Physiological Plant Ecology. (3 h)**

Provides a fundamental understanding of how plants have adapted to the stresses of their habitats, particularly in harsh or extreme environments such as deserts, the alpine, the arctic tundra, and tropical rain forests. P-BIO 113 and 114 or BIO 150, 150L, 160, and BIO 160L.

**BIO 348L. Physiological Plant Ecology. (1 h)**

Physiological plant ecology lab. P or C-BIO 348.

**BIO 349. Tropical Biodiversity of the Amazon and Andes. (4 h)**

Intensive field course in tropical biodiversity focusing on ecosystems, natural resource management, and conservation. Students will travel to major tropical biomes in the vast tropical wildernesses of Andean and Amazonian Peru. Lectures emphasize the basic ecological principles important in each ecosystem. Field-based labs focus on student-designed projects. Offered in the summer only. POI required.

**BIO 352. Developmental Neuroscience. (4 h)**

Focuses on the development of neural structures and the plasticity of the mature nervous system. Laboratory features immunocytochemical and cell culture techniques for the study of neurons. P-BIO 213 and 214 or BIO 265.

**BIO 353. Functional Neuroanatomy. (3 h)**

Introduces the anatomical organization of the vertebrate central nervous system. P-BIO 214 or BIO 245.

**BIO 354. Methods in Neuroscience. (3 h)**

Introduces the techniques used in the field of neuroscience. Anatomical, physiological, molecular and behavioral methods are covered through lectures, laboratory work, and reading the primary literature. Also offered in Salamanca. P-BIO 114 and 214 or BIO 150, 150L, 160, and BIO 160L.

**BIO 356. Ecology and Resource Management of Southeast Australia. (4 h)**

Intensive field-oriented course focusing on ecosystems, natural resource management and environmental conservation of southeastern Australia. Students travel to major biomes including sub-tropical rainforests, coral reefs and the Australian urban environment. Laboratories are field-based, with some consisting of student-designed projects. Taught only in summers in Australia. P-BIO 113 or BIO 150, 150L, 160, and BIO 160L or POI.

**BIO 357. Bioinspiration and Biomimetics. (3 h)**

Explores the ways in which biological mechanisms can inspire new technologies, products, and businesses. The course combines basic biological and entrepreneurial principles. Also listed as ENT 357. P-BIO 114 or BIO 150, 150L, 160, and BIO 160L.

**BIO 358. Biogeography. (3 h)**

Study of geographic variation and distribution of organismal diversity using theoretical, historical and ecological information with specific applications to conservation and sustainability. P-BIO 113 or BIO 150, 150L, 160, and BIO 160L.

**BIO 358L. Biogeography Lab. (1 h)**

Introduces methods of analysis related to the study of biogeography. P or C-BIO 358.

**BIO 360. Metabolic Diseases. (3 h)**

Explores genetic and biochemical pathways in the context of inborn errors of metabolism. P-BIO 370/CHM 370/BMB 370.

**BIO 361. Principles of Biological Microscopy. (4 h)**

Introduces the fundamentals of biological imaging techniques. Students will explore a variety of microscopic methods as well as image acquisition, post-image processing, and scientific figure creation. Emphasis will be on both a theoretical and practical understanding of microscopic imaging principles. Concepts of experimental design and data critique will be explored through student projects and presentations. P-BIO 214 or BIO 265.

**BIO 362. Immunology. (3 h)**

Study of the components and protective mechanisms of the human immune system, including innate and acquired immunity. P-BIO 214 or BIO 265.

**BIO 363. Sensory Biology. (3 h)**

Introduction to sensory physiology and other aspects of sensory systems, e.g. molecular biology and anatomy. Also offered in Salamanca. P-BIO 114 and 214 or BIO 150, 150L, 160, and BIO 160L.

**BIO 363L. Sensory Biology Lab. (1 h)**

Laboratory emphasizing electrophysiological and behavioral techniques to examine sensory systems. Students will design and complete their own projects. P or C-BIO 363.

**BIO 365. Biology of the Cell. (3 h)**

Lecture course on classic and recent experiments in cell biology. Analysis and interpretation of experimental data from the primary literature is emphasized. P-BIO 213 and 214 or any BIO course at the 211 level or above.

**BIO 365L. Biology of the Cell Lab. (1 h)**

Laboratory course introducing basic techniques in cell biology, leading to an independent project. P or C-BIO 365.

**BIO 367. Virology. (3 h)**

Introduces molecular virology, including viral replication, viral-cell interactions, viral disease, and methods for studying and controlling viruses. P-BIO 213 and 214 or BIO 265.

**BIO 368. The Cell Biological Basis of Disease. (3 h)**

Examines defects in basic cellular mechanisms that may lead to disease. P-BIO 214 or BIO 265.

**BIO 368L. The Cell Biological Basis of Disease Lab. (1 h)**

Lab uses advanced microscopic and histological techniques to investigate basic properties of cells. P or C-BIO 368.

**BIO 369. Cancer Biology. (3 h)**

Analysis of molecular and cellular mechanisms that transform normal cells, trigger abnormal proliferation, and lead to tumor formation. Emphasis is on the biological basis of cancer, with some exploration of clinical and social consequences. P-BIO 213 and 214, or BIO 235 or BIO 245, or BIO 265.

**BIO 370. Biochemistry I: Macromolecules and Metabolism. (3 h)**

Introduces principles of biochemistry including structure, function, and biosynthesis of biological molecules, analysis of enzyme function and activity, bioenergetics, and regulation of metabolic pathways. Also listed as BMB 370 and CHM 370. P-any two of the following with associated labs: CHM 122 (or CHM 123), CHM 280 or BIO 214; or any two of the following: CHM 122 (or CHM 123), CHM 280, or BIO 265.

**BIO 370L. Biochemistry Lab. (1 h)**

Overview of biochemical approaches to study structure and function of macromolecules. Also listed as CHM 370L. Credit allowed for BIO 370L/CHM 370L or BIO 371L/BMB 371L/CHM 371L, but not both. P or C-BIO 370/BMB 370/CHM 370.

**BIO 371L. Advanced Biochemistry Lab. (1.5 h)**

Emphasizes approaches for isolation and analysis of enzymes. Required for BMB major and the chemistry major with concentration in biochemistry. Recommended for research focused students. Also listed as BIO 371L and CHM 371L. Credit allowed for BIO 370L/CHM 370L, or BMB 371L/BIO 371L/CHM 371L, but not both. P or C-BMB 370/BIO 370/CHM 370.

**BIO 372. Advanced Molecular Biology. (3 h)**

Presents molecular mechanisms by which stored genetic information is expressed including the mechanisms for and regulation of gene expression, protein synthesis, and genome editing. Emphasizes analysis and interpretation of experimental data from the primary literature. Also listed as BMB 372. P-BIO 370/BMB 370/CHM 370.

**BIO 372L. Advanced Molecular Biology Laboratory. (1.5 h)**

Introduces modern methods of molecular biology to analyze and manipulate expression of genes and function of gene products. Also listed as BMB 372L. P or C-BIO 372/BMB 372 or BMB 373/CHM 373.

**BIO 374. Neuropharmacology. (3 h)**

Introduces how pharmacological agents affect cellular and molecular functions in the nervous system of normal and disease states. Lecture and case studies will be used to examine topics including drugs targeting mood and emotion, memory and dementia, and movement disorders. Drugs of abuse and the neurological basis of addiction will also be evaluated. P-BIO 214 or BIO 150, 150L, 160, and BIO 160L.



**BIO 379. Introduction to Geographic Information Systems (GIS). (4 h)**

Introduces the concepts and use of GIS as a mapping and analytical tool with emphasis on applications environmental modeling, global change, sociodemographic change, and site suitability analyses. P-BIO 113 or BIO 150, 150L, 160, and BIO 160L.

**BIO 380. Biostatistics. (3 h)**

An introduction to statistical methods used by biologists, including descriptive statistics, hypothesis-testing, analysis of variance, and regression and correlation. P-BIO 114 or BIO 150, 150L, 160, and BIO 160L. (QR)

**BIO 381. Epigenetics. (3 h)**

Studies the molecular mechanisms for inheritance of genome modifications. Uses primary literature to explore the environmental and developmental signals that influence epigenetic controls of gene expression and disease. Also listed as BMB 381. P-BIO 213 and 214, or BIO 265.

**BIO 381L. Epigenetics Laboratory. (1 h)**

Provides hands-on experiences with genome editing and molecular genetics to address the function and expression of genes. Also listed as BMB 381L. P or C-BIO 381 or POI.

**BIO 382. Molecular Signaling. (3 h)**

Examines the molecular and biochemical mechanisms by which hormones, neurotransmitters, and other signaling molecules act to change growth, development, and physiological and behavioral responses of organisms with a focus on discussion of primary literature. Also listed as BMB 382. P-BIO 213, 214, and BIO 370/BMB 370/CHM 370 or BIO 265 and BIO 370/BMB 370/CHM 370.

**BIO 383. Genomics. (3 h)**

Examines the architecture, expression, and evolution of genomes. Uses current primary literature to examine the functional and evolutionary dynamics of genomes and the modern analytic techniques used to investigate genome-wide phenomena. Also listed as BMB 383. P-BIO 160 and 160L or CSC 112 or STA 212; and an introductory statistics course such as STA 111, ANT 380, BIO 380, or PSY 311.

**BIO 383L. Genomics Lab. (1 h)**

Introduces analytic methods and interpretation of genome wide data through practical tutorials. Also listed as BMB 383L. P or C-BIO 383.

**BIO 384. Molecular Evolution. (3 h)**

Study of the evolutionary analysis of biological sequences in population genetic and phylogenetic contexts. Explores statistical and bioinformatic techniques for investigating population evolution, molecular adaptations, and reconstruction of evolutionary history through primary literature. P-BIO 160 and 160L or CSC 112 or STA 212; and an introductory statistics course such as STA 111, ANT 380, BIO 380, or PSY 311.

**BIO 384L. Molecular Evolution. (1 h)**

Introduces evolutionary analytic methods and interpretation of molecular data through practical tutorials. P or C-BIO 384.

**BIO 385. Bioinformatics. (3 h)**

Introduction to computational approaches essential to modern biological inquiry. Approaches may include large biological dataset analyses, sequence similarity and motif searches, and analysis of high-throughput genomic technologies. Emphasizes interdisciplinary interaction and communication. Also listed as CSC 385 and PHY 385. P-CSC 201 or 221 (and BIO 150, 150L, 160, and BIO 160L if taken as BIO 385) or POI.

**BIO 387. Computational Systems Biology. (3 h)**

Introduction of concepts and development of skills for comprehension of systems biology problems, including both biological and computational aspects. Topics may include genome-wide transcriptomic analysis, protein interaction networks, large-scale proteomics experiments, and computational approaches for modeling, storing, and analyzing the resulting data sets. Emphasizes interdisciplinary interaction and communication. Also listed as CSC 387. P-CSC 201 or 221 (also requires BIO 150, 150L, 160, and BIO 160L if taken as BIO 387) or POI.

**BIO 388. Methods in Molecular Genetics. (4 h)**

Hybrid lecture/laboratory course gives students a hands-on introduction to a diverse array of techniques commonly used in molecular genetics laboratories. P-BIO 213 and 214, or BIO 150, 150L, 160, and BIO 160L.

**BIO 390. Mentored Research. (2 h)**

Introduces the technology and techniques of research. Working under the supervision of a faculty member or research staff, students will obtain experience in experimental design and analysis. The course may be taken as a precursor to BIO 391. Satisfies the research requirement for the BA and BS degrees. Pass/Fail option. P-BIO 150, 150L, 160, 160L, and POI required.

**BIO 391. Independent Research. (2 h)**

Students participate in a research project involving collection or analysis of data to investigate a defined research question. Students are required to submit a written paper or poster documenting research progress. The same numbered course cannot be repeated. Subsequent courses must be taken in consecutive order. Satisfies the research requirement for the BA and BS degree. Pass/Fail option. P-BIO 150, 150L, 160, 160L and POI required.

**BIO 392. Independent Research. (2 h)**

Continuation of research beyond BIO 391. Students are required to submit a written paper or poster documenting research progress. The same numbered course cannot be repeated. Pass/Fail option. P-BIO 391 and POI required.

**BIO 393. Research in Biology. (2 h)**

Continuation of research beyond BIO 392. Students are required to submit a written paper or poster documenting research progress. The same numbered course cannot be repeated. Pass/Fail option. P-BIO 392 and POI required.

**BIO 394. Research in Biology. (2 h)**

Continuation of research beyond BIO 393. Students are required to submit a written paper or poster documenting research progress. The same numbered course cannot be repeated. Pass/Fail option. P-BIO 393 and POI required.

**BIO 399. Mentored Biology. (2 h)**

Students explore career opportunities in biology-related fields or experiences. Students are required to submit a written paper or poster describing research internship or experience to their adviser. Plans must be approved in advance by the adviser. Course can be repeated for credit, but only 4 total hours will count toward the BA BIO major. Does not count toward the BS BIO major or the BIO minor. Pass/Fail only. P-BIO 150, 150L, 160, 160L and POI required.

## Faculty

**Chair** Susan E. Fahrbach

**Andrew Sabin Family Foundation Presidential Chair in Conservation Biology** Miles R. Silman

**Charles M. Allen Professor of Biology** Gloria K. Muday

**Reynolds Babcock Chaired Professor of Biology** William K. Smith

**Reynolds Professor** Susan E. Fahrbach

**Professors** David J. Anderson, Miriam A. Ashley-Ross, Robert A. Browne, William E. Conner, James F. Curran, Carole L. Gibson, Erik C. Johnson, Kathleen A. Kron, Wayne L. Silver, Clifford W. Zeyl

**Teaching Professors** A. Daniel Johnson, Pat C. W. Lord

**Associate Professors** T. Michael Anderson, Sarah McDonald, Brian W. Tague, Ke Zhang

**Associate Teaching Professors** Diana R. Arnett, Anna Kate Lack

**Assistant Professors** Regina J. Cordy, Joshua Currie, Sheri A. Floge, James B. Pease

**Visiting Assistant Professor** Christine M. Vega

**Director of Microscopy** Glen S. Marrs

**Assistant Director of Microscopy** Heather Brown-Harding

**Teacher-Scholar Postdoctoral Fellow** Sukhpreet Kaur