

BIOLOGY

OVERVIEW

The Biology Graduate Program has excellent students, world-class faculty members who advise students and superb staff members. Faculty members work with students to design a set of courses, a research project and other activities that will prepare them for their career choice of:

- academic research
- medical institution research
- private sector research
- government work
- teaching at the baccalaureate level

No matter what the choice is, this program will help students to develop as research scientists who know how to write, think critically, and express themselves effectively. Faculty will also help students to network and find the right position for their next step: postdoctoral training, industry, teaching position, etc. All Biology students learn to teach undergraduates, helping to develop teaching skills which will serve them well regardless of whether teaching is their ultimate career goal. Biology graduate students are very successful and are appreciated for their contribution to undergraduate research, to the research program of the faculty, and to the quality and liveliness of the Biology Department.

The research of Biology faculty is grouped into two clusters: Cell and Molecular Biology and Ecology-Evolution-Animal Behavior. Students will have the opportunity to mention from the outset of the application process whose research they are interested in. While faculty research interests fall into these two broad groupings, students are encouraged to consider research projects that cross disciplines.

Biology offers an Accelerated Masters Degree, a Masters Degree, a Doctor of Philosophy (PhD) degree, and a Masters of Science in Teaching degree. PhD applicants are given priority over MS applicants.

DEGREES

- Biology AMP
- Biology M.S.
- Biology M.S.T.
- Biology Ph.D.

FACULTY

Agnarsson, Ingi; Assistant Professor, Department of Biology; PHD, George Washington University

Ballif, Bryan A.; Associate Professor, Department of Biology; PHD, Harvard University

Brody, Alison Kay; Professor, Department of Biology; PHD, University of California Davis

Cahan, Sara Irene; Associate Professor, Department of Biology; PHD, Arizona State University

Ebert, Alicia; Assistant Professor, Department of Biology; PHD, Colorado State University

Goodnight, Charles James; Professor, Department of Biology; PHD, University of Chicago

Gotelli, Nicholas James; Professor, Department of Biology; PHD, Florida State University

Kilpatrick, Charles William; Professor, Department of Biology; PHD, University of North Texas

Lam, Ying Wai; Research Assistant Professor, Department of Biology; PHD, Chinese University of Hong Kong

Lockwood, Brent; Assistant Professor, Department of Biology; PHD, Stanford University, CA

Marsden, J. Ellen; Professor, Secondary Appointment in the Department of Biology; PHD, Cornell University

Mitchell, John Joseph; Senior Lecturer, Department of Biology; PHD, University of Connecticut

Stevens, Lori; Professor, Department of Biology; PHD, University of Illinois Chicago

Stockwell, Jason Dana; Associate Professor, Secondary Appointment in the Department of Biology; PHD, University of Toronto

Van Houten, Judith; Professor, Department of Biology; PHD, University of California Santa Barbara

Vigoreaux, Jim Osvaldo; Professor, Department of Biology; PHD, University of Oklahoma

Courses

BIOL 202. Quantitative Biology. 3 Credits.

Topics in quantitative methods in biological research, including statistics and computer-based analysis. Prerequisites: One of BCOR 101, BCOR 102, BCOR 103; MATH 019, MATH 020.

BIOL 203. Population Ecology. 3 Credits.

Analysis of growth, regulation, and interrelations of biological populations in theoretical, laboratory, and natural systems. Prerequisite: BCOR 102.

BIOL 204. Adv Genetics Laboratory. 4 Credits.

Laboratory experiments to provide experience with modern genetic techniques. Bench work and data analysis emphasized. Prerequisite: BCOR 101.

BIOL 205. Adv Genetics Laboratory. 4 Credits.

Laboratory experiments to provide experience with modern genetic techniques. Bench work and data analysis emphasized. Prerequisite: BCOR 101.

BIOL 208. Morphology&Evolution Insects. 0 or 4 Credits.

Systematics, morphology, and anatomy of insect taxa, with comparisons to related arthropods. Prerequisite: BCOR 102.

BIOL 209. Field Zoology. 0 or 4 Credits.

Collection, identification, and ecology of arthropods. Substantial field collecting. Prerequisite: BCOR 102.

BIOL 212. Comparative Histology. 0 or 4 Credits.

Anatomy of tissues, chiefly vertebrate. Tissue similarities and specializations of organs among the various groups of animals in relation to function. Prerequisite: BCOR 103.

BIOL 217. Mammalogy. 0 or 4 Credits.

Classification, identification, morphology, evolution, and distribution of mammals. Prerequisite: BCOR 102.

BIOL 219. Compar/Func Vertebrate Anatomy. 4 Credits.

Structure, function, and phylogeny, with evolutionary and functional trends of all chordate groups. Prerequisite: Two courses from BCOR 101, BCOR 102, BCOR 103.

BIOL 223. Developmental Biology. 3 Credits.

An analysis of the cellular, subcellular, molecular, and genetic mechanisms that operate during oogenesis and embryogenesis in invertebrate and vertebrate organisms. Prerequisites: BCOR 101, BCOR 103.

BIOL 225. Physiological Ecology. 3 Credits.

Processes by which animals cope with moderate, changing, and extreme environments. Prerequisites: BCOR 102, BIOL 255.

BIOL 238. Winter Ecology. 3 Credits.

Natural history and winter adaptation of plants and animals of western Maine. Field work during winter break; oral and written report completed during spring semester. Prerequisite: Instructor permission.

BIOL 246. Ecological Parasitology. 1 or 3 Credit.

Parasite-host interactions examined with evolutionary perspective. Topics include the origin of parasites, evolution of virulence, and ecological consequences of parasitism. Laboratory includes original experiments. Prerequisite: BCOR 102.

BIOL 254. Population Genetics. 0-4 Credits.

Methods of detecting and investigating genetic variation, as well as its causes and consequences. Applications from medicine, forensics, and environmental biology are emphasized. Pre/co-requisite: BCOR 101.

BIOL 255. Comparative Physiology. 0 or 4 Credits.

Physiology at the organ, systems, and organismal levels. Capstone course to consolidate biological concepts. Pre/co-requisites: BCOR 101, BCOR 102, BCOR 103.

BIOL 261. Neurobiology. 3 Credits.

Focus on molecular and cellular aspects of the nervous system. Electrical signaling, synaptic transmission, signal transduction, neural development, plasticity and disease. Prerequisite: BCOR 103 or NSCI 110. Cross-listed with: ANNB 261.

BIOL 262. Neurobiology Techniques. 4 Credits.

Extensive study of laboratory methods used in modern research on the function of the nervous system. Techniques from electrophysiology, cell biology, biochemistry and genetics. Pre/co-requisites: BCOR 103, BIOL 261.

BIOL 263. Genetics Cell Cycle Regulation. 3 Credits.

Molecular events during the cell cycle; mutants defective in cell cycling; comparison of normal and transformed (cancer) cell cycling. Prerequisite: BCOR 101 or Instructor permission.

BIOL 264. Community Ecology. 3 Credits.

Theoretical and empirical analyses of community structure. Topics include population growth, metapopulation dynamics, competition, predation, species diversity, niches, disturbance succession, island biogeography, and conservation biology. Prerequisite: BCOR 102; at least Junior standing.

BIOL 265. Developmental Molecular Genetics. 3 Credits.

Current topics in developmental genetics explored through lectures and discussions of current literature; emphasis on molecular approaches. Prerequisite: BCOR 101.

BIOL 266. Neurodevelopment. 3 Credits.

Current topics in developmental neurobiology through lectures and discussions of primary literature. The course is designed for advanced undergraduate life science majors and graduate students in the biological sciences. Pre/co-requisites: BCOR 101 and BCOR 103.

BIOL 267. Molecular Endocrinology. 4 Credits.

Study of hormone action at the cellular and molecular level. Prerequisite: BCOR 101.

BIOL 270. Speciation and Phylogeny. 3 Credits.

Contribution of modern research in such fields as genetics, systematics, distribution, and serology to problems of evolutionary change. Prerequisite: BCOR 101, BCOR 102 recommended.

BIOL 271. Evolution. 3 Credits.

Basic concepts in evolution will be covered, including the causes of evolutionary change, speciation, phylogenetics, and the history of life. Pre/co-requisites: BCOR 102 or permission of the Instructor.

BIOL 275. Human Genetics. 3 Credits.

Application of genetic techniques to the study of human biology. Topics include pedigree analysis, linkage analysis, and complex genetic disorders of medical importance. Prerequisite: BCOR 101.

BIOL 277. Sociobiology. 3 Credits.

The evolutionary biology of social behavior in animals. Topics include the evolution of sociality, social interactions, and the functional organization of social groups. Prerequisite: BCOR 102.

BIOL 280. Molecular Ecology. 0 or 4 Credits.

Molecular genetic tools and analytical methods used to investigate ecological processes in natural populations of plants and animals. Prerequisite: BCOR 102.

BIOL 286. Forensic DNA Analysis. 3 Credits.

Theory and techniques of modern genetics used to produce and analyze a DNA profile in forensic science. Emphasis on degraded or contaminated DNA samples. Prerequisite: BCOR 101.

BIOL 295. Advanced Special Topics. 0-18 Credits.

See Schedule of Courses for specific titles.

BIOL 296. Advanced Special Topics. 1-18 Credits.

See Schedule of Courses for specific titles.

BIOL 301. Cell Biology. 3 Credits.

Advanced survey of cell organelles, their composition, origin, and the relationship between their structure and function. Emphasis on recent literature and current controversies. Prerequisite: CHEM 142; Graduate standing in Biology or Instructor permission. Cross-listed with: CLBI 301, PBIO 301.

BIOL 302. Specialized Cells & Cell Proc. 3 Credits.

Current issues and research in the field of plant, invertebrate, mammalian cell, and molecular biology. Prerequisite: BIOL 301. Cross-listed with: CLBI 302.

BIOL 352. Evolutionary Computation. 3 Credits.

Theory and practice of biologically-inspired search strategies, including genetic algorithms, genetic programming, and evolution strategies. Applications include optimization, parameter estimation, and model identification. Significant project. Students from multiple disciplines encouraged. Pre/co-requisites: Familiarity with programming, probability, and Statistics. Cross-listed with: CS 352, CSYS 352.

BIOL 371. Graduate Colloquium. 1 Credit.

Topics of current faculty and graduate student interest presented in a seminar-discussion format. Specific titles for colloquia will be listed in the course schedule.

BIOL 372. Cutting Edge Topics. 2 Credits.

Graduate students will explore cutting edge topics in depth. Students will cross disciplinary lines and learn collaboratively to solve problems. Students will present the outcomes in a talk appropriate for a lay audience. Prerequisite: Graduate standing.

BIOL 381. Special Topics. 0-4 Credits.

Readings with conferences, small seminar groups, or laboratories intended to contribute to the programs of graduate students in phases of zoology for which formal courses are not available. Prerequisite: An undergraduate major in life science.

BIOL 382. Eco Lunch. 0-1 Credits.

Review and discussion of current research. Attendance of BIOL 382 or BIOL 384 required of Biology Graduate students. Pre/co-requisites: Graduate standing and Instructor permission.

BIOL 383. Ecology-Evolution Journal Club. 0-1 Credits.

Review and discussion of current research.

BIOL 384. Cell Lunch. 0-1 Credits.

Review and discussion of current research. Attendance of BIOL 382 or BIOL 384 required of Biology Graduate students. Pre/co-requisite: Graduate standing.

BIOL 385. Biology Seminar. 0-1 Credits.

Review and discussion of current biological research. Attendance required of Biology graduate students. Pre/co-requisite: Graduate standing and Instructor permission.

BIOL 391. Master's Thesis Rsch. 1-10 Credits.

Credit as arranged.

BIOL 491. Doctoral Dissertation Rsch. 1-10 Credits.