BIOLOGY

OVERVIEW

While faculty research interests fall into two broad groupings, we encourage students to consider research projects that cross disciplines.

The broad groupings are:

1. cell and molecular biology, neuroscience, physiology and behavior
2. ecology and evolution

Current research projects under the first group include: molecular biology of cilia; chemical sensing by micro-organisms; signal transduction in neurodevelopment and chemical sensing; visual system development in zebrafish; smell and taste receptor cell function using molecular biology, calcium imaging and electrophysiology; olfactory and taste driven behavior; muscle function, development, and aging; structure and biomechanics of myofilaments; proteomics, biochemistry and cell biology applied to molecular mechanisms of signal transduction governing neuronal positioning; thermal stress and cellular physiology; and chemotherapeutic drug effects on taste cells.

Current research projects under the second group include: evolutionary genomics and systems physiology in sea urchins and horned beetles; microbial ecology and genomics; evolutionary genomics of RNA viruses; physiology, development and evolution of marine invertebrates and fruit flies; community ecology and evolutionary ecology of carnivorous plants; phylogenetics to study evolution and biogeography of spiders and other groups; ecology, zoogeography and conservation of small mammals; modeling and analysis of complex biological and environmental systems; multispecies interactions among plants, their mutualist pollinators and antagonists that include herbivores, seed predators, and competitors; developmental plasticity interactions with extreme sexual size dimorphism in spiders; evolution, ecology, and behavior of social insects; and ecology and evolution of disease.

Current research that crosses between disciplines includes proteomic analysis of Chagas disease vectors; evolution and adaptation of flight muscle proteins; evolution of muscle and courtship behavior in flies; and ecological proteomics.

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

Delay, Eugene Raymond; Associate Professor, Department of Biology; PHD, University of Georgia

Delay, Rona J.; Associate 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

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

Schall, Joseph Julian; Professor, Department of Biology; PHD, University of Texas Austin

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

Van Houten, Judith Lee; Professor, Department of Biology; PHD, University of California Berkeley

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. Prerequisite: BCOR 101, BIOL 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. 1-18 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.

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 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.