

## BIOLOGY

<http://www.uvm.edu/~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 very diverse and ranges from cell and molecular biology, through animal behavior, ecology, and evolution. Faculty and student research typically range across these disciplines and students are encouraged to seek out diverse faculty for their graduate committee to meet their particular needs.

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

### DEGREES

- Biology AMP (<http://catalogue.uvm.edu/graduate/biology/biologyamp/>)
- Biology M.S. (<http://catalogue.uvm.edu/graduate/biology/biologyms/>)
- Biology M.S.T. (<http://catalogue.uvm.edu/graduate/biology/biologymst/>)
- Biology Ph.D. (<http://catalogue.uvm.edu/graduate/biology/biologyphd/>)

### FACULTY

**Ballif, Bryan A.;** 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;** Associate Professor, Department of Biology; PHD, Colorado State University

**Gotelli, Nicholas J.;** Professor, Department of Biology; PHD, Florida State University

**Kilpatrick, Charles William;** Professor Emeritus, 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

**Marsden, J. Ellen;** Professor, Rubenstein School of Environmental and Natural Resources; PHD, Cornell University

**Martinsen, Ellen;** Adjunct Assistant Professor, Department of Biology; PHD, University of Vermont

**May-Collado, Laura J.;** Assistant Professor, Department of Biology; PHD, Florida International University

**Pespeni, Melissa H.;** Assistant Professor, Department of Biology; PHD, Stanford University

**Schall, Joseph J.;** Professor Emeritus, Department of Biology; PHD, University of Texas at Austin

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

**Stockwell, Jason Dana;** Associate Professor, Rubenstein School of Environmental and Natural Resources; PHD, University of Toronto

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

**Vigoreaux, Jim Osvaldo;** Professor, Department of Biology; Molecular Physiology and Biophysics; PHD, University of Oklahoma

### Courses

#### **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 & Proteomics Lab. 4 Credits.**

Laboratory experiments to provide experience with modern genetic and proteomics techniques. Bench work and data analysis are emphasized. Prerequisites: BCOR 101, BCOR 103.

#### **BIOL 209. Field Zoology of Arthropods. 0 or 4 Credits.**

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

#### **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 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. Prerequisite: BCOR 101 or BCOR 102.

**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. Credit not awarded for both BIOL 261 and NSC1 261. Prerequisite: BCOR 103.

**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 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 269. Plant-Animal Interactions. 3 Credits.**

Ecological and evolutionary interactions among plants and animals. Topics include herbivory, pollination, seed predation, ant-plant interactions, biological control, and anthropogenic effects on plant-animal interactions including the effects of GMOs and global climate change. Prerequisites: BCOR 102.

**BIOL 270. Speciation and Phylogeny. 0 or 4 Credits.**

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

**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 276. Behavioral Ecology. 3 Credits.**

Adaptive significance of behavior in natural environments. Evolutionary theory applied to behavior and tested with field data. Prerequisite: BCOR 102 or Instructor permission.

**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 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. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate standing.

**BIOL 380. Ecological Genomics. 4 Credits.**

An exploration of the merger of ecology and genomics to address the genetic basis of adaptive variation in natural populations. Emphasis on integrating quantitative approaches and hands-on analysis of large genomic and ecological data sets. Pre/Co-requisites: BCOR 101, BCOR 102, STAT 141 or STAT 211; basic knowledge of statistics, probability, genetics, and evolution required; familiarity with programming in R or bash is recommended. Cross-listed with: PBIO 380.

**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 biology or related disciplines for which formal courses are not available. Prerequisite: An undergraduate major in life science.

**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 390. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BIOL 391. Master's Thesis Research. 1-10 Credits.**

Credit as arranged.

**BIOL 392. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOL 394. Independent Graduate Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOL 490. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BIOL 491. Doctoral Dissertation Research. 1-10 Credits.****BIOL 494. Independent Graduate Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOL 496. Advanced Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.