Ecology and Evolution: MA in Biological Sciences

**Chairperson**
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**Degree Awarded**
M.A. in Biological Sciences: Concentration in Applied Ecology or Concentration in Applied Evolution

**Web site**
http://life.bio.sunysb.edu/ee/masters.htm

Ecology and Evolution Department

The Department of Ecology and Evolution and the Graduate Program in Ecology and Evolution (GPEE) at Stony Brook were the first such units in the United States and have served as models for corresponding units at many other institutions. The Faculty of the GPEE at Stony Brook includes two members of the National Academy of Sciences, several past presidents of national and international societies in ecology, evolution, and systematics, and authors of influential books in these disciplines. GPEE provides training that leads to the M.A. and Ph.D. Since its inception, the program has emphasized the integration of concepts from ecology and evolutionary biology.

The faculty and the graduate students in GPEE are engaged in research on Long Island and around the world, including Alaska, the continental US, the Caribbean, Mexico, Central and South America, and Africa. They study terrestrial, freshwater, and marine organisms in a wide range of taxa, including fish, amphibians, reptiles, primates, birds, mollusks, insects, vascular plants, fungi, and bacteria. Their research interests incorporate experimental, comparative, theoretical, and statistical approaches and utilize field and laboratory studies. Research in GPEE includes interspecific interactions, geographical variation and phylogeography, population genetics, experimental evolution, evolutionary genomics, evolutionary developmental biology, phylogenetics, evolutionary ecology, biological invasions, phenotypic plasticity, and paleontology. There is great interest in development of methods for systematics, morphometrics, and multivariate statistics. Many faculty members are active in the application of their research to problems in conservation.

Graduates are qualified for positions in academic or research institutions, government agencies, conservation organizations, and environmental consulting companies. Former students have become faculty members in biology, ecology and evolution, agricultural entomology, and marine biology departments at prominent private and public universities as well as selective liberal arts and smaller state colleges. Although GPEE emphasizes basic research, many of its graduates have entered careers that apply ecological and evolutionary principles to problems in such areas as marine toxicology, agricultural entomology, invasive species, natural resource management, conservation, and risk assessment.

Master of Arts in Biological Sciences

**Concentration in Applied Ecology and Concentration in Applied Evolution**

The Graduate Program in Ecology and Evolution at Stony Brook University is among the finest of its kind in the world. Our program has graduate students studying toward both the master and doctoral degrees.

The masters program in Applied Ecology is intended to address the need for professionals in environmental sciences at federal, state, county, and other levels of government, environmental departments of large industrial companies and smaller environmental consulting firms, and non-governmental conservation and environmental protection organizations. The Applied Evolution concentration will also prepare students for work in these sectors, specifically for technical positions that require genetic, evolutionary and population based analytical skills. Career paths in biotechnology, forensics and biomedicine will also be available to graduates of this program. Both concentrations are useful for further specialized degree programs or careers in education. Both programs are particularly strong in quantitative skills, providing enhanced career opportunities for those with mastery in this area.

The plan of study is individually tailored within the course offerings and other training opportunities to match the student’s personal goals. Courses offered by the Department of Ecology and Evolution provide training in ecology, evolution, conservation biology, mathematical methods, and statistics, with applications in these fields. Students must complete 30 graduate credits and a masters’ project for the degree. Credits can also be earned through a traineeships and participation in research projects on or off campus. This program can be completed in three to four semesters of full time enrollment.

**Requirements for Admission to the M.A. Program**

The application deadline for the Masters Program is March 15 for Fall admission. Most MA students enter the program in Fall semester. The Department does not offer support for MA students; loans and other financial aid may be available through the University. Stony Brook University has among the lowest tuition and fees of any university in the U.S.
Fill out an online application on the Graduate School website.

Applicants will also need to provide:

1. Official transcripts of undergraduate and (if applicable) graduate course work
2. Official Graduate Record Examination (GRE) scores (Stony Brook's code for score reporting is 2548)
3. Three letters of recommendation
4. A non-refundable application fee of $100.00. (Please note that applications will not be processed without the $100.00 fee.)
5. Foreign students are required to take the TOEFL test for proficiency in English.

For more information on applying, call the Ecology and Evolution departmental office (631-632-8600). You can also email the Ecology and Evolution department's Graduate Program Coordinator, or use the Information Request Form.

For further Information, contact:

Dr. Lev Ginzburg, Director  
MA Program in Applied Ecology and Applied Evolution
Department of Ecology & Evolution
Stony Brook University  
Stony Brook, New York 11794-5245

Facilities of Ecology and Evolution Department

Ample laboratory, greenhouse, and environmental facilities and all of the standard laboratory equipment for molecular studies are available. All the equipment typically found in modern laboratories undertaking protein electrophoresis and DNA analysis is available, including automated DNA sequence/fragment analyzer, high-speed and ultracentrifuges, sonicators, fraction collectors, spectrophotometers, liquid scintillation, and spectrofluorometers. The department houses laboratories of Drosophila genetics, bacterial genetics, and ecology. The department has excellent computing facilities. In addition to microcomputers in most labs, Unix-based servers are also available within the department for mail and more intense computations than can be provided by desktop computers.

Field and marine study areas are at Flax Pond, a University-affiliated laboratory near campus. Terrestrial studies are performed at the Ashley Schiff Nature Preserve, a 26-acre forested area on campus. The University is a member of the Organization for Tropical Studies, which maintains field stations in Costa Rica. There are other opportunities for field studies both in this country and abroad; faculty members have continuing projects at Friday Harbor Marine Labs in Washington, Cook Inlet in Alaska, Ranomafana National Park in Madagascar, and Cajus National Park in Ecuador. Collaboration is possible with scientists at Brookhaven National Laboratory and Cold Spring Harbor Laboratory. Opportunities are also available for projects at field stations maintained by other university centers and colleges of the State University of New York. The School of Marine and Atmospheric Sciences is located on campus. Stony Brook is close enough to New York City and Washington, D.C., for arrangements to be made for consultation and work at museums and other institutions in those cities.

Requirements for the M.A. Degree in Ecology and Evolution

Concentration in Applied Ecology

The Concentration in Applied Ecology provides students with a strong foundation in ecological principles and the quantitative tools necessary for sound assessment of environmental issues. This training is valuable in environmental planning, resource use and regulation, conservation biology and data analyses for decision makers in government and the private sector.

Required Graduate Courses:

1. Principles of Applied Ecology and Evolution (4 cr.)
2. Applied Ecology and Conservation Biology Laboratory (3 cr.)
3. Mathematical Methods in Population Biology (3 cr.)
4. Landscape Ecology Laboratory (3 cr.) or Ecology Laboratory (3 cr.)
5. Biometry (4 cr.)

Electives include:

1. Molecular Diversity Laboratory (3 cr.)
2. Population Genetics and Evolution (3 cr.)
3. Environmental Toxicology and Public Health (3 cr.)
4. Environmental Law and Regulation (3 cr.)
5. Introduction to Ecological Modeling (3 cr.)
6. Principles of Evolution (4 cr.)

Concentration in Applied Evolution

In recent years, there has been growing recognition that what had previously been considered to be strictly ecological problems often have a significant evolutionary dimension. Environmental impacts often reduce the size of populations (the ecological component) but may also
result in evolutionary changes within the impacted populations that adversely affect human welfare (e.g., evolution of antibiotic or pesticide resistance), reduce the sustainability of vulnerable populations, or their value to humans (e.g., higher levels of inbreeding, loss of genetic variability and valuable genetic traits). Evolutionary principles are also regularly applied in biotechnology, forensics, agricultural, pharmaceutical, and biomedical fields, and especially to problems of genome and protein sequence analysis.

Required Graduate Courses:

1. Principles of Applied Ecology and Evolution (4 cr.)
2. Population Genetics and Evolution (3 cr.) or an equivalent approved by the Program Director
3. Computational Biology (3 cr.) or AMS 533 - Numerical Methods and Algorithms in Computational Biology (3 cr.)
4. Molecular Diversity Laboratory (3 cr.)
5. Biometry (4 cr.)

Electives include:

1. Mathematical Methods in Population Biology (3 cr.)
2. Applied Ecology and Conservation Biology Laboratory (3 cr.)
3. Principles of Ecology (4 cr.)
4. Molecular Modeling of Biological Molecules (3 cr.)
5. Quantitative Genetics (3 cr.)
6. Human Evolution (4 cr.)
7. Primate Evolution (4 cr.)
8. Vertebrate Evolution (4 cr.)
9. Molecular Genetics (3 cr.)

Faculty of Ecology and Evolution Department

Distinguished Professors
Dykhuizen, Daniel E., Ph.D., 1971, University of Chicago: Population genetics and molecular evolution, especially of bacteria
Futuyma, Douglas, Ph.D. 1969, University of Michigan: speciation, evolution of ecological interactions among species
Levinton, Jeffrey S., Ph.D., 1971, Yale University: Marine benthic ecology; population genetics of bivalve mollusks; paleoecology.
Rohlf, F. James, Ph.D., 1962, University of Kansas: Multivariate data analysis techniques applied to problems in taxonomy and ecology; computer modeling; applied ecology.

Professors
H. Resit Ackakaya, Ph.D. Stony Brook University, 1989: Applied ecology; conservation biology; population dynamics; landscape ecology.
Bell, Michael A., Ph.D., 1976, University of California, Los Angeles: Evolutionary biology; ichthyology; paleobiology; geographic variation.
Jernvall, J., Ph. D. 1995, University of Helsinki, Finland: Mammalian tood development and evolution, vertebrate paleontology, diversity in recent and extinct communities.
Lopez, Glenn R., Ph.D., 1976, University at Stony Brook: Marine and freshwater benthic ecology; animal-microbe-sediment interactions; detritus.
Padilla, Dianna K., Ph.D., 1987, University of Alberta, Canada: Phenotypic plasticity, plant-herbivore functional ecology, ecology of invading species.
Wright, Patricia\(^3\), Ph.D., 1985, City University of New York: Primates and tropical conservation.

Associate Professors
Armstrong, Robert\(^2\), 1975, University of Minnesota: Mathematical modeling in marine ecology and biogeochemistry.
Battley, Edwin H., Emeritus. Ph.D., 1956, Stanford University: Thermodynamics of microbial growth; ecological energetics; microbial ecology; nitrification and denitrification in aquatic systems.
Bingham, Paul\(^4\), Ph.D., 1979, Harvard University: Regulation of transcription in developing multicellular organisms; the role of transposons in evolution and speciation.
Chase, Ivan\(^5\), Ph.D., 1972, Harvard University: Social behavior; dominance hierarchies; cooperation; resource distribution.
Graham, Catherine, Ph.D., 2003, University of Missouri – St. Louis: Landscape and behavioral ecology.
Hechtel, George J.\(^6\), Ph.D., 1962, Yale University: Systematics and zoogeography of marine demospongiae.
True, John, Ph.D., 1995, Duke University: Evolutionary and developmental genetics of color patterning in *Drosophila*.
Wiens, John J., Ph.D., 1995, University of Texas at Austin: Systematics and biology of reptiles and amphibians.
Assistant Professors
Baines, Stephen, Ph. D., 1993, Yale University-New Haven; Aquatic ecosystem ecology, biogeochemistry of carbon and trace elements.
Davalos, Liliana, Ph.D., 2004, Columbia University; Conservation biology, climate change, phylogeny.
Munch, Stephan\(^2\) Ph. D., 2002, University at Stony Brook: Evolutionary ecology of growth and life history traits, Evolution in harvested populations, Applied population dynamics modeling, Mathematical modeling and statistics
Rest, Joshua, Ph.D., 2004, University of Michigan; Genome evolution.

Number of teaching, graduate, and research assistants, fall 2009: 39
Students on fellowships: 11

1) Department of Anatomical Sciences
2) School of Marine and Atmospheric Sciences
3) Department of Anthropology
4) Department of Biochemistry
5) Department of Sociology
6) Director, Africa Program, Wildlife Conservation Society

*NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.*