Ecology and Evolution: MA in Biological Sciences

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Degrees Awarded
M.A. in Biological Sciences: Concentration in Applied Ecology or Concentration in Applied Evolution; Ph.D. in Ecology and Evolution

Facilities of 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 three 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.

M.A. Program in Applied Ecology

A three-semester program leads to an M.A. in Biological Sciences with a concentration in Applied Ecology. This curriculum provides training in environmental sciences for positions in government environmental offices, environmental departments of industrial companies, environmental consulting firms, and conservation and environmental protection organizations. Applied environmental research involves data collection, data analysis, and interpretation of the findings. The need for trained personnel is greatest in the area of data analysis, which is a focus of the concentration in Applied Ecology. Students need to complete 30 credits and the master’s paper to graduate.

In addition to Graduate School admission requirements, the department requirements include:

A. A bachelor’s degree in a course of study that provides an appropriate background for advanced training in ecology.

B. Report of Graduate Record Examination (GRE) General Test scores and, for non-native speakers of English, TOEFL scores.

C. Acceptance by the Graduate Program in Ecology and Evolution and by the Graduate School.

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 Cajas 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

The Graduate Program in Ecology and Evolution (GPEE) usually does not accept a student whose goal is an M.A. degree, except those who wish to concentrate in applied ecology (see below). However, a student already in GPEE may be awarded an M.A. degree upon satisfaction of the following requirements in addition to the minimum Graduate School requirements:

A. Completion of an approved course of study including 30 graduate credit hours with a minimum 3.0 overall grade point average.

B. Preparation of a research thesis.

Requirements for the M.A. Degree in Applied Ecology

Students must complete 30 credits and achieve a 3.0 overall grade point average to graduate; this can be achieved in three semesters. Six courses form the core of the program: three courses focus on ecology; three provide training in mathematical methods, statistics, and computer programming. The six courses are:

BEE 550 Principles of Ecology

BEE 552 Biometry

BEE 555 Mathematical Methods in Population Biology

BEE 571 Ecology Laboratory

BEE 585 Introduction to Ecological Research

BEE 587 Applied Ecology and Conservation Biology Laboratory

A large number of elective courses are available to fulfill the degree requirements.

Requirements for the Ph.D. Degree

A. Course Requirements

1. In the first year in residence, students are normally required to take BEE 550 Principles of Ecology, BEE 551 Principles of Evolution, BEE 552 Biometry, and BEE 556 Research Areas in Ecology and Evolution.

2. Students must take a minimum of three other graduate courses, other than seminars, within this or other programs of this or other universities in order to advance to Ph.D. Candidacy.

3. BEE 671 and BEE 672 Colloquium in Ecology and Evolution must be taken each semester in residence.

4. A minimum of one graduate seminar per year is required under normal circumstances.

5. Most students will require advanced training in various ancillary disciplines appropriate to their chosen field of research. Requirements will be determined by the student’s advisory committee and might include one or more foreign languages or advanced studies in mathematics, statistics, computer science, molecular biology, taxonomy, or other areas.

B. Entering Student Advising and Evaluation

Early in the first semester of study, each student meets with an advisory committee that recommends additional courses beyond required first-year courses. At the end of the second semester, a Preliminary Examination will be given testing students' knowledge of ecology and evolution. In the third semester, each student writes a substantial paper reviewing a topic of interest in ecology and evolution.

C. Oral Examination

No later than the end of the fourth year of study, a student takes an Oral Examination tailored to the student’s interests and administered by his or her advisory committee. The student and his or her committee decide in advance on the areas to be covered in this examination.

D. Advancement to Candidacy

The faculty will recommend a student to the Graduate School for advancement to candidacy upon satisfactory completion of the Oral Examination and any language requirement established for the student, and upon acceptance of a dissertation proposal by the faculty.

E. Research and Dissertation

A dissertation is required for the Ph.D. degree. It must contain the results of original and significant investigation. A student’s progress in research is monitored by regular evaluations by the faculty in meetings held twice a year. Continued lack of progress may result in probation or dismissal.

F. Dissertation Committee
Students select a temporary advisor during the first semester and a permanent advisor at the beginning of the third semester. The advisory committee, consisting of the permanent advisor and at least two other GPEE faculty members, is nominated by the student in consultation with his or her permanent advisor and must be approved by the Graduate Program Director. Additional members from outside GPEE and/or the University may be appointed to the dissertation committee.

G. Final Examination
The dissertation must be approved by the student’s advisory committee. A dissertation examining committee (which must include an external examiner) is then approved by the Dean of the Graduate School. A formal public oral dissertation defense is held, at which the student presents his or her findings and is questioned by the examining committee and other members of the audience.

H. Teaching Requirement
All graduate students completing a doctoral degree will function as teaching assistants during at least two semesters of their graduate careers.

I. Residence Requirement
At least two consecutive semesters of full-time graduate study are required. The demands of the course of study usually necessitate a longer period of residence.

J. Time Limit
The time limit imposed by the Graduate School is observed by GPEE. Students must satisfy all requirements for the Ph.D. degree within seven years after completing 24 credit hours of graduate courses in GPEE.

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.
Fleagle, John G.¹, Ph.D., 1976, Harvard University: Primate evolution; comparative anatomy; behavioral ecology.
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.
Conover, David O.², Ph.D., 1981, University of Massachusetts: Ecology of fishes; fisheries biology.
Jernvall, J., Ph. D. 1995, University of Helsinki, Finland: Mammalian tooth development and evolution, vertebrate paleontology, diversity in recent and extinct communities.
Lopez, Glenn R.², 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.
Susman, Randall L.¹, Ph.D., 1976, University of Chicago: Primate ecology.
Wright, Patricia³, Ph.D., 1985, City University of New York: Primates and tropical conservation.

Associate Professors
Armstrong, Robert, 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, Ph.D., 1979, Harvard University: Regulation of transcription in developing multicellular organisms; the role of transposons in evolution and speciation.

Chase, Ivan, 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., 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, 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.