

# Doctor of Philosophy

## Ecological Sciences (PhD)

Daniel Barshis, Graduate Program Director

The primary goal of the doctoral program in ecological sciences is to provide advanced training in ecological, evolutionary, and integrative biology.

The program has notable strengths in a broad range of biological sub-disciplines, including:

- ecosystem studies,
- experimental ecology,
- community ecology,
- behavioral ecology,
- marine biology,
- molecular genetics/genomics,
- conservation biology,
- systematics,
- modeling,
- evolutionary biology,
- biomechanics,
- parasitology, and
- functional morphology.

Program faculty conduct studies in a variety of terrestrial, freshwater, and marine environments on several continents, and their research focuses on a broad spectrum of taxa, including, but not limited to:

- vascular plants,
- polychaetes,
- mollusks,
- crustaceans,
- corals,
- insects,
- arachnids,
- birds,
- fishes, and
- amphibians.

Many faculty combine active field research with parallel laboratory studies. Quantitative approaches are encouraged and the opportunity exists to obtain a master's degree in statistics while pursuing a doctorate in ecological sciences. The program is enhanced by excellent on-campus resources that include a scanning electron microscopy lab, genetic sequencing facilities, herbarium, aquatics laboratory, water tunnel and flow quantification facility, GIS facilities, greenhouse, and digital imaging facilities. Field research sites have been established in:

- the Virginia Coastal Reserve,
- Blackwater Ecologic Preserve,
- Great Dismal Swamp,
- Atlantic Ocean,
- Chesapeake Bay, and
- other areas.

## Admission

Application forms for admission to the Ph.D. program in ecological sciences are available from the Office of Admissions and online (<http://www.odu.edu/admission/graduate> (<http://www.odu.edu/admission/graduate/>)). The following should be sent to the Admissions Office:

1. the completed application form;
2. official transcripts from all universities attended;

3. test of English as a Foreign Language (TOEFL) score (from students whose native language is not English);
4. three letters of recommendation, including one from the applicant's undergraduate or graduate major advisor (if applicable); and,
5. a statement of professional goals that includes specific research interests.

The deadline for application to the program is **February 1** for the subsequent fall semester. Students may be admitted during the spring and summer semesters as well, provided they obtain permission from the Graduate Program Director. If an applicant is interested in requesting financial aid, an application for institutional graduate financial assistance should be completed during the application process (see Office of Admissions web page for form).

To qualify for admission, a student needs:

1. a satisfactory academic average (overall GPA score of at least 3.0 on a 4.0 scale, and overall GPA in the sciences of at least 3.0);
2. a TOEFL score of at least 550 (paper-based test), 213 (computer-based test), or 79 (internet-based test) for applicants whose native language is not English;
3. satisfactory letters of recommendation; and
4. a statement of professional goals as stated above.

A master's degree is desirable but not required. The applicant is expected to have a background in the sciences, with an appropriate undergraduate degree and substantial course work in biology, chemistry or geology.

Applicants are strongly advised to contact the ODU faculty member closest to their area of interest prior to submitting an application to determine whether that faculty member is accepting new graduate students. No student, regardless of qualifications, is admitted to the Ecological Sciences Program without the approval of a specific faculty advisor. Potential applicants therefore should initiate a dialogue, preferably by email, with an appropriate member of the program faculty. Applicants should consult the list of faculty in the Department of Biological Sciences, which includes a brief description of their research interests. Applicants may also find it desirable to visit the campus for an interview with a potential advisor and the Graduate Program Director.

It is important for potential applicants to realize that many considerations enter into the decision to accept a student into the program. In addition to the strength of an applicant's credentials (transcripts, personal statement, and letters of recommendation), the availability of space in the appropriate faculty advisor's lab and availability of adequate financial aid may influence the decision. Of these, space in an appropriate advisor's lab is the most important consideration after an applicant's academic qualifications. For this reason, applicants are strongly encouraged to contact a potential advisor directly.

## Curriculum Requirements

Many pertinent graduate courses are offered for the Master of Science in Biology programs that can be applied toward the degree requirements. A program of study is developed by the student with approval of advisory committee and the Graduate Program Director.

A set of six core courses is required:

### RCR Course

BIOL 847	Responsible Conduct of Research	2
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### Statistics Course \*

BIOL 857	Biometry	4
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### Fundamentals Course

Select one of the following:		3
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BIOL 804	Animal Ecophysiology
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BIOL 810	Advanced Cell Biology
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BIOL 849	Biogeography
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BIOL 859	Foundations and Principles in Ecology
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### Data Analysis Course

Select one of the following:	3
BIOL 801 Practical Computing for Biology	
BIOL 872 Modeling and Simulation in Life Sciences	
BIOL 803 Advanced Genomics Data Analysis	
BIOL 832 GIS in the Life Sciences	
<b>Research Course ***</b>	<b>12-18</b>
BIOL 898 Research in Biology	
<b>Dissertation Course</b>	<b>3</b>
BIOL 899 Dissertation	
<b>Elective Coursework **,****</b>	<b>21-45</b>
<b>Total Credit Hours</b>	<b>48-78</b>

- \* BIOL 857 is the recommended statistics course for this program. However, depending upon your area of research/concentration, another course may be approved by your graduate program director.
- \*\* Remaining credits are elective, based on student interests, with guidance and approval of the student's faculty advisory committee. Additional core courses, beyond the five required, can be used as elective credits.
- \*\*\* 18 (12 if MS holding)
- \*\*\*\* 45 (21 if MS holding)

## Additional Requirements

### Program Requirements

Program requirements are designed to provide a firm foundation in conceptual elements of ecological, evolutionary, and integrative biology, while moving students expeditiously toward their own research. In general, students must complete:

- 48 hours beyond the master's degree, or
- in the absence of a master's, 78 hours beyond the bachelor's degree.

The student's program of study should be broad and balanced. Coursework varies with each student, depending on background and goals. Enrollment in a weekly ecology seminar is required, on average, one semester each year. Professional experience (environmental management or teaching) is encouraged. A five-member advisory committee of faculty is selected to guide the student through his or her course of study and to provide initial approval of the dissertation research. This committee also administers the comprehensive written and oral candidacy examinations, which are taken after all required coursework is completed and the research skill requirement (proficiency in one foreign language, computer programming, or a quantitative skill approved by the advisory committee) is satisfied. The written exam must be passed before the oral exam may be taken. Once the candidacy exams are completed and a dissertation committee approves a written dissertation prospectus, the student advances to candidacy. At least three of the members of the original advisory committee, including the committee chair (student's major advisor), will compose the dissertation committee. This committee approves a written dissertation prospectus and will supervise the research. At this time, the student's attention turns almost exclusively to their own research. However, students continue to participate in seminar courses on a variety of topics, and an average of one seminar course per year of residency on campus is required. At the conclusion of their research, the student submits a dissertation to the committee and presents a public defense of this work.