Biology

Degrees Offered

• Master of Science
• Doctor of Philosophy

Nature of the Program

The Department of Biology’s graduate program is dedicated to scholarship in academics and research. The objectives of the program are to empower students through the following:

1. Recognize important biological problems
2. Design, execute, and analyze experiments aimed at solving important problems
3. Communicate their findings in oral and written form
4. Foster an awareness of the social and political issues of the day related to biology
5. Create a desire to continue independent study after graduation

The Department of Biology offers graduate courses and research that lead to M.S. and Ph.D. degrees in biology. The focal areas of research in the graduate program are: plant sciences, biochemistry and molecular biology, bioinformatics, genetics, genomics and evolutionary biology, biology education, cell and developmental biology, ecology, forensic biology, neuroanatomy and neurophysiology and behavioral neurobiology.

FACULTY

CHAIRPERSON

• Richard B. Thomas - Ph.D. (Clemson University)

PROFESSORS

• Jonathan R. Cumming - Ph.D. (Cornell University)
  Plant Physiology, Rhizosphere Ecology
• James B. McGraw - Ph.D. (Duke University)
  Plant Ecology, Plant Population Biology, Conservation Biology
• Richard B. Thomas - Ph.D. (Clemson University)
  Physiological Plant Ecology, Global Environmental Change
• Ashok Bidwai - Ph.D. (Utah State University)
  Biochemical and Molecular Genetic Analysis of Protein Kinases
• Stephen DiFazio - Ph.D. (Oregon State University)
  Plant Genomics, Ecological Genetics

ASSOCIATE PROFESSOR

• Michelle D. Withers - Ph.D. (University of Arizona)
  Biology Education: Scientific Teaching
• Rita V.M. Rio - Ph.D. (Yale University)
  Symbioses
• Clifton P. Bishop - Ph.D. (University of Virginia)
  Developmental and Molecular Biology of Drosophila
• Kevin C. Daly - Ph.D. (University of Arizona)
  Psychophysics and Neurophysiology of Manduca Sexta
• Sarah M. Farris - Ph.D. (University of Illinois)
  Nervous System Evolution and Development, Entomology
• William T. Peterjohn - Ph.D. (Duke University)
  Biogeochemistry, Ecosystem Ecology

ASSISTANT PROFESSOR

• Craig Barrett - PhD The Ohio State University
  Plant evolutionary Biology
• Sadie Bergeron - Ph.D. (University of Massachusetts - Amherst)
  Developmental Neuroscience
• Edward Brzostek - Ph.D. (Boston University)
  Forest ecology, ecosystem modeling
• Andrew Dacks - Ph.D. (University of Arizona)
  Neural Basis of Behavior States, Nervous System Evolution
• Timothy Driscoll - Ph.D. (Virginia Tech)
  Bioinformatics, microbial metagenomics
• Jennifer Gallagher - Ph.D. (Yale University)
  Molecular Mechanisms of Genetic Variation
• Jennifer Hawkins - Ph.D. (Iowa State University)
  Plant Comparative Genomics, Molecular Evolution, Regulation of Gene Expression
• Gary Marsat - Ph.D. (McGill University)
  Sensory Processing of Communication Signals; Systems Neuroscience and Computational Neuroscience

CLINICAL ASSOCIATE PROFESSOR
• Donna Ford-Werntz - Ph.D. (Washington University, St. Louis)
  Plant Systematics

CLINICAL ASSISTANT PROFESSOR
• Zachariah Fowler - Ph.D (West Virginia University)
  Forest ecology

PREREQUISITES AND ADMISSION
The program for the degree of doctor of philosophy reflects a flexible, research-oriented approach geared to develop the interests, capabilities, and potentials of mature students. Applicants must have met all the entrance requirements listed above for the master of science program, but a fiftieth percentile ranking or higher in the verbal quantitative and analytical section of the Graduate Record Examination is expected. Acceptance into the Ph.D. program is by vote of the Graduate Committee of the Department of Biology. This committee ensures that all entrance requirements are met or that provisions have been made to remedy the deficiencies, and that facilities and personnel are adequate to support the program to a successful conclusion.

Master of Science
Students must have a program of study formulated and approved by an Advisory Committee at the end of the second semester of entering the M.S. program. The program of study outlines the coursework to be taken in support of the proposed research. The advisory committee ensures that all of the Department of Biology, Eberly College of Arts and Sciences, and University requirements are met during the course of the student’s program of study.

MAJOR REQUIREMENTS
Minimum GPA of 3.0 is required.

<table>
<thead>
<tr>
<th>Biology Coursework (400+)</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>6</td>
</tr>
<tr>
<td>BIOL 797</td>
<td>Research (Repeated)</td>
</tr>
<tr>
<td>Graduate Seminars</td>
<td>6</td>
</tr>
<tr>
<td>BIOL 796</td>
<td>Graduate Seminar (Repeated)</td>
</tr>
<tr>
<td>Departmental Seminars</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 799</td>
<td>Graduate Colloquium (Repeated for at least 3 semesters)</td>
</tr>
<tr>
<td>Thesis Proposal</td>
<td></td>
</tr>
<tr>
<td>Thesis</td>
<td></td>
</tr>
<tr>
<td>Thesis Defense</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours 33

* Excludes BIOL 486, BIOL 490, BIOL 796, BIOL 797, BIOL 799

THESIS
All M.S. students must write and defend a thesis. A final oral examination is administered after an original, written thesis has been submitted to the Advisory Committee. Full-time students in the department are expected to complete all requirements for the program within four years. Regardless of status, all requirements for the M.S. degree must be completed within a period of eight years, starting with the initial enrollment after the most recent degree. For complete guidelines, please see the graduate student handbook at http://biology.wvu.edu/students/graduate-students/forms-and-policies.
Doctor of Philosophy

Each student admitted to the Ph.D. program works under the close supervision of a faculty research advisor and an advisory committee; details on the composition and establishment of an advisory committee are available in the department’s Graduate Student Handbook. Students must have a program of study formulated and approved by the end of the second semester of entering the Ph.D. program; all deficiencies must have been removed earlier. Significant deviations from an established program of study require approval from the advisory committee and the Graduate Committee.

MAJOR REQUIREMENTS

Minimum GPA of 3.0 is required.

<table>
<thead>
<tr>
<th>Biology Coursework (400+)</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Seminar</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 796 Graduate Seminar (Repeated)</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>6</td>
</tr>
<tr>
<td>BIOL 797 Research (Repeated)</td>
<td></td>
</tr>
<tr>
<td>Comprehensive Examination</td>
<td></td>
</tr>
<tr>
<td>Dissertation Proposal</td>
<td></td>
</tr>
<tr>
<td>Dissertation</td>
<td></td>
</tr>
<tr>
<td>Dissertation Defense</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>26</td>
</tr>
</tbody>
</table>

* Excludes BIOL 486, BIOL 490, BIOL 796, BIOL 797, BIOL 799

EXAMINATIONS AND DISSERTATION PROPOSAL

The advisory committee is responsible for overseeing the progress of the student and for administering and judging performance in the required examinations. The advisory committee ensures that all of the Department of Biology, Eberly College of Arts and Sciences, and University requirements are met during the course of the student’s program of study. The program of study outlines the coursework to be taken in support of the proposed research.

Students must successfully complete a preliminary exam with written and oral components before being promoted to candidacy for the Ph.D. The preliminary exam is given no later than the end of the third semester in residence. All doctoral students must also write and defend a research proposal (the proposal exam) no later than the end of the fourth semester in residence. For complete guidelines, see the graduate student handbook at http://biology.wvu.edu/students/graduate-students/forms-and-policies.

CANDIDACY

Successful passage of the preliminary examination leads to promotion to candidacy. Because the qualifying examination attests to the academic competence of the student who will become an independent researcher or practitioner, the examination cannot precede the conferring of the degree by an extended period. Consequently, doctoral candidates are allowed no more than five years in which to complete remaining degree requirements (http://catalog.wvu.edu/graduate/advisingcoursesdegrees/#Doctoral_Coursework). The expected time to completion of the Ph.D. degree is four-five years; however, all requirements for a graduate degree must be completed within a period of eight years, starting with the initial enrollment after the most recent degree. The final examination consists of the submission of a completed and acceptable written dissertation and an oral dissertation defense. A formal departmental seminar covering the dissertation research must be presented before graduation.

Major Learning Goals

BIOLOGY

The graduate programs in the Department of Biology provide rigorous training in several fields of biology. The central mission of our graduate program is to train the next generation of Biologists for careers in the field, laboratory and several other professional settings that rely on deep expertise in the biological sciences.

Students earning a M.S. or Ph.D. in Biology will be able to:

- Explain general biological principles as well as those specific to their research sub-discipline.
- Comprehend and critically evaluate literature published within their field.
- Independently design and execute experiments and provide quality data, analysis and interpretation, critical to progress in their research area.
- Effectively communicate their research in oral and written formats, including the ability to author manuscripts suitable for publication in peer reviewed scientific journals.
- Understand the role of ethics in personal and professional behavior.
- Learn and apply best laboratory practices (i.e. proper laboratory safety procedures and experimental protocols).