

Doctor of Philosophy in Microbiology

Goals and Program Description

The Ph.D. in Microbiology is granted for proven ability, independent investigation, and scholarly attainment in a special field. The Ph.D. degree is a research-based academic degree that enhances transferable skills, such as critical reasoning, problem-solving, and in-depth analysis. Recipients may become professors in academia or gain positions in public health agencies and private industry (medical, food and beverage processing, biopharmaceutical, etc.). Other employment areas include biotechnology, patent law, or scientific publishing.

Admission Requirements

In addition to the Graduate School Admission requirements, acceptance into the Microbiology Ph.D. program requires:

- A suitable faculty advisor
- GPA of 3.0 or above for all upper division course credits taken in the last degree-earning program
- Competitive GRE General Test scores (verbal and quantitative sections in the 40th percentile or higher and analytical writing score of at least 3.5)
- Applicants who hold only a B.S. degree require a GPA of 3.0 or above in all undergraduate coursework and GRE General Test scores in the 50th percentile or higher for verbal and quantitative sections

The following course work is also recommended for applicants applying to the Microbiology Ph.D. program:

- 1 year of General Biology (+lab)
- 1 year of General Chemistry (+lab)
- 1 year of Organic Chemistry (+lab)
- 1 year of Physics (+lab)
- 1 semester of Calculus (Calculus through Multivariable Calculus recommended)
- 1 semester of Quantitative Analysis, Analytical Chemistry, or Inorganic Chemistry (+lab)
- 1 semester of Statistics
- General Microbiology (+lab)
- Genetics (lab recommended)

If either the GPA or GRE requirement is not met, the Biological Sciences Graduate Programs Committee may choose to admit the candidate to "Classified (with performance requirements)" status. Applicants admitted as "Classified (with performance requirements)" status will be required to rectify any deficiencies as determined by the student's Advisory Committee.

Students in the Microbiology or Biology M.S. program may be permitted to change to the Microbiology Ph.D. program with approval of the Biological Sciences Graduate Program Committee and ISU Graduate School. Application for change must include a letter from the student that provides a rationale for the status change and a letter of support from the research advisor.

General and Course Requirements

The intent of the Microbiology Ph.D. program is to produce scientists with a broad background in the major sub-disciplines of Microbiology, while ensuring focused study in their major field of interest. The student's Graduate Advisory Committee will direct the student to specific course offerings within the Department and University to satisfy graduate-level coursework guidelines. Training in our Microbiology Ph.D. program is based on a strong foundation

in Mathematics, Chemistry, Genetics, Molecular Biology, and Biochemistry in addition to extensive coursework offered in three core areas of Microbiology:

- Biochemistry, Genetics, Molecular Biology, and Physiology of Microorganisms
- Immunology, Virology, and Medical Microbiology
- Microbial Ecology and Applied, Industrial, and Environmental Microbiology

A minimum of 42 credits in graduate-level coursework, including at least 15 credits earned at the 6600 level, are required for graduation.

Biology Core Course Requirements

Code	Title	Credits
BIOL 6690	Careers in Life Sciences (fall semester of first year)	1
BIOL 6605	Biometry (spring semester)	4
BIOL 6691	Seminar (third semester)	1

Microbiology Course Requirement

Code	Title	Credits
BIOL 6648	Graduate Problems	9
BIOL 6695	Seminar in Microbiology (may be repeated up to 6 credits)	1-3
BIOL 8850	Doctoral Dissertation	6
Advisory Committee recommended courses		15

* Candidates who have already received an M.S. degree may transfer 9 credits of graduate-level work, providing grades of "B" or higher were earned. Transfer of credit is subject to approval by the Graduate Programs Committee.

* Incoming Ph.D. students are required to take a diagnostic assessment to evaluate the breadth of their knowledge within multiple biological science disciplines and to help plan their Program of Study. The diagnostic assessment must be completed in the student's first semester as part of BIOL 6690.

Research Requirements

During the third semester, the student will submit and present a research proposal in a public forum as part of BIOL 6691. Immediately following the proposal seminar, the student will defend the research proposal in closed session with her/his Advisory Committee.

A Comprehensive Examination will be administered, with the student's Advisory Committee's approval, following successful defense of the research proposal (no later than the fifth semester or equivalent). This examination is intended to test the student's breadth of knowledge in relevant sub-disciplines within the field of Microbiology that pertain to the proposed research project and is designed to determine if the student is qualified for advancement to candidacy for the Ph.D. degree. It will be administered during a closed session and it will consist of a written and an oral portion. There are four potential outcomes of the Comprehensive Examination:

1. Pass: Student is advanced to candidacy for the Ph.D. degree.
2. Conditional pass: Student is advanced to candidacy for the Ph.D. degree contingent on recommendations put forth by the Advisory Committee. Failure to complete the requirements set forth by the committee by the stated deadline will result in Deferral.

3. Defer program: Student will transfer from the Microbiology Ph.D. program to the Microbiology M.S. program.
4. Fail: Student will be dismissed from the program completely.

The Ph.D. in Microbiology degree will culminate when the candidate submits a written dissertation embodying the results of original and creative research. The dissertation must demonstrate the student's ability to understand and evaluate current literature, to design and independently investigate, and to articulate science in a coherent manner to others. The dissertation requires the candidate to defend her/his research findings in a public forum, followed by a satisfactory oral exam conducted by her/his Advisory Committee. A meeting with the candidate's Advisory Committee should take place approximately 6 months before the anticipated public defense date to ensure approval and completion of the Final Program of Study.