Microbiology, PhD

Graduate study in microbiology is designed to help students become highly qualified in microbiology research and teaching. PhD students develop expertise in research in a specific area of microbiology and/or immunology.

Faculty members have strengths in bacteriology, parasitology, immunology, and virology. Areas of research include cellular microbiology, molecular virology and immunology, bacterial biochemistry and physiology, bacterial and viral pathogenesis, and molecular parasitology. Working in the laboratory of their PhD advisor, students learn to define and experimentally investigate scientific questions and to conduct original research in preparation for positions in academia, government, and industry.

Learning Outcomes

Graduates will be able to:

- demonstrate detailed knowledge in their area of specialization;
- master the analytical/methodological and critical thinking skills needed to evaluate and conduct research in their areas of specialization;
- demonstrate their ability to design and conduct original research in their chosen fields of specialization;
- teach college-level courses in their areas of specialization; and
- communicate in both the written and oral form in a clear and effective manner.

Requirements

The Doctor of Philosophy in microbiology requires a minimum of 72 s.h. of graduate credit, including at least 12 s.h. of graded coursework. Students must maintain a UI cumulative grade-point average of at least 3.00 to earn the degree. Qualified students interested in earning the Doctor of Medicine (MD) along with the PhD may apply to the Medical Scientist Training Program, which offers a combined MD/PhD program.

Students have the opportunity to tailor their curriculum with courses that enhance their educational goals. They take a combination of graduate-level courses that include seminar courses.

The PhD in microbiology requires the following coursework.

Core Curriculum

Course #	Title	Hours
MICR:6255	Graduate Experimental Approaches to Molecular Microbiology	2
MICR:6265	Introduction to Grant Writing	2
MICR:7263	Graduate Student Research Seminar	1
BMED:7270	Scholarly Integrity/ Responsible Conduct of Research I	0
BMED:7271	Scholarly Integrity/ Responsible Conduct of Research II	0

Additional courses offered by the Department of Microbiology and Immunology and other departments, as appropriate for each student

Students enroll for a minimum of 8 additional s.h., which can be selected from the following.

Course #	Title	Hours
MICR:6201/ IMMU:6201	Graduate Immunology	3
MICR:6247/ IMMU:6247	Graduate Immunology and Human Disease	4
MICR:6259	Graduate Bacteria and Human Disease	4
MICR:6267	Graduate Viruses and Human Disease	3
MICR:6268	Biology and Pathogenesis of Viruses	2
MICR:6270	Graduate Bacterial Genetics	3
MICR:6310	Biology of Bacteria and Interactions With the Host	2
MICR:7265	Topics in Virology Literature	1

Examples of Elective Coursework

Course #	Title	Hours
BIOL:4386	Introduction to Scientific Computing for Biologists	3
BMED:5207	Principles of Molecular and Cellular Biology	3
MMED:6220/ ACB:6220/ MPB:6220	Mechanisms of Cellular Organization	3

Additional Requirements

Laboratory Rotations

Graduate students rotate through two to three different laboratories during their first academic year. The laboratory rotations are approximately ten weeks each. At the conclusion of each rotation, a student meets with the rotation mentor for an exit interview and an evaluation of the student's performance. This evaluation becomes part of the student's departmental record. The student is also required to present the research completed during the rotation in the graduate seminar course.

Teaching

Graduate students participate in the formal teaching activities of the department for at least two semesters. First-year students as well as students who are within a year of receiving the PhD typically are not asked to teach. Teaching may take a variety of forms, including tutoring, leading discussions and laboratory groups, correcting examinations, preparing teaching materials, and lecturing.

Comprehensive Examination

The comprehensive examination is designed to measure a student’s ability to write and defend a research proposal. The format of this proposal follows guidelines for R21 research proposals outlined by the National Institutes of Health (NIH). Guidance, in the design of these proposals, is provided by the director of graduate studies and the student’s comprehensive examination committee.

Written Examination

During the spring semester of the second year, a student prepares a detailed research proposal. The topic of the research proposal is determined in collaboration with the advisor and the comprehensive examination committee. A detailed guide can be found in the Graduate Program in Microbiology Graduate Student Handbook on the Department of Microbiology and Immunology website.

Oral Examination

Questions during the oral examination may come from the examination proposal, coursework, or other general areas of microbiology. In order to pass the comprehensive examination, a student must satisfactorily defend the written research proposal and answer questions of general microbiology that are germane to the proposal or that are important for a full understanding of the proposed experiments and their interpretation.

Final Examination

The PhD thesis committee serves as an advisory body for the preparation of the thesis. This committee meets with the student to review the material that is expected to be incorporated into the thesis. Although meetings of the candidate with the committee should be yearly, the candidate, thesis advisor, or the committee can request a meeting at any time. A final draft of the thesis must be given to all members of the committee two weeks before the final examination. The final examination takes the form of a seminar presented to the department. This presentation is announced according to the Graduate College policy. Questions, comments, and discussion will follow. After the seminar, the candidate meets with the committee for the final thesis defense. The PhD is not awarded until the thesis is signed by the committee members and the department chair. In some cases, revisions may be required.

Combined Programs

PhD/MD

Students may work toward the MD degree and a PhD in microbiology in a combined degree program offered by the Department of Microbiology and Immunology and the Carver College of Medicine. Applicants must be admitted to both programs before they may be admitted to the combined degree program. See the Medical Scientist Training Program (Carver College of Medicine) in the catalog.

Admission

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations on the Graduate College website. They should have a cumulative grade-point average of at least 3.00 and have completed courses in biology, chemistry (inorganic and organic), mathematics including calculus, and physics. Those admitted with deficiencies in certain areas may be required to complete the relevant coursework during their first year of graduate study. Admission is determined through a review, interview, and formal vote of the admission committee.

Career Advancement

Graduates typically pursue research or teaching positions.

Academic Plans

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

Microbiology, PhD

Course	Title	Hours
Academic Career		
Any Semester		
72 s.h. must be graduate level coursework; graduate transfer credits allowed upon approval. More information is included in the General Catalog and on department website. [a, b, c]		
Graduate College program GPA of at least 3.00 is required. [d]		
	Hours	**0**
First Year		
Fall		
BMED:7270	Scholarly Integrity/Responsible Conduct of Research I	0
MICR:6247	Graduate Immunology and Human Disease	4
MICR:6255	Graduate Experimental Approaches to Molecular Microbiology	2
MICR:6259	Graduate Bacteria and Human Disease	4
MICR:6267	Graduate Viruses and Human Disease	3
MICR:7261	Graduate Research in Microbiology	1
MICR:7263	Graduate Student Research Seminar	1
	Hours	**15**
Spring		
MICR:6201	Graduate Immunology	3
MICR:6268	Biology and Pathogenesis of Viruses	2
MICR:6310	Biology of Bacteria and Interactions With the Host	2
MICR:7261	Graduate Research in Microbiology	5
MICR:7263	Graduate Student Research Seminar	1
Elective course		2
	Hours	**15**
Second Year		
Fall		
BMED:7271	Scholarly Integrity/Responsible Conduct of Research II	0
MICR:6265	Introduction to Grant Writing	2
MICR:6270	Graduate Bacterial Genetics	3
MICR:7261	Graduate Research in Microbiology	5
MICR:7263	Graduate Student Research Seminar	1
MICR:7265	Topics in Virology Literature	1
Elective course		3
	Hours	**15**

Spring		
Exam: Doctoral Comprehensive Exam		
MICR:6268	Biology and Pathogenesis of Viruses	2
MICR:6310	Biology of Bacteria and Interactions With the Host	2
MICR:7261	Graduate Research in Microbiology	6
MICR:7263	Graduate Student Research Seminar	1
Elective course		4
	Hours	**15**
Third Year		
Fall		
MICR:7261	Graduate Research in Microbiology	1
MICR:7263	Graduate Student Research Seminar	1
	Hours	**2**
Spring		
MICR:7261	Graduate Research in Microbiology	1
MICR:7263	Graduate Student Research Seminar	1
	Hours	**2**
Fourth Year		
Fall		
MICR:7261	Graduate Research in Microbiology	1
MICR:7263	Graduate Student Research Seminar	1
	Hours	**2**
Spring		
MICR:7261	Graduate Research in Microbiology	1
MICR:7263	Graduate Student Research Seminar	1
	Hours	**2**
Fifth Year		
Fall		
MICR:7261	Graduate Research in Microbiology	1
MICR:7263	Graduate Student Research Seminar	1
	Hours	**2**
Spring		
MICR:7261	Graduate Research in Microbiology	1
MICR:7263	Graduate Student Research Seminar	1
Exam: Doctoral Final Exam [e]		
	Hours	**2**
	Total Hours	**72**

a Graduate students rotate through two to three different laboratories during their first academic year.
b Graduate students participate in the formal teaching activities of the department for at least two semesters.
c Students must complete specific requirements in the University of Iowa Graduate College after program admission. Refer to the Graduate College website and the Manual of Rules and Regulations for more information.
d Graduate College program GPA is comprised of all courses that are approved degree requirements. If a student takes more than the minimum required number of semester hours to complete the degree, but all courses taken are eligible to count toward the degree, those courses will be included in the Graduate College program GPA.
e Program seminar followed by the dissertation defense.