MICROBIOLOGY (PH.D.)

https://colsa.unh.edu/molecular-cellular-biomedical-sciences/program/phd/microbiology

Description

The Ph.D. in Microbiology combines a dynamic curriculum in a broad range of areas with interdisciplinary research opportunities at the frontiers of microbiology, host-microbe interactions, and environmental microbiology. Graduates of the program are equipped for leadership positions in biotechnology and pharmaceutical companies, academic and government research laboratories, and successful careers in teaching and research at the college and university level.

Distinctive Features of the Program

- Research opportunities are available in many cutting-edge microbiology research areas
- Emphasis on interdisciplinary research training
- Well-equipped research laboratories and core facilities on the UNH campus
- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of invited speakers
- Opportunities to gain teaching experiences as a Graduate Teaching Assistant

Research Opportunities

- Host-microbe interactions, parasitology, and immunology
- Environmental microbiology
- Signal transduction pathways
- Molecular microbiology
- Genomics and bioinformatics
- Microbial ecology and evolution
- Biotechnology

Financial Support

- Students admitted to the Ph.D. Program are typically supported by Research Assistantships or Teaching Assistantships
- Intramural summer and academic year fellowships are available to students on a competitive basis

Career Prospects

- Research scientists in biotechnology and pharmaceutical industries
- Lab managers in academic research labs and research institutes, state and federal government agencies
- Academic preparation for future teaching and research roles in a college or university environment

Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, genetics, and mathematics
  - Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- Three letters of recommendation
- Personal statement, including research interests and names of two or three potential Microbiology faculty thesis advisors.

Requirements

Ph.D. Degree Requirements

Students with appropriate academic training at the baccalaureate or master's level may be considered for admission to the doctoral program. Students admitted to the Ph.D. program are required to conduct an independent research project in conjunction with a Microbiology graduate program faculty adviser. Specific coursework is determined in conjunction with the graduate committee.

Advancement to candidacy requires the successful completion of the following:

1. All courses required by the graduate committee
2. A written qualifying exam administered by the graduate program coordinator and graduate faculty
3. An independent research proposal developed in conjunction with a faculty adviser
4. An oral defense of the research proposal

Students enrolled in the doctoral program are required to complete one semester of teaching and successfully complete and defend a dissertation based on their research proposal. The acceptance of the dissertation is contingent on its approval by the doctoral committee and evidence that at least two manuscripts based on the thesis research have been submitted to a peer-reviewed journal appropriate to the topic.

All graduate students are required to enroll in and attend MCBS 997 Seminar each semester and present one seminar each year.

Code	Title	Credits
Approved courses for the Microbiology Ph.D. and M.S. programs:		
Biological Sciences		
BIOL 804	Plant-Microbe Interactions	3
Microbiology		
MICR 805	Immunology	3
MICR 815	Immunology Laboratory	2
Genetics		
GEN 804	Genetics of Prokaryotic Microbes	5
GEN 813	Microbial Ecology and Evolution	4
GEN 817	Molecular Microbiology	5
Natural Resources		
NR 806	Soil Ecology	4
Additional non-disciplinary courses to consider:		
ANFS 933	Design, Analysis, and Interpretation of Experiments	4
BCHM 825	Cell Phenotyping and Tissue Engineering Laboratory	4
BCHM 853	Cell Culture	5
BCHM 854	Molecular Biology Research Methods	5
BIOL 811	Experimental Design & Analysis	4
BIOL 902	Writing and Publishing Science	2
BIOL 950	Scientific Communication	2
GEN 812	Programming for Bioinformatics	5
GRAD 891	National Science Foundation Graduate Research Fellowship Preparation	0

GRAD 930	Ethics in Research and Scholarship	2 or 3
LSA 900	College Teaching	2
MATH 835	Statistical Methods for Research	3
MCBS 901	Introduction to Research in the Life Sciences	2
MCBS 913	Applied Bioinformatics	3
MCBS 910	Cell Signaling Networks Across the Kingdoms	3
MCBS 997	Seminar	1
NR 905	Grant Writing	2
NR 909	Analysis of Ecological Communities and Complex Data	4

Student Learning Outcomes

All MCBS graduates will be able to:

- Critically apply theories, methodologies, and knowledge to address fundamental questions in their primary area of study.
- Pursue research of significance in the discipline or an interdisciplinary or creative project. Students plan and conduct this research or implement this project under the guidance of an advisor while developing the intellectual independence that typifies true scholarship.
- Demonstrate skills in oral and written communication sufficient to publish and present work in their field and to prepare grant proposals.
- Follow the principles of ethics in their field and in academia.
- Demonstrate, through service, the value of their discipline to the academy and community at large.
- Demonstrate a mastery of skills and knowledge at a level required for college and university undergraduate teaching in their discipline and assessment of student learning.
- Interact productively with people from diverse backgrounds as both leaders/mentors and team members with integrity and professionalism.

Graduates of the Microbiology Ph.D degree program will be able to:

- Demonstrate strong foundational knowledge in microbiology theory and practice, and sub-disciplinary and cross-disciplinary knowledge specific to the student's research area.
- Critically analyze and interpretate the primary literature.
- Integrate knowledge by 1) synthesizing research questions and/or hypotheses, 2) designing, executing, and interpretating research and 3) contextualizing their contributions to the field of study.
- Demonstrate competency in laboratory safety, and specialized microbiological methods.
- Promote the importance of science, the discipline of microbiology, and microbes themselves to society by communicating the meaning and value of your scholarship across formal and informal forums.
- Independently construct analytical arguments as demonstrated by the development, execution, defense and publication of a dissertation research project.