Molecular Microbiology & Microbial Pathogenesis, PhD

Degree Requirements

Molecular Microbiology & Microbial Pathogenesis

The Molecular Microbiology & Microbial Pathogenesis (MMMP) program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

Our program is tailored to the needs and interests of the individual student and emphasizes laboratory research, supported by coursework, journal clubs and seminars. The program teaches comprehensive and modern approaches to understanding microbes and the diseases they cause. Our faculty spans both the Medical and Danforth campuses at WashU.

This program includes two major areas of research:

Molecular Microbiology

Research in molecular microbiology employs genetics, cell biology, biochemistry, and biophysics to investigate fundamental biological problems including environmental sensing and cell-cell signaling, transcriptional and post-transcriptional regulation, secretion, energy generation, and the bacterial cell cycle. State-of-the-art computational and comparative genomic approaches are used to study commensal, pathogenic, and environmental organisms in their natural environment.

Microbial Pathogenesis and Host Defense

Research in the molecular biology and biochemistry of pathogenic bacteria, fungi, protozoa, helminths and viruses, with an emphasis on mechanisms of virulence and host-parasite interactions. Applying a wide range of emerging technologies in molecular genetics and cell biology, this work includes the discovery and analysis of virulence-associated genes, the study of innate and acquired immunity to pathogens, and the identification and exploration of novel targets for chemotherapy.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
  - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
  - **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, students will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.
  - Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5392 Molecular Microbiology & Pathogenesis
- BBS 5217 Special Topics in Microbial Pathogenesis
- One of the following:
  - BBS 5480 Nucleic Acids & Protein Biosynthesis
  - BBS 5068 Fundamentals of Molecular Cell Biology

One or More Advanced Electives (3 units)

MMMP students have commonly selected the following courses for this requirement:

- BBS 5014 Biotech Industry Innovators
- BBS 5053 Immunobiology I
- BBS 5054 Immunobiology II
- BBS 5488 Genomics
- BBS 5910 Nano Topics in Biology and Biomedical Sciences

Journal Clubs

Students must complete one credit of journal or specific emphasis pathway course. Please consult with Program Directors for recommendations for this requirement.

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.