

MOLECULAR BIOLOGY AND MICROBIOLOGY, PHD

Degree: Doctor of Philosophy (PhD)

Field of Study: Molecular Biology and Microbiology

Program Overview

Students entering through BSTP begin the first of three research rotations during the summer and participate in the Core Curriculum in Cell and Molecular Biology (C3MB), two integrated courses which provide formal instruction in modern cell and molecular biology. Some exceptional students with strong backgrounds, such as a previous Master's Degree, may be eligible to be exempted from part of the Core Curriculum, and instead, enroll in one or more advanced courses during the fall semester. Some students may be eligible to apply for the transfer of credit from their previous institution. Transfer credit must be requested prior to beginning coursework at CWRU.

Admissions

Students are admitted to this PhD program through the Biomedical Sciences Training Program (BSTP) or the Medical Scientist Training Program (MSTP).

Biomedical Sciences Training Program (BSTP)

The BSTP offers a common entry point to most of the School of Medicine's biomedical PhD programs. BSTP students can choose among research mentors in many different PhD programs in the School of Medicine.

Medical Scientist Training Program (MSTP)

Students in the MSTP earn the dual MD/PhD degree. MSTP students also have the choice of mentors in many different PhD programs. The admission requirements of those programs can be viewed on their pages in the Bulletin. Program requirements for the dual can be found on the Medical Scientist Training Program, PhD/Medicine, MD program page.

PhD Policies

For PhD policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

Program Requirements

To earn a PhD in Molecular Biology and Microbiology, a student must complete 400-level graduate Core and Elective coursework including Responsible Conduct of Research and Research Rigor and Reproducibility as described in the course of study.

Students in the Molecular Biology and Microbiology PhD program are expected to attend the joint student seminars (MBIO 435) for at least 3 semester (total of 3 credit hours). Continued participation in the seminars after completion of this requirement is encouraged. Up to 4 credit hours can be allocated to the seminar course (one credit per semester).

Students should take MBIO 435 and beyond that, any combination of graduate courses from within or outside the department can be used to fulfill the requirement as long as the planned program of study has the approval of the Graduate Program Director, the student's mentor, and their

thesis committee.

Students must successfully complete a qualifying examination for advancement to candidacy in the form of a short grant proposal with oral defense. The qualifying exam is generally completed in the summer after year two. During the dissertation period, students are expected to meet twice a year with the thesis committee, present seminars in the department, and fulfill journal publication requirements. Throughout the doctoral training, students are expected to be enthusiastic participants in seminars, journal clubs, and research meetings in the lab and program.

Biomedical Sciences Training Program (BSTP) Requirements

Coursework

Students take integrated courses in Cell and Molecular Biology (IBMS 453, IBMS 455). They also complete a course in biostatistics (IBMS 450) and a literature based reading course (IBMS 456A). These four courses, offered in the fall semester, emphasize the molecular approaches that form the basis of modern biology. We also seek students with strong quantitative training who may have majored in physics or math, and offer alternative courses for these students to acquire foundations in biology. Qualified students also may take more specialized elective courses. All students take IBMS 500 On Being a Professional Scientist: The Responsible Conduct of Research.

Research Rotations

The research rotations allow students to explore research areas and become familiar with faculty members and their laboratories. The main purpose of these rotations is to aid students in selecting a laboratory for their thesis work. Students are encouraged to begin their rotations in July. Doing so gives them the opportunity to complete rotations during the summer before classes begin at the end of August. Students must complete at least three rotations.

Choosing a Thesis Advisor

During the first year, students select an advisor for their dissertation research. Each student also joins the PhD program with which their advisor is affiliated. Once students choose a PhD program, the requirements of that program are followed to obtain the PhD. The emphasis of the PhD work is on research, culminating in the completion of an original, independent research thesis and publishing the results in the scientific literature. PhD programs also focus on educating students to work as professional scientists.

Sample Plan of Study

First Year

Fall		Credit Hours
IBMS 453	Cell Biology I	3
IBMS 455	Molecular Biology I	3
IBMS 457	Basics of AI and Data Science in BioMedicine	2
BSTP 400 or MSTP 400	Research Rotation in Biomedical Sciences Training Program or Research Rotation in Medical Scientist Training Program	1

Credit Hours

9

Spring

MBIO 435	Seminar in Molecular Biology/ Microbiology	1
MBIO 601	Research in Molecular Biology and Microbiology	1 - 18
Elective graduate coursework		3-4
IBMS 500	On Being a Professional Scientist: The Responsible Conduct of Research	1
Credit Hours		6-24

Second Year**Fall**

Elective graduate coursework		3-4
MBIO 435	Seminar in Molecular Biology/ Microbiology	1
MBIO 601	Research in Molecular Biology and Microbiology	1 - 18
Credit Hours		5-23

Spring

Elective graduate coursework		3-4
MBIO 435	Seminar in Molecular Biology/ Microbiology	1
MBIO 601	Research in Molecular Biology and Microbiology	1 - 18
Credit Hours		5-23
Total Credit Hours		25-79

By the end of Year two: Complete elective coursework so that total graded courses = 24 credits; Research credits switch from MBIO 601 to MBIO 701 once passed into candidacy

Third Year +: Full-time dissertation research (MBIO 701) - 18 credit hours total

The SOM requires that PhD students who are 4 years beyond their initial RCR training in IBMS 500, register for IBMS 501.