

# BIOCHEMISTRY, MICROBIOLOGY, AND MOLECULAR BIOLOGY

## Degree Requirements

### Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<http://gradschool.psu.edu/graduate-education-policies/>)

A minimum of 30 credits at the 400, 500, 600, or 800 level is required, with at least 18 credits at the 500 and 600 level, combined. Master's students must complete the following core courses in BMMB:

Code	Title	Credits
<b>Required Courses</b>		
BMMB 501	Core Concepts in Biomolecular Science	5
BMMB 502	Critical Analysis of the Biochemical, Microbial, and Molecular Biology Scientific Literature	1
BMMB 507	Seminar in Biochemistry, Microbiology, and Molecular Biology	2
BMMB 509	Ethics in Biomedical Science	1
<b>Culminating Experience</b>		
BMMB 600 or BMMB 610	Thesis Research Thesis Research Off Campus	6

Students are required to write a thesis, and at least 6 credits in thesis research (BMMB 600 or BMMB 610) must be taken in conjunction with completing the thesis. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School, and the student must pass a thesis defense.

### Doctor of Philosophy (Ph.D.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<http://gradschool.psu.edu/graduate-education-policies/>)

Each student must take a total of 19 credits in 400-,500- and 800-level courses, required and elective, from a list approved by the program faculty. Doctoral students must complete the core courses in BMMB:

Code	Title	Credits
<b>Required Courses</b>		
BMMB 501	Core Concepts in Biomolecular Science	5
BMMB 502	Critical Analysis of the Biochemical, Microbial, and Molecular Biology Scientific Literature	1
BMMB 507	Seminar in Biochemistry, Microbiology, and Molecular Biology	2
BMMB 509	Ethics in Biomedical Science	1

Additional course work and research are individually planned by the student and the research adviser in consultation with the Ph.D. committee. The Ph.D. committee is established in compliance with Graduate Council policy (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/phd-dissertation-committee-formation/>) once the student has passed the qualifying examination.

Doctoral students must pass a qualifying examination, a comprehensive oral examination, and a final oral examination (the dissertation defense). Continuation in the Ph.D. program is decided on the basis of the student's performance in courses, research and teaching. In addition, an oral qualifying examination is taken during the fall semester of the second year. This examination tests the student's ability to utilize what they have learned in solving problems based on the scientific method. A comprehensive oral examination is taken before the student's Ph.D. committee within approximately three semesters after the student has passed the qualifying examination. The student is expected to present a written dissertation proposal including data that has been gathered, future research directions, and experimental approaches. Questioning may involve, but is not limited to, that dissertation proposal.

The faculty requires that each student demonstrate the ability to collect, organize, and present the results of their research in a professional manner before graduation. This is accomplished by preparing a manuscript based on the Ph.D. dissertation research. The manuscript must be written by the student and submitted for publication in a refereed journal prior to the final oral examination (the dissertation defense). The dissertation defense is taken before the student's Ph.D. committee at the end of the program. The student must also present a public seminar on the dissertation research within the two-week period preceding the dissertation defense. To earn the Ph.D. degree, the student's dissertation must be accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School.

### Other Relevant Information

The director of graduate studies is in charge of advising students about academic and related matters until they have chosen a dissertation adviser. Beginning students carry out a series of rotation projects in at least three different faculty laboratories before deciding on a research area. Students generally decide on their dissertation research adviser at the end of their first fall semester.

All students are required to participate as teaching assistants in undergraduate laboratory courses as part of their training. Students are required to register for BMMB 602 (Supervised Experience in College Teaching) for two semesters; however, these credits cannot be counted towards the minimum credits required for the degree.