

# PhD in Biochemistry

## Degree Requirements

Along with courses and seminars, students embark on lab rotations, dissertation research, qualifying and comprehensive exams and committee meetings, culminating in the dissertation defense. Prior to successfully completing the comprehensive examination, a student must complete nine credit hours per semester, or four per summer, to remain a full-time graduate student. Following successful completion of the comprehensive exam, each student should register for a minimum of two hours of thesis/dissertation research per semester (or one in summer) to maintain continuous enrollment. More than the minimum may be needed to obtain the 72 credit hours required by the MU Graduate School (<http://gradschool.missouri.edu/>) for completion of the PhD.

### Core Course Work

BIOCHM 8200	Principles and Research Practices in Biochemistry	2
BIOCHM 8240	Introduction to Graduate Biochemistry I *	3

### Elective Course Work

PhD students are required to take additional 8000/9000-level science courses (9 total hours required). The following are recommended and pre-approved. Other Graduate level sciences courses may complete this requirement with approval by the GEC before enrolling.

AN_SCI/PLNT_SCI 8430	Introduction to Bioinformatics Programming	4
BIOCHM 8434	Signaling in Molecular Cell Biology #	3
AN_SCI 8443	Functional Genomics of Mammals	4
BIOCHM 9001	Topics in Biochemistry (Structural Biology and Molecular Association) #	2
BIOCHM 9200	Structural Biology for the Life Sciences	3
<b>Ethics Seminar</b>		
BIOCHM 8060	Ethical Conduct of Research	1

\* All graduate students are required to earn a grade of B or better.

# A student who earns a grade of C or lower in any of these courses must retake the course.

## Department Seminars

Students are expected to attend all department seminars.

## Teaching Experience

An important part of graduate education is learning to communicate effectively as a teacher. Enrollment in BIOCHM 9001 helps prepare the students for their teaching assistant experience, which consists of one semester in an undergraduate laboratory or lecture venue. This is a required component of PhD degrees and typically is performed in the second year of graduate study. Students must satisfy this teaching experience requirement with a grade of B or better to remain in good standing as a graduate student in Biochemistry. This teaching experience usually involves assisting a faculty member in one of several courses and interacting with the students fairly extensively. Missouri requires that students whose first language is not English demonstrate adequate oral proficiency before assisting in teaching.

## Qualifying Process

The Qualifying Exam (QE) assesses the student's foundational knowledge, including knowledge of proteins and enzymes, metabolism, nucleic acids and gene expression, and supramolecular structure and gene expression. The QE should be completed before the end of the Spring semester (May 31<sup>st</sup>) of their first year. The criteria and format of the one-hour QE is at the discretion of the student's Doctoral Program Committee (DPC), who should agree to a proposed content/format with the student/advisor at least one month prior to the exam. It often includes a short presentation by the student introducing their project area of interest and future research directions but also may include basic questions on foundational concepts or topics, likely in the context of the student's research interests (although not limited to this).

## Comprehensive Examination Process

Students who have passed the qualifying exam should complete the Comprehensive Exam during the next two semesters following a satisfactory performance of the Qualifier Exam, by June of their second year. This examination involves writing a proposal for doctoral research in the format of a federal postdoctoral fellowship application. The student must then orally defend the proposal before his/her doctoral program committee plus a member of the graduate education committee. This is designed to assess the student's ability to think critically about science and to communicate effectively both in writing and in an oral presentation.

## Dissertation Requirements

### BIOCHM 9087

Students are required to enroll in at least three semesters of BIOCHM 9087 Seminar in Biochemistry (specific to Biochemistry Graduate Students, for 2 credit hours). This is typically taken in the Spring semesters of year 3, 4, and 5. Students may enroll in year 2 after approval from the DGS. A student's first spring BIOCHM 9087 seminar is devoted to a presentation of the proposed dissertation research. The second should provide an update of research progress or a review of major journal papers in the student's research area. The third should be a practice for the dissertation defense. The student's thesis committee is expected to attend these presentations at the invitation of the student. A meeting with the doctoral program committee (DPC) can be arranged after the seminar presentation and may serve as the required annual meeting.

## Thesis/Dissertation Research

### BIOCHM 9090

Prior to successfully completing the comprehensive examination, a student must complete nine credit hours per semester, or five per summer, to remain a full-time graduate student. Following successful completion of both parts of the comprehensive exam, each student should register for a minimum of two hours of thesis/dissertation research per semester (or one in summer) to maintain continuous enrollment. More than the minimum may be needed to obtain the 72 credit hours required by the MU Graduate School (<https://gradschool.missouri.edu/>) for completion of the Ph.D.

## Research Rotations

Starting in the fall semester of the first year, each student completes three laboratory rotations with the aim of identifying a lab in which to conduct PhD thesis research. By the beginning of the second semester, most students have chosen their labs. Each rotation should be conducted

for a period of at least five weeks. Three rotations are performed in the first semester. One-half of the student's time and effort should be directed toward the rotation project and the other half toward course work. The rotation laboratory should serve as an academic home, and the student should participate in all usual laboratory activities, including weekly group meetings.

## Admissions

Applicants are required to meet two sets of minimum qualifications for admission: the requirements of the PhD in Biochemistry program (<https://gradschool.missouri.edu/degreecategory/biochemistry/>) and the minimum requirements of the Graduate School (<https://gradschool.missouri.edu/admissions/eligibility-process/>). Because requirements vary, you must refer to a degree program's graduate admission page to learn about specific admission criteria, application deadlines, eligibility and application process. Before official admission to the University of Missouri, your application materials will be reviewed by both the Graduate School and the degree program to which you've applied.

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