

BIOCHEMISTRY AND MOLECULAR GENETICS (PHD)

Doctor of Philosophy in Biochemistry and Molecular Genetics

Unit: School of Medicine (<http://louisville.edu/medicine/>) (GM)

Department: Biochemistry and Molecular Genetics (<http://louisville.edu/medschool/biochemistry/>)

Program Website (<https://louisville.edu/medicine/departments/biochemistry/programs/graduateprograms/>)

Academic Plan Code(s): BIOCPHD

Program Information

As educators and scientists, the faculty of the Department of Biochemistry and Molecular Genetics subscribe to the following missions:

- Provide up-to-date and high-quality classroom and laboratory instruction in the disciplines of biochemistry, molecular biology, and genetics to students at the university.
- Conduct and publish research or other scholarship in areas that advance knowledge of a discipline, and contribute to improving the human condition.
- Train pre- and post-doctoral individuals in biomedical research.

Admission Requirements

All applications must be submitted using the online graduate application (<https://graduate.louisville.edu/admission/apply/>).

Doctoral students are admitted for Fall term only. Be sure to select Fall term for start date and Biochemistry and Molecular Genetics for the program. Rolling admission is used for the PhD program. Review of applications begins in December of each year. Applications are reviewed continuously through March.

Criteria and Mechanism for Selection

Criteria

The Biochemistry and Molecular Genetics department uses a holistic approach for reviewing applications and selecting candidates for interview. The applicant's academic record, research experience, and letters of recommendation are closely evaluated. Competitive candidates have a strong background in biochemistry, chemistry, or biology with evidence of rigorous coursework. In addition, a one-to-two-page personal statement describing past educational, laboratory and relevant life experiences, as well as a brief description of professional goals after the degree program, is required.

Competitive applicants have:

- A minimum undergraduate (and graduate) overall grade point average of 3.0 (4.0 system) with an average of 3.0 in science courses.
- Previous research experience
- Strong letters of recommendation

Selection

The Biochemistry and Molecular Genetics Department's Graduate Executive Committee (GEC) reviews and considers applications from December through March. Top candidates will be interviewed online or in person. Select candidates will be invited to a recruitment weekend in February to visit the department and meet faculty and students.

Select candidates are nominated for Integrated Programs in Biomedical Sciences (IPIBS). Fellowship awards for qualified applicants (louisville.edu/medicine/ipibs/about (<http://louisville.edu/medicine/ipibs/about/>)). The department will notify applicants by email of their decision. All applicants who are accepted into the program must respond with their decision no later than April 15. In the absence of a response, after April 15 the position in the program and financial support is no longer guaranteed and may be offered to another applicant. The Biochemistry and Molecular Genetics Department accepts four to six students per year into the PhD program.

Requirements for the PhD Degree in Biochemistry and Molecular Genetics

During PhD training students receive considerable guidance from their mentor, committee, and faculty members of the department. However, students need to recognize that individuals who pursue a biomedical graduate degree are expected to take full responsibility for their own scientific and professional development and to seek out and utilize all available resources for that goal.

Annual progress reports to document that a student is in good standing within the Biochemistry and Molecular Genetics department graduate program are required. The criteria for good standing in the graduate program are based on successful completion of milestones that indicate progression towards a degree. These milestones are the successful completion of:

1. All coursework with a minimum GPA of 3.0.
2. A minimum of two laboratory rotations.
3. Two seminar presentations.
4. Annual progress reports that indicate satisfactory progress.
5. PhD qualifying exam (QE).
6. Approved dissertation research proposal and committee meeting.
7. Annual research conferences with committee meetings in years three and beyond.

To fulfill all requirements for the PhD degree a student must

1. Complete a body of novel research (dissertation).
2. Publish, at minimum, one first author manuscript.
3. Write and defend a doctoral dissertation that is acceptable by the dissertation committee and Graduate School.

Student Support

An IPIBS Fellowship will provide stipend support for the first 23 months. Support after the first 23 months is the responsibility of the individual student's dissertation advisor. Students are also encouraged to seek extramural support.

Guidance for the Student

The Director of the Biochemistry and Molecular Genetics Graduate Program will serve as the first year advisor to all incoming graduate students until a dissertation advisor (mentor) is selected. During the first year, all students will meet with all available faculty to discuss potential research projects and complete a minimum of two laboratory rotations to help select a lab and mentor. After completion of lab rotations and before beginning a second year, the student will select a mentor, subject to the approval of the Graduate Executive Committee and the department chair.

PhD Qualifying Exam

The PhD academic program must be completed by the end of year two.

Upon successful completion of all coursework, a student becomes eligible to take the PhD Qualifying Exam (QE). The purpose of the QE is to evaluate the student's ability to interpret literature, develop a research plan, integrate material from the graduate curriculum, display core knowledge of biochemical principles, and orally defend his/her ideas.

The format of the QE requires the student to write and orally defend a NIH-style fellowship proposal, followed by an oral exam covering general biochemical/genetic principles covered in the curriculum. Upon successful completion of the QE, a student becomes a doctoral candidate and may also be eligible to earn an MS degree. An initial committee meeting should be held during the second year to provide guidance on the student's research. A full research proposal must be completed and approved by the committee before the end of the Spring term of the student's year three.

Curriculum

Year 1	Hours
Fall	
Required Courses	
BIOC 613 Biochemistry Laboratory	4
BIOC 645 Advanced Biochemistry I	4
BIOC 646 Nucleic acids and information metabolism	1
BIOC 648 Journal Club in Biochemistry and Molecular Genetics	1
BIOC 649 Protein Function: from interactions to enzyme control	1
Hours	11
Spring	
Required Courses ¹	
BIOC 630 Responsible Conduct of Research: Survival Skills and Research Ethics	1
BIOC 648 Journal Club in Biochemistry and Molecular Genetics	1
BIOC 667 Cell Biology	3
BIOC 668 Molecular Biology	4
Electives	0-3
BIOC 613 Biochemistry Laboratory	2-4
BIOC 619 Research	1-9
ENGL 677 Graduate Writing in the Disciplines	3
Hours	15-28
Summer	
Required Courses	
BIOC 619 Research	6
Hours	6
Year 2	
Fall	
Required Courses ¹	
BIOC 606 Biochemistry Seminar	1
BIOC 648 Journal Club in Biochemistry and Molecular Genetics	1
BIOC 670 Biomedical Genetics and Genomics	3
ASNB 622 Analytics in Biomedical Science	3
Electives	
BIOC 619 Research	1
BIOC 663 High-Throughput Sequencing Data Analysis	
BIOC 670 Biomedical Genetics and Genomics (for 2 additional credits)	
Hours	9
Spring	
Required Courses ¹	
BIOC 620 Scientific Method and Grant Writing	2
BIOC 648 Journal Club in Biochemistry and Molecular Genetics	1
Electives	
BIOC 619 Research	2-3

BIOC 661	Molecular Mechanisms of Toxicology	3
BIOC 675	Cancer Biology	4
ENGL 677	Graduate Writing in the Disciplines	3
Hours		15-16
Summer		
Required Courses		
MAST 600 or BIOC 619	Master's Degree Candidacy or Research	0 or 6
Hours		0-6
Years 3-5		
Required Courses ¹		
DOCT 600	Doctoral Candidacy	
Hours		0
Minimum Total Hours		56-76

¹ Students seeking only the PhD must complete 42 minimum total hours to earn the degree. Students in the MD-PhD program typically complete 24 minimum total hours to earn the degree.