

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 (<http://louisville.edu/medschool/biochemistry/>)

Academic Plan Code(s): BIOCPHD

Program Information

As teachers 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 discipline of biochemistry, molecular biology, and genetics to students at the university.
- Conduct and publish research or other scholarship in areas that advance our knowledge of a discipline, and contribute to improving the human condition.
- Train students and post-doctoral fellows in biochemical research.

Admission Requirements

All applications must be submitted using the online graduate application (<http://louisville.edu/graduate/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. Review of applications begins in December of each year and applications are reviewed on a rolling basis 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 Graduate Executive Committee (GEC) reviews applications on a rolling basis. 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/](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 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:

- a. All coursework with a minimum GPA of 3.0.
- b. A minimum of two laboratory rotations.
- c. Two seminar presentations.
- d. Annual progress reports that indicate satisfactory progress.
- e. Exam 1 (PhD qualifying exam).
- f. Exam 2a and 2b (approved research proposal and committee meeting).
- g. Annual research conferences with committee meetings in years three and beyond.

To fulfill all requirements for the PhD degree a student must

- a. Complete a body of novel research (dissertation).
- b. Publish at minimum one first author manuscript.
- c. 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 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.

Qualifying Exam

All required coursework must be completed by the end of year two. Upon successful completion of all coursework the student moves into

master's candidacy and is eligible for 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, the student will be awarded a MS degree and move into doctoral candidacy. 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 students year three.

Curriculum

| Year 1 | | Hours |
|-------------------------|--|-------|
| Fall | | |
| Required Courses | | |
| BIOC 611 | Techniques in Biomolecular Interactions | 4 |
| BIOC 613 | Biochemistry Laboratory | 4 |
| BIOC 645 | Advanced Biochemistry I | 4 |
| BIOC 648 | Journal Club in Biochemistry and Molecular Genetics | 1 |
| Hours | | 13 |
| Spring | | |
| Required Courses | | |
| BIOC 619 | Research | 1 |
| BIOC 630 | Responsible Conduct of Research: Survival Skills and Research Ethics | 1 |
| BIOC 667 | Cell Biology | 3 |
| BIOC 668 | Molecular Biology | 4 |
| Electives | | 0-3 |
| ENGL 677 | Graduate Writing in the Disciplines | 3 |
| Hours | | 9-12 |
| Summer | | |
| Required Courses | | |
| BIOC 619 | Research | 5 |
| BIOC 662 | Biomedical Research Data Analysis Methods | 1 |
| Hours | | 6 |
| Year 2 | | |
| Fall | | |
| Required Courses | | |
| BIOC 606 | Biochemistry Seminar | 1 |
| BIOC 648 | Journal Club in Biochemistry and Molecular Genetics | 1 |
| BIOC 670 | Biomedical Genetics and Genomics | 3-5 |
| Electives | | |
| BIOC 619 | Research | 1-2 |
| BIOC 663 | High-Throughput Sequencing Data Analysis | 3 |
| BIOC 670 | Biomedical Genetics and Genomics (for 2 additional credits) | 2 |
| Hours | | 11-14 |
| Spring | | |
| Required Courses | | |
| BIOC 619 | Research | 4 |
| BIOC 620 | Scientific Method and Grant Writing | 2 |
| Electives | | |
| BIOC 675 or BIOC 661 | Cancer Biology or Molecular Mechanisms of Toxicology | 3-4 |
| Hours | | 9-10 |
| Summer | | |
| Required Courses | | |
| MAST 600 | Master's Degree Candidacy | 0 |
| Hours | | 0 |

Years 3-5

Required Courses

| | | |
|---------------------|--------------------|-------|
| DOCT 600 | Doctoral Candidacy | 0 |
| Hours | | 0 |
| Minimum Total Hours | | 48-55 |