

DOCTOR OF PHILOSOPHY IN NATURAL SCIENCES: MOLECULAR BIOLOGY AND BIOCHEMISTRY

Student Learning Outcomes

Students graduating from this program will:

- Demonstrate a thorough degree of knowledge in the disciplines
- Demonstrate an ability to use proper investigation techniques for the disciplines
- Use oral and written forms of communication to convey their ideas

Program Structure

Total Credits Required for Graduation: 42*

Residency requirements: Ph.D. students must satisfy the doctoral residency requirement by satisfactory completion of at least 18 credits in no more than 24 consecutive months. When satisfying the residency requirement, all Ph.D. students are subject to the following restrictions:

- The doctoral residency requirement must be satisfied no later than the end of the semester in which the student completes his or her comprehensive examinations.
- Students must achieve a cumulative graduate grade-point average of at least 3.0 in all courses counted toward satisfying the residency requirement.

* *Specific disciplines may require more credit hours for graduation. See discipline specific coursework requirements for more information on total credit hours required for graduation.*

Program Requirements

The coursework requirements encompass:

- A minimum of 12 credit hours of coursework within the primary area, accompanied by at least 12 dissertation hours. The primary disciplines retain the flexibility to potentially request more than the minimum credit hours.
- A minimum of 9 credit hours within a secondary discipline area, with the secondary discipline also having the option to specify additional credit hours beyond the minimum.
- A minimum of 30 classroom credits is required beyond the baccalaureate, including fundamental and advanced courses along with seminars.
- Any primary area discipline can be combined with any secondary area discipline.

Participating Disciplines

Participating disciplines encompass a range of fields, including:

- Biomedical and Health Informatics
- Cell Biology and Biophysics
- Chemistry
- Geosciences
- Mathematics
- Molecular Biology and Biochemistry
- Oral and Craniofacial Sciences
- Pharmaceutical Science
- Pharmacology
- Physics

Student Learning Outcomes

Students graduating from this program will:

- Demonstrate a thorough degree of knowledge in the discipline
- Demonstrate an ability to use proper investigation techniques for the discipline
- Use oral and written forms of communication to convey their ideas

Molecular Biology and Biochemistry

Primary Discipline Program Requirements

Code	Title	Credits
A minimum of 23 credit hours of coursework within the primary area, accompanied by at least 15 dissertation hours.		
LS-MBB 5561	General Biochemistry I	3
LS-MBB 5562	General Biochemistry II	3
LS-MBB 5596 or LS-MBB 5597	Advanced Experimental Molecular Biology I Advanced Experimental Molecular Biology II	2
LS-MBB 5611	Seminar in Molecular Biology and Biochemistry	1
LS-MBB 5611	Seminar in Molecular Biology and Biochemistry	1
LS-MBB 5690	Analytical Methods in Molecular Biology and Biochemistry	5
BIOLOGY 5501	Proposal Writing	1
Electives		7+
Dissertation		15

Total Credit Hours: 48 - This includes 23 primary discipline hours, 10 hours in a secondary discipline, and 15 dissertation hours.

Secondary Discipline Program Requirements

Code	Title	Credits
A minimum of 10 credit hours		
LS-MBB 5561	General Biochemistry I	3
LS-MBB 5562	General Biochemistry II	3
LS-MBB 5611	Seminar in Molecular Biology and Biochemistry	1
Electives - at least 3 hours		3

Admission Requirements

A cumulative GPA of at least 3.0 (on a 4.0 scale) on all college work for bachelor's degree or post-baccalaureate work. Due to the sequencing of coursework, new students selecting Molecular Biology and Biochemistry as their primary discipline will normally only be admitted in the fall term.

Other Discipline-Specific Special Requirements

Research

The Division of Biological and Biomedical systems offers research opportunities in many areas of modern life sciences that address problems of basic life processes at the cellular, subcellular and molecular levels. Graduate studies offered with primary participation of the faculty in the Division of Molecular Biology and Biochemistry are based on the belief that training for research can be best accomplished by having an appropriate breadth of background coursework, combined with a depth of specialization in a particular research area. The faculty have established guidelines that have a minimum of formal requirements so that students have the flexibility to advance at a pace consistent with development of the individual. Diligence, creativity and independent thinking are the qualities desired in the candidate's dissertation work.

Teaching

As part of their graduate training, all Ph.D. students with Molecular Biology and Biochemistry as the primary discipline participate in the teaching program of the Division of Biological and Biomedical systems. This is an important component of preparation for a career in academia or other institutions and aids in the development of effective communication skills.

Seminars

Students will participate in seminars in which current developments in various areas of life sciences will be discussed and explored. Students also will present seminars on their own work or on work in the current scientific literature. The latter is taken as part of the core of graduate-level courses in the primary or co-disciplines.

Course Restrictions

5700-level courses may not be used to satisfy molecular biology and biochemistry discipline-specific course requirements.

Dissertation

The dissertation abstract and proposal must be submitted to and approved by the supervisory committee prior to beginning the third academic year of study after enrollment in the Ph.D. program.

Retention in Program

For students with this discipline as their primary discipline, no more than one C grade in a core course, and no D or F grades, are permitted. A student who receives more than one C grade will be recommended for termination from the doctoral program. A student who receives a D or F grade will be dropped from the program.

The doctoral faculty in Molecular Biology and Biochemistry meets formally at the end of each academic year to discuss and evaluate the progress of all graduate students. Each student's committee also meets with the student at least once a year. After the annual doctoral faculty meeting, all students receive written evaluations of their status and a report is placed in each student's file.

Requirements for Comprehensive Examinations

To become a Ph.D. candidate, the student must pass a Comprehensive Exam that may be taken on completion of essentially all of the coursework specified in the student's study plan and on satisfactorily fulfilling the requirements for full admission. This must be done before the *beginning* of the third academic year after admission to UMKC with graduate student status, or (for part-time students) immediately after completion of 25 credit hours approved by the discipline-doctoral program at UMKC. This exam will be administered by the student's supervisory committee and will test the student's knowledge of background material, as well as the student's ability to analyze and interpret information and solve problems.

Written Portion

The written examination for students who have Molecular Biology and Biochemistry as their primary discipline consists of an NIH-style grant proposal that the student will prepare. The topic of the research proposal will be determined by the student in consultation with the student's supervisory committee.

Oral Portion

The oral examination also has two aspects: (1) questions covering the grant proposal prepared by the student for the written examination and (2) other related material in the student's area of specialization, including fundamental knowledge of the discipline(s).