

BIOCHEMISTRY, MS

Degree: Master of Science (MS)

Field of Study: Biochemistry

Email Department Coordinator

Program Overview

The Biochemistry Department offers an 18-21 month Masters of Science in Biochemistry that provides students with advanced study in biochemistry and related fields. This degree may be combined with other degrees in four dual-degree programs: MD/MS, JD/MS, MS/MBA, and MS/MA in Patent Practice.

The Biochemistry MS program prepares students for employment in academia and biotechnology, and for advancement to other degree programs. Classroom work provides the latest advancements in biochemistry and related fields. In addition, laboratory courses allow students to acquire technical laboratory skills in biotechnology and a solid understanding of the practice of biochemical research. Students typically enroll in three courses for each of four semesters.

Prerequisites for admission are one year each of chemistry, organic chemistry, calculus, biology and physics. Applicants must also have a BA, BS, or equivalent undergraduate degree. As part of the application process, students are required to take the Graduate Record Examination. Students with excellent qualifications who lack some of the prerequisites may be conditionally admitted and allowed to make up the deficiencies. Students with advanced training (coursework, laboratory research, MS degree, etc.) may be given advanced standing. Please visit the department's web page for details about the application process.

Graduate Policies

For graduate policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

Program Requirements

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The program follows **Plan B for the Master's degree**. The advisor for this program is usually the Graduate Advisor, but another advisor may be selected. The student's progress is monitored by the Graduate Advisor and by the Graduate Education Committee. The program requires 36 hours of academic credit of which 18 hours must be graded coursework. BIOC 407 and BIOC 408 are the only required courses, providing students with flexibility in constructing a program that meets their interests. Many students get hands-on experience by working in the laboratory of a faculty mentor and taking 6-12 hours of BIOC 601. Other students opt for the Experimental Biotechnology Track, which provides research experience and builds lab skills. All courses must be at the 400 level or

higher; they must be on the list of approved electives or be approved by the advisor.

Experimental Biotechnology Track

Many graduates of the Biochemistry MS program work as researchers in academia, government laboratories, and the biotechnology sector. To prepare students for employment opportunities in biotech, the Experimental Biotechnology Track in the MS program prepares students for lab careers. Students take a laboratory-directed sequence in the first year: BIOC 407 Introduction to Biochemistry: From Molecules To Medical Science, BIOC 408 Molecular Biology, BIOC 502A, BIOC 502B, BIOC 502C, and BIOC 511. BIOC 500-502 introduce students to common techniques used in biochemistry labs and provide hands-on experience and training. BIOC 511 presents information about the organization of biotechnology research in academic and industrial settings. It also covers product development, as well as the biotech and pharmaceutical industries.

In the first year, students take BIOC 500, 501, 502, and 511, which provide a solid foundation in lab skills and techniques. In the second year, students perform research in an academic or biotech laboratory as BIOC 601, providing hands-on experience to improve the skills they acquired in the first-year courses. Students in this track also take didactic Biochemistry courses to provide a strong base of knowledge to complement the laboratory experiences.

Optional Elective Focus Areas

The program has two required course, BIOC 407 Introduction to Biochemistry: From Molecules To Medical Science, and BIOC 408 Molecular Biology, leaving space in student schedules for research in faculty laboratories and for coursework. In addition to the Experimental Biotechnology track, we have created optional focus areas with suggested lists of elective courses. These are:

Code	Title	Hours
Molecular Structure and Function		
BIOC 412	Proteins and Enzymes	3
BIOC 415	Biological Membranes and Their Proteins	3
BIOC 434	Structural Biology	3
BIOC 501	Biochemical and Cellular Techniques for Biotechnology	3
Molecular Basis of Infectious Disease		
BIOC 410	Microbial Physiology and Therapeutic Opportunities	3
BIOC 411	Antimicrobial Therapies and Resistance	3
BIOC 412	Proteins and Enzymes	3
BIOC 501	Biochemical and Cellular Techniques for Biotechnology	3
Cancer Biology		
BIOC 450	Molecular Basis of Cancer	3
BIOC 453	Biochemical Pathways in Cancer Therapeutics	3
BIOC 460	Advanced Technologies for Cancer Research	3
BIOC 501	Biochemical and Cellular Techniques for Biotechnology	3

Sample Plan of Study

First Year		
Fall		Hours
BIOC 407	Introduction to Biochemistry: From Molecules To Medical Science	4
BIOC Electives		5
Hours		9
Spring		
BIOC 408	Molecular Biology	4
BIOC Electives		5
Hours		9
Second Year		
Fall		Hours
BIOC 412	Proteins and Enzymes	3
BIOC Electives		6
Hours		9
Spring		
BIOC 434	Structural Biology	3
BIOC Electives		5
EXAM 600	Master's Comprehensive Exam	1
Hours		9
Total Hours		36

Sample Plan of Study: Experimental Biotechnology Track

Course	Title	Hours
First Year		
Fall		Hours
BIOC 407	Introduction to Biochemistry: From Molecules To Medical Science	4
BIOC 500	Biotechnology Laboratory: Molecular Biology Basics	1
BIOC 501	Biochemical and Cellular Techniques for Biotechnology	3
BIOC 511	Practice and Professionalism in Biotechnology	1
Hours		9
Spring		
BIOC 408	Molecular Biology	4
BIOC 502A	Biotechnology Laboratory: Molecular Biology and Biochemical Techniques ^a	2
BIOC 502B	Biotechnology Laboratory: Eukaryotic Molecular and Cellular Biology ^a	2
BIOC 502C	Biotechnology Laboratory: Mass Spectrometry Techniques ^a	1
Hours		9
Second Year		
Fall		Hours
BIOC 412	Proteins and Enzymes	3
BIOC 601	Biochemical Research	3
BIOC Elective		3
Hours		9

Spring		
BIOC 434	Structural Biology	3
BIOC 601	Biochemical Research (or Elective)	2
Elective		3
EXAM 600	Master's Comprehensive Exam	1
Hours		9
Total Hours		36

a Students may take BIOC 502A, BIOC 502B, and BIOC 502C in the first and/or second year.

Dual Degree Options

- Biochemistry, MS/Business Administration, MBA
- Biochemistry, MS/Law, JD
- Biochemistry, MS/Medicine, MD
- Biochemistry, MS/Patent Practice, MA