BS in Biochemistry

Degree Program Description

Biochemists are the locksmiths of life science. They use their imagination, ingenuity and understanding of the basics of living processes to unlock life's mysteries. By unraveling the complexities of nature, they improve the quality of life. Biochemistry combines the tools of biology, chemistry and genetics to fight human disease, increase the production and quality of food, and protect the environment. The knowledge acquired through the program prepares students for careers in many areas, including Medicine, Biotechnology, Agriculture and Government.

Premedical Track Students interested in a medical career may choose from a variety of science-based majors. The most common choice of students is biochemistry because it is a collaborative program between CAFNR and the School of Medicine. The Biochemistry degree provides excellent preparation for the intellectual demands of the medical profession. This training includes, as part of the degree requirements, all of the science courses necessary for application to medical school or related professional fields. Many graduates of this program matriculate at medical, dental, veterinary, pharmacy or optometry schools.

In **Biotechnology**, some of the nation's largest and most respected private biotechnology companies, such as Bayer, Dow Chemical and Pfizer, employ biochemists in a wide range of specialties, including molecular biology, genetic engineering, pharmaceutical development and microbiology. Many graduates have chosen to pursue Masters or Doctoral degrees at major research institutions across the country. Some have been selected for internships at National Institute of Health and others have earned National Science Foundation Pre-Doctoral Awards.

In **Agriculture**, biochemists find employment with agricultural industry companies such as Cargill, Bayer, and Nestle Purina. They may work on projects to develop new varieties of crops that resist drought and insects, nutritionally correct animal feed, or herbicide resistant crops.

In **Government**, state and federal agencies such as the U.S. Food and Drug Administration, the State Public Health Lab and Epidemiology for Public Health Lab employ biochemists in many fields. They might perform genetic testing and biological sample testing, research epidemics in the region, or identify food-borne pathogens.

Major Program Requirements

Students earning a Bachelor of Science in Biochemistry are required to complete all University general education (https://catalog.missouri.edu/academicdegreerequirements/generaleducationrequirements/), University graduation (https://catalog.missouri.edu/academicdegreerequirements/universityrequirements/), and degree requirements, including selected foundational courses, which may fulfill some University general education requirements.

Foundational Courses

CHEM 1400 & CHEM 1401	College Chemistry I and College Chemistry I Laboratory	4
or CHEM 1400H & CHEM 1401H	College Chemistry I - Honors and College Chemistry I Laboratory - Honors	
BIO_SC 1500	Introduction to Biological Systems with Laboratory	4-5
or BIO_SC 1500H	Introduction to Biological Systems with Laboratory Honors	
or BIO_SC 1030	General Principles and Concepts of Biology with Laboratory	
or BIO_SC 1010 & BIO_SC 1020	General Principles and Concepts of Biology and General Biology Laboratory	
MATH 1500	Analytic Geometry and Calculus I	5
or MATH 1500H	Analytic Geometry and Calculus I - Honors	
AGSC_COM 2220	Verbal Communication in Agriculture, Food and Natural Resources	3
or COMMUN 1200	Public Speaking	

Degree and Major Courses

Major core requirements

Biochemistry		**25-26**
BIOCHM 1090	Introduction to Biochemistry	3
BIOCHM 1094	Introductory Biochemistry Laboratory	3
BIOCHM 2480	Introduction to Macromolecular Structure and Function ^	3
BIOCHM 2482	Integrative Cellular and Molecular Biochemistry ^	3
BIOCHM 4270	Biochemistry (I: First semester of two semester sequence)	3
BIOCHM 4272	Biochemistry (II: Continuation of BIOCHM 4270)	3
BIOCHM 4300	Physical Chemistry of Biological Systems ^	3
BIOCHM 4974W	Biochemistry Laboratory - Writing Intensive	5
BIOCHM 4972	Post-Normal Biochemistry	2
Biological Sciences		**3-4**
BIO_SC 2200	General Genetics	3-4
or AN_SCI 3213	Genetics of Agricultural Plants and Animals	
or PLNT_SCI 3213	Plant Genetics	
Chemistry		**12**
CHEM 1410 & CHEM 1411	College Chemistry II and College Chemistry II Laboratory	4
or CHEM 1410H & CHEM 1411H	College Chemistry II - Honors and College Chemistry II Laboratory - Honors	
CHEM 2100	Organic Chemistry I	3
CHEM 2110 & CHEM 2130	Organic Chemistry II and Organic Laboratory I	5
Mathematics		**5**
STAT 1200	Introductory Statistical Reasoning	3
or STAT 2500	Introduction to Probability and Statistics I	
Information Technology		
INFOTC 1040	Introduction to Problem Solving and Programming	3
or INFOTC 4401	Python 1: Learn to Program in Python	
Physics		**8-10**
PHYSCS 1210	College Physics I	4-5
or PHYSCS 2750	University Physics I	
PHYSCS 1220	College Physics II	4-5
or PHYSCS 2760	University Physics II	
Advanced science (10 or more credit hours; At least 5 credit hours of Biochm courses are required.) *		
BIOCHM 4970	Senior Problem Based Learning in Biochemistry	3
BIOCHM 4971	Biochemistry of Obesity	2
BIOCHM 4978	Cancer Biology	3

BIOCHM 4950	Advanced Undergraduate Research in Biochemistry ~	1-3
BIOCHM 4996H	Honors Thesis Research in Biochemistry ~	1-3
AN_SCI 3242	Principles and Applications of Animal Nutrition	4
AN_SCI 4312	Monogastric Nutrition	4
AN_SCI 3253	Physiology of Domestic Animals- All Majors	4
AN_SCI 4314	Physiology of Reproduction	3
BIO_SC 3400	Evolution and Ecology	3
BIO_SC 3650	General Ecology	5
BIO_SC 3700	Human Physiology	5
BIO_SC 3750	General Microbiology	3
BIO_SC 3760	Microbiology Laboratory	2
BIO_SC 3780	Genetics Laboratory	2
BIO_SC 4500	Neurobiology	3
BIO_SC 4600	Evolution	3
BIO_SC 4972	Developmental Biology	3
BIO_SC 4990	Vertebrate Histology and Microscopic Anatomy	5
CHEM 3200	Quantitative Methods of Analysis with Lab	4
CHEM 4170	Medicinal Chemistry	3
CHEM 4200	Instrumental Methods of Analysis with Lab	3
CHEM 4600	Introduction to Radiochemistry with Lab	3
F_S 3210	Kitchen Chemistry	3
F_S 4310	Food Chemistry and Analysis	3
MATH 3000	Introduction to Advanced Mathematics	3
MATH 4100	Differential Equations	3
MATH 4110	Advanced Calculus With Applications	3
MATH 4120	Graph Theory and Combinatorics	3
MATH 4130	Theory of Equations	3
MATH 4140	Matrix Theory	3
MATH 4160	Mathematical Logic	3
MATH 4300	Numerical Analysis	3
MATH 4310	Numerical Linear Algebra	3
MATH 4315	Introduction to Mathematical Statistics	3
MPP 3202	Elements of Physiology	5
MPP 4202	Medical Physiology	4
MPP 4204	Medical Pharmacology	4
MICROB 3200	Medical Microbiology and Immunology	4
MICROB 4304	Immunology for Health Professions	3
NEP 4340	Human Nutrition II Lecture	3
PTH_AS 4220W	Forensic Pathology and Death Investigation - Writing Intensive	2
PTH_AS 4222	Gross Human Anatomy (The Health Professions)	7
PLNT_SCI 3225	Plant Breeding and Genetics	3
PLNT_SCI 4313	Soil Fertility and Plant Nutrition	3
PLNT_SCI 4315	Crop Physiology	3
PLNT_SCI 4320	Molecular Plant Physiology	3
PLNT_SCI 4500	Biology and Pathogenesis of Plant-Associated Microbes	4
PSYCH 4210	Physiological Psychology	3
PSYCH 4240	Cognitive Neuroscience	3
STAT 3500	Introduction to Probability and Statistics II	3
STAT 4510	Applied Statistical Models I	3
STAT 4520	Applied Statistical Models II	3
MICRO 3551	Introduction to Immunology I	3

* Science courses that are not used to fulfill other major requirements. For an approved list of courses, email mubchemadvising@missouri.edu.

^ Some courses may only be offered during fall or spring semester. Please check with the department for course offerings.

~ Only 3 credit hours of BIOCHM 4950 or BIOCHM 4996H will count towards advanced science.

Semester Plan

Below is a sample plan of study, semester by semester. A student's actual plan may vary based on course choices where options are available.

First Year			
Fall	**CR**	**Spring**	**CR**
BIOCHM 1090	3	CHEM 1410 & CHEM 1411	4
CHEM 1400 & CHEM 1401	4	ENGLSH 1000	3
BIO_SC 1500	5	MATH 1500	5
INFOTC 1040	3	BIOCHM 1094 or BIO_SC 2200	3-4
INTDSC 1001	1		
	16		**15-16**
Second Year			
Fall	**CR**	**Spring**	**CR**
BIOCHM 2480	3	BIOCHM 2482	3
BIO_SC 2200 or BIOCHM 1094	3-4	CHEM 2110	3
CHEM 2100	3	CHEM 2130	2
STAT 1200	3	BIO_SC 2300 (or general elective)	4
Elective (Humanities)	3	Social/Behavioral Sci Elective	3
	15-16		**15**
Third Year			
Fall	**CR**	**Spring**	**CR**
BIOCHM 4270	3	BIOCHM 4272	3
PHYSCS 1210	4	PHYSCS 1220	4
HIST 1100 or 1200	3	Advanced Science Elective (3000 level or above)	4-5
AGSC_COM 2220	3	Elective (Social/Behavioral Sci)	3
Elective (Humanities)	3		
	16		**14-15**
Fourth Year			
Fall	**CR**	**Spring**	**CR**
BIOCHM 4300	3	General Electives	6
BIOCHM 4974W (or Writing Intensive Elective)	5	Writing Intensive Elective or BIOCHM 4974W	3-5
BIOCHM 4972 (or other Adv Science BIOCHM)	2	Adv Sci BIOCHM or BIOCHM 4972	2
BIOCHM 4978	3	Adv Sci BIOCHM	2

General Elective	3	
	16	**13-15**

Total Credits: 120-125