Science Courses Required for BA and BS Degrees in Biochemistry and Molecular Biology

The following science coursework is required for a bachelor's degree in Biochemistry and Molecular Biology. Additional specific requirements for BA and BS degrees are indicated at right.

	Required Courses	Total s.h.	BA Total s.h.	BS Total s.h.
Required Courses for a Bachelor's Degree in Biochemistry and Molecular Biology				
Biochemistry	Biochemistry & Molecular Biology I (BMB 3120) **and** II (BMB 3130) **and** Experimental Biochemistry (BMB 3140)	8		
Biology	Foundations of Biology (BIOL 1411) **and** Diversity of Form and Function (BIOL 1412)	8		
Chemistry	Principles of Chemistry I (CHEM 1110) **and** II (CHEM 1120)	8		
Organic Chemistry	Organic Chemistry I (CHEM 2210) **or** Organic Chemistry I for Majors (CHEM 2230)	3		
	Organic Chemistry II (CHEM 2220) **or** Organic Chemistry II for Majors (CHEM 2240)	3		
	Organic Chemistry Lab (CHEM 2410) **or** Organic Chemistry Lab for Majors (CHEM 2420)	3		
Mathematics	Calculus I (MATH 1850) **or** Engineering Mathematics I: Single Variable Calculus (MATH 1550) **or** Calculus for the Biological Sciences (MATH 1460)	4		
	Calculus II (MATH 1860) **or** Engineering Mathematics II: Multivariable Calculus (MATH 1560) **or** Biostatistics (STAT 3510) **or** Introduction to Biostatistics (BIOS 4120)	3-4		
Physics	College Physics I (PHYS 1511) **or** Introductory Physics I (PHYS 1611)	4		
	College Physics II (PHYS 1512) **or** Introductory Physics II (PHYS 1612)	4		
Additional Course Requirements Specific for BA and BS Degrees				
Advanced Biochemistry	Biophysics and Advanced Biochemistry (BMB 4240)	--	3	3
Advanced Chemistry	Principles of Physical Chemistry (CHEM 4430) **or** Chemical Thermodynamics I (CHEM 4431) **or** Quantum Mechanics & Chemical Kinetics (CHEM 4432)	–	--	3
Advanced Science Electives	Many courses satisfy this requirement (see examples on page 7)	–	6	9
Research or Advanced labs	Advanced Undergraduate Biochemistry Research (BMB 4999) **or** Advanced Laboratory Courses (see page 7)	–	–	6
Research Seminar	Development of Senior Research Project (BMB 3150) is a prerequisite for BMB 4999.		–	2*

*BMB 3150 is required for students taking BMB 4999 **but not** required for BS students taking advanced lab courses.

The Bachelor of Arts with a major in Biochemistry and Molecular Biology requires a minimum of 120 s.h., including 58 s.h. of work for the major. The Bachelor of Science with a major in Biochemistry and Molecular Biology requires a minimum of 120 s.h., including 70-72 s.h. of work for the major. They also must complete the College of Liberal Arts and Sciences General Education Program. (http://clas.uiowa.edu/students/students-graduation-requirements/general-education-program-requirements)

Advanced Biochemistry-Chemistry Choices

BA and BS majors need to complete:

BMB 4240 Principles and experimental approaches used to student macromolecular structure, stability, and function; ligand binding and macromolecular interactions; enzyme kinetics and mechanisms; x-ray crystallography and NMR spectroscopy; single molecule and other biophysical approaches. ***Prerequisite courses: BMB:3120 with a minimum grade of C- and BMB:3130 with a minimum grade of C-. Requirements: One year of biochemistry. Recommendations: Physical Chemistry course and one semester of calculus.***

BS majors also need any one of these courses:

CHEM 4430 Principles of Physical Chemistry (Kinetics, transport properties, elementary thermodynamics, and selected topics in quantum mechanics and spectroscopy; emphasis on application of chemistry to areas of science including health and biosciences, environmental sciences, and related areas.)
Requirements: CHEM:1120 and MATH:1460 or MATH:1850 and PHYS:1512 or PHYS:1612.

CHEM 4431 Chemical Thermyodynamics (Chemical thermodynamics and its application to chemical equilibrium, phase changes and chemical equilibria; ideal and real gases; kinetic theory; surface absorption and electrochemistry; thermodynamics.)
Requirements: CHEM:1120 and MATH:1560 or MATH:1860 and PHYS:1512 or PHYS:1612.

CHEM 4432 Quantum Mechanics & Chemical Kinetics (Quantum mechanics and its application to atomic and molecular structure; determination of structure and bonding by various spectroscopic methods; chemical kinetics.)
Requirements: CHEM:1120 and MATH:1560 or MATH:1860 and PHYS:1512 or PHYS:1612.

Examples of Advanced Science Electives accepted for BA and BS Degrees in Biochemistry and Molecular Biology

The requirement for advanced science electives is intended to help students expand their education by pursuing courses outside the standard Biochemistry and Molecular Biology (BMB) undergraduate curriculum. The requirement usually is fulfilled by taking classes that are 3000-level or higher (though some lower-level classes may be acceptable). Independent study and research credits do NOT count toward this requirement.

Research or Advanced Labs (BS degree only): The BS degree in BMB requires six semester hours of either BMB 4999 (Advanced Undergraduate Biochemistry Research) or advanced laboratory courses. Research credit taken in other science departments can also count for this requirement (subject to approval by a BMB advisor). Only 6 s.h. of BMB 4999 can count toward the requirements for the BS degree in BMB.

Examples of Advanced Science Electives are listed below*. *Many* other courses may be taken; students should check with their advisor about whether or not a specific course not listed below will fulfill this requirement. It may be necessary for the student to obtain a syllabus or other information from the instructor before the advisor can make this decision.

		# S.H.	*When Offered*
Anatomy and Cell Biology			
ACB 3110	Principles of Human Anatomy	3	Fall
Biochemistry and Molecular Biology			
BMB 4310 (BME 4310)	**Computational Biochemistry**	**3**	**Fall**
Biology			
BIOL 2254	Endocrinology	3	Fall, Spr
BIOL 2512	Fundamental Genetics	4	Fall, Spr, Su
BIOL 2673	Ecology	3	Fall
BIOL 2723	Cell Biology	3	Fall, Spr
BIOL 3172	Evolution	4	Fall, Spr
BIOL 3212	Bioinformatics for Beginners	3	Fall
BIOL 3233	Intro to Developmental Biology	3	Fall
BIOL 3244	Animal Behavior (can be taken without or **with lab**)	3,5	Fall
BIOL 3253	Neurobiology I	4	Fall
BIOL 3343	Animal Physiology	3	Fall
BIOL 3626	**Cell Biology Lab**	**4**	**Fall**
BIOL 3713	Molecular Genetics	4	Fall, Spr
BIOL 3716	**Genetics & Biotechnology Lab**	**4**	**Spr**
BIOL 3736	**Developmental Biology Lab**	**4**	**Spr**
BIOL 4333	Genes & Development	3	Spr
Biomedical Engineering			
BME 4310	**Computational Biochemistry**	**3**	**Fall**
Biostatistics			
BIOS 4120	Introduction to Biostatistics	3	Fall, Spr, Su
Chemistry			
CHEM 2021	**Fundamentals of Chemical Measurements**	**3**	**Fall, Spr**
CHEM 3110	Equilibria and Electrochemistry	3	Fall
CHEM 3120	Spectroscopy and Separations	3	Spr
CHEM 3250	Inorganic Chemistry	3	Spr

		# S.H.	*When Offered*
CHEM 3430	**Analytical Measurements**	**3**	**Spr**
CHEM 3440	**Physical Measurements**	**3**	**Fall**
CHEM 3530	**Inorganic Chemistry Lab**	**3**	**Fall**
CHEM 4270	Advanced Inorganic Chemistry	3	Fall
CHEM 4372	Advanced Organic Chemistry	3	Fall
CHEM 4450	**Synthesis and Measurement**	**3**	**Spr**
CHEM 5328	Mechanisms of Organic Reactions	3	Fall
Environmental Sciences			
ENVS 2673	Ecology	3	Spr
Health and Human Physiology			
HHP 1100	Human Anatomy	3	Fall, Spr, Su
HHP 1110	**Human Anatomy Lab**	**1**	**Fall, Spr, Su**
HHP 1300	Fundamentals of Human Physiology	3	Fall, Spr, Su
HHP 1310	**Human Physiology Lab**	**1**	**Fall, Spr, Su**
HHP 3105	Anatomy for Human Physiology	3	Su
HHP 3110	**Advanced Anatomy Lab**	**2**	**Fall**
HHP 3115	**Anatomy for Human Physiology with Lab**	**5**	**Fall, Spr**
HHP 3450	Immunology in Health & Disease	3	Fall
HHP 3500	Human Physiology	3	Fall, Spr, Su
HHP 3550	**Human Physiology with Lab**	**5**	**Fall, Spr**
Mathematics, Statistics and Computer Science			
MATH 2700	Introduction to Linear Algebra	4	Fall, Spr
MATH 2850	Calculus III	4	Fall, Spr
MATH 3600	Intro to Ordinary Differential Equations	2-3	Fall, Spr
MATH 4060	Discrete Mathematical Models	3	Spr
STAT 3120	Probability and Statistics	4	Fall
STAT 3510	Biostatistics	3	Fall, Spr

		# S.H.	When Offered
STAT 4143	Introduction to Statistical Methods	3	Fall, Spr
Microbiology and Immunology			
MICR 2157	General Microbiology	3	Fall, Spr
MICR 2158	**General Microbiology Lab**	**2**	**Fall, Spr**
MICR 3147	Immunology and Human Disease	3	Fall
MICR 3159	Bacteria and Human Disease	3	Spr
MICR 3164	Microbiology & Human Health	4	Spr
MICR 3168	Viruses and Human Disease	3	Fall
MICR 3170	Microbial Genetics	2	Fall
Neuroscience and Pharmacology			
PCOL 3101	Pharmacology I: A Drug's Fantastic Journey	3	Fall
PCOL 3102	Pharmacology II: Mechanisms of Drug Action	3	Spr
PCOL 4130	Drug Mechanisms and Actions	3	Spr
Physics and Astronomy			
PHYS 3850	Electronics	4	Spr
Psychological and Brain Sciences			
PSY 2130	Advanced Psychology for Pre-Med Track	3	Spr
PSY 2301	Introduction to Clinical Psychology	3	Fall, Spr, Su
PSY 2401	Introduction to Developmental Science	3	Fall, Spr, Su
PSY 2501	Introduction to Social Psychology	3	Fall, Spring
PSY 2601	Introduction to Cognitive Psychology	3	Fall, Spr, Su
PSY 2701	Introduction to Behavioral Neuroscience	4	Fall, Spr

Courses in **Bold** can be used to satisfy either Advanced Science Electives (BA or BS) or the 6 s.h. research/advanced lab requirement for the BS degree.

*The above course information is current as of 4/1/2023. Please consult MyUI and the UI general catalog for course availability and delivery method when selecting electives.