Science Courses Required for BA and BS Degrees in Biochemistry

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

<table>
<thead>
<tr>
<th>Required Courses for Bachelor’s Degree in Biochemistry</th>
<th>Total s.h.</th>
<th>BA Total s.h.</th>
<th>BS Total s.h.</th>
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</thead>
<tbody>
<tr>
<td>Calculus</td>
<td>8</td>
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<tr>
<td>Calculus I (MATH 1850) and II (MATH 1860)</td>
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<tr>
<td>Chemistry</td>
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<tr>
<td>Principles of Chemistry I (CHEM 1110) and II (CHEM 1120)</td>
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<tr>
<td>Biology</td>
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<tr>
<td>Foundations of Biology (BIOL 1411) and Diversity of Form and Function (BIOL 1412)</td>
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<tr>
<td>Organic Chemistry</td>
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<tr>
<td>Recommended: Organic Chemistry I, II, and Lab for majors (CHEM 2230, 2240, 2420)</td>
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<tr>
<td>Also accepted: Organic Chemistry I, II, and Lab (CHEM 2210, 2220, 2410)</td>
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<tr>
<td>Physics</td>
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<td>Recommended: Introductory Physics I (PHYS 1611) and II (PHYS 1612 with the lab)</td>
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<tr>
<td>Also accepted: College Physics I (PHYS 1511) and II (PHYS 1512)</td>
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<td>Biochemistry</td>
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<tr>
<td>Biochemistry &amp; Molecular Biology I (BMB 3120) and II (BMB 3130), Experimental Biochemistry (BMB 3140)</td>
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<tr>
<td>Additional Course Requirements Specific for BA and BS Degrees</td>
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<tr>
<td>Advanced Biochemistry</td>
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<tr>
<td>Biophysics and Advanced Biochemistry (BMB 4240)</td>
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<tr>
<td>Advanced Chemistry</td>
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<td>3</td>
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<tr>
<td>Principles of Physical Chemistry (CHEM 4430), Chemical Thermodynamics (CHEM 4431), Quantum Mechanics &amp; Chemical Kinetics (CHEM 4432)</td>
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<tr>
<td>Advanced Science Electives</td>
<td>–</td>
<td>6</td>
<td>9</td>
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<tr>
<td>Many courses satisfy this requirement (see examples on other side of page)</td>
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<tr>
<td>Research or Advanced labs</td>
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<tr>
<td>Advanced Undergraduate Biochemistry Research (BMB 4999) or Advanced Laboratory Courses (see examples on other side of page)</td>
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<tr>
<td>Research Seminar</td>
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<tr>
<td>Development of Senior Research Project (BMB 3150) is a prerequisite for BMB 4999.</td>
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</table>

*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 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 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](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 Thermodynamics (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

Advanced Science Electives (BA & BS degrees): The requirement for advanced science electives are intended to help students expand their education by pursuing courses outside the standard biochemistry 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 Biochemistry 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 Biochemistry advisor). Only 6 s.h. of BMB 4999 can count toward the requirements for the BS degree in Biochemistry.

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.

### Anatomy and Cell Biology
- ACB 3110 Principles of Human Anatomy 3 s.h.

### Biochemistry
- BMB 3310 Practical Data Science & Bioinformatics 3 s.h.
- BMB 4310 Computational Biochemistry 3 s.h.

### Biology
- BIOL 2254 Endocrinology 3 s.h.
- BIOL 2346 Vertebrate Zoology 4 s.h.
- BIOL 2512 Fundamental Genetics 4 s.h.
- BIOL 2672 Ecology 3 s.h.
- BIOL 2722 Cell Biology 3 s.h.
- BIOL 3172 Evolution 4 s.h.
- BIOL 3212 Bioinformatics for Beginners 3 s.h.
- BIOL 3233 Intro to Developmental Biology 3 s.h.
- BIOL 3244 Animal Behavior (can be taken without or with lab) 3.5 s.h.
- BIOL 3253 Neurobiology 4 s.h.
- BIOL 3343 Animal Physiology 3 s.h.
- BIOL 3626 Cell Biology Lab 4 s.h.
- BIOL 3713 Molecular Genetics 4 s.h.
- BIOL 3716 Genetics & Biotechnology Lab 4 s.h.
- BIOL 3736 Developmental Biology Lab 4 s.h.
- BIOL 3743 Basic Biology of Human Disease 2 s.h.
- BIOL 4333 Genes & Development 3 s.h.

### Biomedical Engineering
- BME 4310 Computational Biochemistry 3 s.h.

### Biostatistics
- BIOS 4120 Introduction to Biostatistics 3 s.h.

### Chemical and Biochemical Engineering
- CBE 3150 Thermodynamics/Transport Lab 3 s.h.
- CHEM 2021 Fundamentals of Chemical Measurements 3 s.h.
- CHEM 3110 Equilibria and Electrochemistry 3 s.h.
- CHEM 3120 Spectroscopy and Separations 3 s.h.
- CHEM 3250 Inorganic Chemistry 3 s.h.
- CHEM 3430 Analytical Measurements 3 s.h.
- CHEM 3440 Physical Measurements 3 s.h.

### Pharmacy
- MATH 2700 Introduction to Linear Algebra 4 s.h.
- MATH 2850 Calculus III 4 s.h.
- MATH 3600 Intro to Ordinary Differential Equations 5-3 s.h.
- MATH 4060 Discrete Mathematical Models 3 s.h.
- STAT 3120 Probability and Statistics 4 s.h.
- STAT 3510 Biostatistics 3 s.h.

### Microbiology
- MATH 2150 Introduction to Statistical Methods 3 s.h.

### Pharmacology
- HHP 3105 Anatomy for Human Physiology 3 s.h.
- HHP 3110 Advanced Anatomy Lab 2 s.h.
- HHP 3115 Anatomy for Human Physiology with Lab 5 s.h.
- HHP 3450 Immunology in Health & Disease 3 s.h.
- HHP 3500 Human Physiology 3 s.h.
- HHP 3550 Human Physiology with Lab 5 s.h.
- MATH 2700 Introduction to Linear Algebra 4 s.h.
- MATH 2850 Calculus III 4 s.h.
- MATH 3600 Intro to Ordinary Differential Equations 5-3 s.h.
- MATH 4060 Discrete Mathematical Models 3 s.h.
- STAT 3120 Probability and Statistics 4 s.h.
- STAT 3510 Biostatistics 3 s.h.

### Bioinformatics
- ACB 3110 Principles of Human Anatomy 3 s.h.

### Chemistry
- ACB 3110 Principles of Human Anatomy 3 s.h.

### Computer Science
- ACB 3110 Principles of Human Anatomy 3 s.h.

### Environmental Sciences
- ENVS 2673 Ecology 3 s.h.

### Health and Human Physiology
- HHP 1100 Human Anatomy 3 s.h.
- HHP 1110 Human Anatomy Lab 1 s.h.
- HHP 1190 Human Anatomy Lecture with Lab 4 s.h.
- HHP 1300 Fundamentals of Human Physiology 3 s.h.
- HHP 1310 Human Physiology Lab 1 s.h.
- HHP 1350 Fund. of Human Physiology w. Lab 4 s.h.

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.

Note that some of these courses are offered only in the spring or fall semesters and may require other courses as prerequisites; be sure to consult MyUI when selecting electives.