

## 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<br>Total<br>s.h. | BS<br>Total<br>s.h. |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------|---------------------|
| <b>Required Courses for a Bachelor's Degree in Biochemistry and Molecular Biology</b> |                                                                                                                                                                                          |            |                     |                     |
| Biochemistry                                                                          | Biochemistry & Molecular Biology I (BMB 3120) <b>and</b> II (BMB 3130) <b>and</b> Experimental Biochemistry (BMB 3140)                                                                   | 8          |                     |                     |
| Biology                                                                               | Foundations of Biology (BIOL 1411) <b>and</b> Diversity of Form and Function (BIOL 1412)                                                                                                 | 8          |                     |                     |
| Chemistry                                                                             | Principles of Chemistry I (CHEM 1110) <b>and</b> II (CHEM 1120)                                                                                                                          | 8          |                     |                     |
| Organic Chemistry                                                                     | Organic Chemistry I (CHEM 2210) <b>or</b> Organic Chemistry I for Majors (CHEM 2230)                                                                                                     | 3          |                     |                     |
|                                                                                       | Organic Chemistry II (CHEM 2220) <b>or</b> Organic Chemistry II for Majors (CHEM 2240)                                                                                                   | 3          |                     |                     |
|                                                                                       | Organic Chemistry Lab (CHEM 2410) <b>or</b> Organic Chemistry Lab for Majors (CHEM 2420)                                                                                                 | 3          |                     |                     |
| Mathematics                                                                           | Calculus I (MATH 1850) <b>or</b> Engineering Mathematics I: Single Variable Calculus (MATH 1550) <b>or</b> Calculus for the Biological Sciences (MATH 1460)                              | 4          |                     |                     |
|                                                                                       | Calculus II (MATH 1860) <b>or</b> Engineering Mathematics II: Multivariable Calculus (MATH 1560) <b>or</b> Biostatistics (STAT 3510) <b>or</b> Introduction to Biostatistics (BIOS 4120) | 3-4        |                     |                     |
| Physics                                                                               | College Physics I (PHYS 1511) <b>or</b> Introductory Physics I (PHYS 1611)                                                                                                               | 4          |                     |                     |
|                                                                                       | College Physics II (PHYS 1512) <b>or</b> Introductory Physics II (PHYS 1612)                                                                                                             | 4          |                     |                     |
| <b>Additional Course Requirements Specific for BA and BS Degrees</b>                  |                                                                                                                                                                                          |            |                     |                     |
| Advanced Biochemistry                                                                 | Biophysics and Advanced Biochemistry (BMB 4240)                                                                                                                                          | --         | 3                   | 3                   |
| Advanced Chemistry                                                                    | Principles of Physical Chemistry (CHEM 4430) <b>or</b> Chemical Thermodynamics I (CHEM 4431) <b>or</b> 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) <b>or</b> 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 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 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.

|                                           |                                                            | #<br>S.H. | When<br>Offered |                                    |                                              | #<br>S.H. | When<br>Offered      |
|-------------------------------------------|------------------------------------------------------------|-----------|-----------------|------------------------------------|----------------------------------------------|-----------|----------------------|
| <b>Anatomy and Cell Biology</b>           |                                                            |           |                 | <b>Chemistry</b>                   |                                              |           |                      |
| ACB 3110                                  | Principles of Human Anatomy                                | 3         | Fall            | CHEM 2021                          | Fundamentals of Chemical Measurements        | 3         | Fall, Spr            |
| <b>Biochemistry and Molecular Biology</b> |                                                            |           |                 | CHEM 3110                          | Equilibria and Electrochemistry              | 3         | Fall                 |
| <b>BMB 4310</b><br>(BME 4310)             | <b>Computational Biochemistry</b>                          | <b>3</b>  | <b>Fall</b>     | CHEM 3120                          | Spectroscopy and Separations                 | 3         | Spr                  |
| <b>Biology</b>                            |                                                            |           |                 | CHEM 3250                          | Inorganic Chemistry                          | 3         | Spr                  |
| BIOL 2254                                 | Endocrinology                                              | 3         | Fall, Spr       | <b>CHEM 3430</b>                   | <b>Analytical Measurements</b>               | <b>3</b>  | <b>Spr</b>           |
| BIOL 2512                                 | Fundamental Genetics                                       | 4         | Fall, Spr, Su   | <b>CHEM 3440</b>                   | <b>Physical Measurements</b>                 | <b>3</b>  | <b>Fall</b>          |
| BIOL 2673                                 | Ecology                                                    | 3         | Spr             | <b>CHEM 3530</b>                   | <b>Inorganic Chemistry Lab</b>               | <b>3</b>  | <b>Fall</b>          |
| BIOL 2723                                 | Cell Biology                                               | 3         | Fall, Spr       | CHEM 4270                          | Advanced Inorganic Chemistry                 | 3         | Fall                 |
| BIOL 3172                                 | Evolution                                                  | 4         | Fall, Spr       | CHEM 4372                          | Advanced Organic Chemistry                   | 3         | Fall                 |
| BIOL 3212                                 | Bioinformatics for Beginners                               | 3         | Fall            | <b>CHEM 4450</b>                   | <b>Synthesis and Measurement</b>             | <b>3</b>  | <b>Spr</b>           |
| BIOL 3233                                 | Intro to Developmental Biology                             | 3         | Fall            | CHEM 5328                          | Mechanisms of Organic Reactions              | 3         | Fall                 |
| BIOL 3244                                 | Animal Behavior (can be taken without or <b>with lab</b> ) | 3,5       | Fall            | <b>Environmental Sciences</b>      |                                              |           |                      |
| BIOL 3253                                 | Neurobiology I                                             | 4         | Fall            | ENVS 2673                          | Ecology                                      | 3         | Spr                  |
| BIOL 3343                                 | Animal Physiology                                          | 3         | Fall            | <b>Health and Human Physiology</b> |                                              |           |                      |
| <b>BIOL 3626</b>                          | <b>Cell Biology Lab</b>                                    | <b>4</b>  | <b>Fall</b>     | HHP 1100                           | Human Anatomy                                | 3         | Fall, Spr, Su        |
| BIOL 3713                                 | Molecular Genetics                                         | 4         | Fall, Spr       | <b>HHP 1110</b>                    | <b>Human Anatomy Lab</b>                     | <b>1</b>  | <b>Fall, Spr, Su</b> |
| <b>BIOL 3716</b>                          | <b>Genetics &amp; Biotechnology Lab</b>                    | <b>4</b>  | <b>Spr</b>      | <b>HHP 1310</b>                    | <b>Human Physiology Lab</b>                  | <b>1</b>  | <b>Fall, Spr, Su</b> |
| <b>BIOL 3736</b>                          | <b>Developmental Biology Lab</b>                           | <b>4</b>  | <b>Spr</b>      | HHP 2400                           | Fundamentals of Human Physiology             | 3         | Fall, Spr, Su        |
| BIOL 4333                                 | Genes & Development                                        | 3         | Spr             | HHP 3105                           | Anatomy for Human Physiology                 | 3         | Su                   |
| <b>Biomedical Engineering</b>             |                                                            |           |                 | <b>HHP 3110</b>                    | <b>Advanced Anatomy Lab</b>                  | <b>2</b>  | <b>Fall</b>          |
| <b>BME 4310</b>                           | <b>Computational Biochemistry</b>                          | <b>3</b>  | <b>Fall</b>     | <b>HHP 3115</b>                    | <b>Anatomy for Human Physiology with Lab</b> | <b>5</b>  | <b>Fall, Spr</b>     |
| <b>Biostatistics</b>                      |                                                            |           |                 | HHP 3450                           | Immunology in Health & Disease               | 3         | Fall                 |
| BIOS 4120                                 | Introduction to Biostatistics                              | 3         | Fall, Spr, Su   | <b>HHP 3550</b>                    | <b>Human Physiology with Lab</b>             | <b>5</b>  | <b>Fall, Spr</b>     |

|                                                     |                                          | #<br>S.H. | When<br>Offered  |                                         |                                            | #<br>S.H. | When<br>Offered |
|-----------------------------------------------------|------------------------------------------|-----------|------------------|-----------------------------------------|--------------------------------------------|-----------|-----------------|
| <b>Mathematics, Statistics and Computer Science</b> |                                          |           |                  | MICR 3170                               | Microbial Genetics                         | 2         | Fall            |
| MATH 2700                                           | Introduction to Linear Algebra           | 4         | Fall, Spr        | <b>Neuroscience and Pharmacology</b>    |                                            |           |                 |
| MATH 2850                                           | Calculus III                             | 4         | Fall, Spr        | PCOL 3101                               | Pharmacology I: A Drug's Fantastic Journey | 3         | Fall            |
| MATH 3600                                           | Intro to Ordinary Differential Equations | 2-3       | Fall, Spr        | PCOL 3102                               | Pharmacology II: Mechanisms of Drug Action | 3         | Spr             |
| MATH 4060                                           | Discrete Mathematical Models             | 3         | Spr              | PCOL 4130                               | Drug Mechanisms and Actions                | 3         | Spr             |
| STAT 3120                                           | Probability and Statistics               | 4         | Fall             | <b>Physics and Astronomy</b>            |                                            |           |                 |
| STAT 3510                                           | Biostatistics                            | 3         | Fall, Spr        | PHYS 3850                               | Electronics                                | 4         | Spr             |
| STAT 4143                                           | Introduction to Statistical Methods      | 3         | Fall, Spr        | <b>Psychological and Brain Sciences</b> |                                            |           |                 |
| <b>Microbiology and Immunology</b>                  |                                          |           |                  | PSY 2130                                | Advanced Psychology for Pre-Med Track      | 3         | Spr             |
| MICR 2157                                           | General Microbiology                     | 3         | Fall, Spr        | PSY 2301                                | Introduction to Clinical Psychology        | 3         | Fall, Spr, Su   |
| <b>MICR 2158</b>                                    | <b>General Microbiology Lab</b>          | <b>2</b>  | <b>Fall, Spr</b> | PSY 2401                                | Introduction to Developmental Science      | 3         | Fall, Spr, Su   |
| MICR 3147                                           | Immunology and Human Disease             | 3         | Fall             | PSY 2501                                | Introduction to Social Psychology          | 3         | Fall, Spring    |
| MICR 3159                                           | Bacteria and Human Disease               | 3         | Spr              | PSY 2601                                | Introduction to Cognitive Psychology       | 3         | Fall, Spr, Su   |
| MICR 3164                                           | Microbiology & Human Health              | 4         | Spr              | PSY 2701                                | Introduction to Behavioral Neuroscience    | 4         | Fall, Spr       |
| MICR 3168                                           | Viruses and Human Disease                | 3         | Fall             |                                         |                                            |           |                 |

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 4/2025. Please consult MyUI and the UI general catalog for course availability, delivery method, and when offered when selecting electives.**