MOLECULAR AND CELL BIOLOGY, B.A.

Requirements

University General Education Requirements

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements section of the Guide.

General Education

- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

College of Letters & Science Degree Requirements: Bachelor of Arts (B.A.)

Students pursuing a bachelor of arts degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either a bachelor of arts or a bachelor of science curriculum.

Bachelor of Arts Degree Requirements

Mathematics

Complete the University General Education Requirements for Quantitative Reasoning A (QR-A) and Quantitative Reasoning B (QR-B) coursework.

Foreign Language

- Complete the fourth unit of a foreign language; OR
- Complete the third unit of a foreign language and the second unit of an additional foreign language.

L&S Breadth

- 12 credits of Humanities, which must include 6 credits of literature; and
- 12 credits of Social Science; and
- 12 credits of Natural Science, which must include one 3+ credit Biological Science course and one 3+ credit Physical Science course.

Liberal Arts and Science Coursework

Complete at least 108 credits.

Depth of Intermediate/Advanced work

Complete at least 60 credits at the intermediate or advanced level.

Major

Declare and complete at least one major.

Total Credits

Complete at least 120 credits.

UW-Madison Experience

- 30 credits in residence, overall; and
- 30 credits in residence after the 86th credit.

Quality of Work

- 2.000 in all coursework at UW–Madison
- 2.000 in Intermediate/Advanced level coursework at UW–Madison

Non–L&S Students Pursuing an L&S Major

Non–L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

Requirements for the Major

Mathematics, Chemistry & Physics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mathematics and Statistics</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>Complete one of the following:</td>
<td></td>
</tr>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td>5</td>
</tr>
<tr>
<td>MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Complete one of the following:</td>
<td></td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td>4</td>
</tr>
<tr>
<td>MATH 213</td>
<td>Calculus and Introduction to Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 234</td>
<td>Calculus–Functions of Several Variables</td>
<td>4</td>
</tr>
<tr>
<td>MATH 276</td>
<td>Topics in Calculus II</td>
<td>5</td>
</tr>
<tr>
<td>STAT 301</td>
<td>Introduction to Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>STAT 371</td>
<td>Introductory Applied Statistics for the Life Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

General Chemistry—complete one option:

- 5-10
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103</td>
<td>General Chemistry I and General Chemistry II</td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
</tr>
<tr>
<td>CHEM 115</td>
<td>Chemical Principles I and Chemical Principles II (by consent of instructor only)</td>
</tr>
</tbody>
</table>

Organic Chemistry -complete the sequence 8
### INTRODUCTORY BIOLOGY

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete one option:</td>
<td></td>
<td>10-13</td>
</tr>
<tr>
<td><strong>Option A:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/BIOLOGY/</td>
<td>Introductory Biology</td>
<td>5</td>
</tr>
<tr>
<td>BOTANY 151</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/BIOLOGY/</td>
<td>Introductory Biology</td>
<td>5</td>
</tr>
<tr>
<td>BOTANY 152</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Option B:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCORE 381</td>
<td>Evolution, Ecology, and Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOCORE 382</td>
<td>Evolution, Ecology, and Genetics Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>BIOCORE 383</td>
<td>Cellular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOCORE 384</td>
<td>Cellular Biology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>BIOCORE 485</td>
<td>Principles of Physiology</td>
<td>3</td>
</tr>
<tr>
<td><strong>Option C:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/ BIOLOGY</td>
<td>Animal Biology</td>
<td>3</td>
</tr>
<tr>
<td>101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/ BIOLOGY</td>
<td>Animal Biology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOTANY/ BIOLOGY</td>
<td>General Botany</td>
<td>5</td>
</tr>
<tr>
<td>130</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BREADTH COURSEWORK

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biochemistry</strong> - complete one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 501</td>
<td>Introduction to Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM 507 &amp; BIOCHEM 508</td>
<td>General Biochemistry I and General Biochemistry II</td>
<td>6</td>
</tr>
<tr>
<td><strong>Cell Biology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 570</td>
<td>Cell Biology</td>
<td>3</td>
</tr>
<tr>
<td><strong>Molecular Biology and Genetics</strong> - complete one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCORE 381 &amp; BIOCORE 383 &amp; BIOCORE 587</td>
<td>Evolution, Ecology, and Genetics and Biological Interactions</td>
<td>9</td>
</tr>
<tr>
<td>GENETICS 466</td>
<td>Principles of Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 467 &amp; GENETICS 468</td>
<td>General Genetics 1 and General Genetics 2</td>
<td>6</td>
</tr>
<tr>
<td><strong>Microbiology and Genetics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MICROBIO 470</td>
<td>Microbial Genetics &amp; Molecular Machines</td>
<td>3</td>
</tr>
</tbody>
</table>

### Total Credits

9-18

### DEPTH COURSEWORK

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biochemistry and Biophysics (no minimum)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 550</td>
<td>Principles of Human Disease and Biotechnology</td>
<td>2</td>
</tr>
<tr>
<td>BIOCHEM 601</td>
<td>Protein and Enzyme Structure and Function</td>
<td>2</td>
</tr>
<tr>
<td>BIOCHEM/ GENETICS/ MICROBIO 612</td>
<td>Prokaryotic Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM/ GENETICS/ MD GENET 620</td>
<td>Eukaryotic Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM/ BOTANY 621</td>
<td>Plant Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM 625</td>
<td>Mechanisms of Action of Vitamins and Minerals</td>
<td>2</td>
</tr>
<tr>
<td><strong>Cellular Systems (no minimum)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 470</td>
<td>Introduction to Animal Development</td>
<td>3</td>
</tr>
<tr>
<td>ZOOLOGY/ PSYCH 523</td>
<td>Neurobiology</td>
<td>3</td>
</tr>
<tr>
<td>ZOOLOGY 603</td>
<td>Endocrinology</td>
<td>3-4</td>
</tr>
<tr>
<td>ZOOLOGY/ BIOCHEM/PHMCOL-M 630</td>
<td>Cellular Signal Transduction and Mechanisms</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 627</td>
<td>Animal Developmental Genetics</td>
<td>3</td>
</tr>
<tr>
<td>ONCOLOGY 401</td>
<td>Introduction to Experimental Oncology</td>
<td>2</td>
</tr>
<tr>
<td>PATH-BIO/ M M &amp; I 528</td>
<td>Immunology</td>
<td>3</td>
</tr>
<tr>
<td>BIOCORE 587</td>
<td>Biological Interactions</td>
<td>3</td>
</tr>
<tr>
<td>NTP/ NEURODPT 610</td>
<td>Cellular and Molecular Neuroscience</td>
<td>4</td>
</tr>
<tr>
<td><strong>Genetics (no minimum)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AN SCI/DY SCI 361</td>
<td>Introduction to Animal and Veterinary Genetics</td>
<td>2</td>
</tr>
<tr>
<td>AGRONOMY/ HORT 338</td>
<td>Plant Breeding and Biotechnology</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 520</td>
<td>Neurogenetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/ HORT 550</td>
<td>Molecular Approaches for Potential Crop Improvement</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/ MD GENET 565</td>
<td>Human Genetics</td>
<td>3</td>
</tr>
<tr>
<td>HORT/AGRONOMY/ BOTANY 340</td>
<td>Plant Cell Culture and Genetic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 607</td>
<td>Advanced Microbial Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/ BIOCHEM/ MICROBIO 612</td>
<td>Prokaryotic Molecular Biology</td>
<td>3</td>
</tr>
</tbody>
</table>
Molecular and Cell Biology, B.A.

CODE
Title
Credits

GENETICS/BIOCHEM/MD GENET 620
Eukaryotic Molecular Biology
3

GENETICS 627
Animal Developmental Genetics
3

GENETICS/BIOCHEM 631
Plant Genetics and Development
2

GENETICS/MD GENET 662
Cancer Genetics
3

Microbiology and Virology (no minimum)

MICROBIO 303
Biology of Microorganisms
3

MICROBIO/AN SCI/BOTANY 335
The Microbiome of Plants, Animals, and Humans
3

MICROBIO/SOIL SCI 425
Environmental Microbiology
3

MICROBIO/SOIL SCI 523
Soil Microbiology and Biochemistry
3

MICROBIO 526
Physiology of Microorganisms
3

PL PATH 622
Plant-Bacterial Interactions
2-3

BOTANY/ENTOM/PL PATH 505
Plant-Microbe Interactions: Molecular and Ecological Aspects
3

BIOCHEM/M M & I 575
Biology of Viruses
2

ONCOLOGY/PL PATH 640
General Virology-Multiplication of Viruses
3

Quantitative Biology (no minimum)

MATH/COMP SCI 240
Introduction to Discrete Mathematics
3

MATH 340
Elementary Matrix and Linear Algebra
3

STAT 303
R for Statistics I
1

STAT 304
R for Statistics II
1

STAT 305
R for Statistics III
1

STAT 327
Learning a Statistical Language
1

STAT 333
Applied Regression Analysis
3

STAT 421
Applied Categorical Data Analysis
3

B M E 556
Systems Biology: Mammalian Signaling Networks
3

COMP SCI 300
Programming II
3

COMP SCI 368
Learning a Programming Language
1

COMP SCI 540
Introduction to Artificial Intelligence
3

COMP SCI/B M I 567
Medical Image Analysis
3

COMP SCI/B M I 576
Introduction to Bioinformatics
3

MICROBIO 657
Bioinformatics for Microbiologists
3

MATH 608
Mathematical Methods for Physical Modeling in Biology
3

LABORATORY COURSE

Complete 2 credits minimum:

Code
Title
Credits

CHEM 327
Fundamentals of Analytical Science
4

CHEM 329
Fundamentals of Analytical Science
4

GENETICS 545
Genetics Laboratory
2

MICROBIO 304
Biology of Microorganisms
2

HORT/AGRONOMY/BOTANY 339
Plant Biotechnology. Principles and Techniques I
4

ZOOLOGY 555
Laboratory in Developmental Biology
3

DIRECTED/INDEPENDENT STUDY

Complete two credits minimum:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOL BIOL 699</td>
<td>Directed Studies in Molecular Biology</td>
<td>1-4</td>
</tr>
</tbody>
</table>

Senior Thesis

MOL BIOL 681
Senior Honors Thesis
3

MOL BIOL 682
Senior Honors Thesis
3

MOL BIOL 691
Senior Thesis
3

MOL BIOL 692
Senior Thesis
3

RESIDENCE AND QUALITY OF WORK

• 2.000 GPA in all MOL BIOL and major courses
• 2.000 GPA on at least 15 credits of upper-level in the major, taken in residence
• 15 credits in MOL BIOL, taken on the UW–Madison campus

HONORS IN THE MAJOR

Students may declare Honors in the Molecular Biology and Cell Biology major in consultation with the Molecular and Cell Biology undergraduate advisor.

HONORS IN THE MOLECULAR AND CELL BIOLOGY MAJOR REQUIREMENTS

To earn Honors in the Major in Molecular and Cell Biology, students must satisfy both the requirements for the major (above) and the following additional requirements:

• Earn a 3.300 overall university GPA
• Earn a 3.300 GPA for all courses accepted in the major
• Complete at least 15 credits of honors courses in the major while in residence at UW-Madison. This requirement can be broken down as indicated below:
  • At least 9 credits from the Breadth and Depth course options in the Molecular and Cell Biology major
  • Complete two semester Senior Honors Thesis, a piece of original research composition.

Complete one semester of the Molecular Biology senior honors seminar course.

Complete one semester of the Molecular Biology senior honors seminar course.

Code
Title
Credits

MOL BIOL 686
Senior Honors Seminar in Molecular Biology
1
FOOTNOTES

1. BIOCORE is a competitive honors program and certificate.

2. Students are encouraged to see their advisor for assistance in choosing depth coursework.

3. Courses accepted in the major that are Intermediate or Advanced are considered upper-level in this major.

UNIVERSITY DEGREE REQUIREMENTS

<table>
<thead>
<tr>
<th>Total Degree</th>
<th>To receive a bachelor’s degree from UW-Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residency</td>
<td>Degree candidates are required to earn a minimum of 30 credits in residence at UW-Madison. &quot;In residence&quot; means on the UW-Madison campus with an undergraduate degree classification. &quot;In residence&quot; credit also includes UW-Madison courses offered in distance or online formats and credits earned in UW-Madison Study Abroad/Study Away programs.</td>
</tr>
<tr>
<td>Quality of Work</td>
<td>Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.</td>
</tr>
</tbody>
</table>