**Biology, B.A. (L&S)**

**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 (http://guide.wisc.edu/undergraduate/#requirementsforundergraduestudytext) 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.

**Core Requirements**

**Mathematics and Statistics**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td>5-10</td>
</tr>
<tr>
<td>MATH 171 &amp; MATH 217</td>
<td>Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td></td>
</tr>
<tr>
<td>STAT 301</td>
<td>Introduction to Statistical Methods</td>
<td></td>
</tr>
<tr>
<td>STAT 371</td>
<td>Introductory Applied Statistics for the Life Sciences</td>
<td></td>
</tr>
</tbody>
</table>

**Total Credits**

8-14

**Chemistry**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103 &amp; CHEM 104</td>
<td>General Chemistry I and General Chemistry II</td>
<td>5-10</td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
</tbody>
</table>
### Organic Chemistry

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 115</td>
<td>Chemical Principles I</td>
<td></td>
</tr>
<tr>
<td>CHEM 116</td>
<td>and Chemical Principles II</td>
<td></td>
</tr>
</tbody>
</table>

**CHEM 343** Introductory Organic Chemistry 3

**CHEM 344** Introductory Organic Chemistry Laboratory 2

**CHEM 345** Intermediate Organic Chemistry 3

**Total Credits** 13-18

### Physics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 103</td>
<td>General Physics</td>
<td>4-5</td>
</tr>
<tr>
<td>PHYSICS 201</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 207</td>
<td>General Physics</td>
<td></td>
</tr>
</tbody>
</table>

**First Semester Physics (complete one of the following):** 4-5

**Second Semester Physics (complete one of the following):** 4-5

**Total Credits** 8-10

### Introductory Biology

For AP Biology policy, as it applies to introductory biology in the biology major, see this link (http://biologymajor.wisc.edu/advising/advisor-resources/ap-ib-biology-policy/).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOLOGY/</td>
<td>Introductory Biology</td>
<td>10-13</td>
</tr>
<tr>
<td>BOTANY/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 151</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOLOGY/</td>
<td>Introductory Biology</td>
<td></td>
</tr>
<tr>
<td>BOTANY/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 152</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Option A:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOCORE 381</td>
<td>Evolution, Ecology, and Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 382</td>
<td>Evolution, Ecology, and Genetics Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 383</td>
<td>Cellular Biology</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 384</td>
<td>Cellular Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 485</td>
<td>Principles of Physiology</td>
<td></td>
</tr>
</tbody>
</table>

**Option B:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOLOGY/</td>
<td>Animal Biology</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY 101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOLOGY/</td>
<td>Animal Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY 102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOTANY/</td>
<td>General Botany</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY 130</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Credits** 10-13

### Foundation Course (complete one of the following):

Students may use BIOCORE 381 and BIOCORE 383 toward both Introductory Biology and Foundation.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRONOMY/</td>
<td>Plant Breeding and Biotechnology</td>
<td>3</td>
</tr>
<tr>
<td>HORT 338</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGRONOMY/</td>
<td>Plant Biotechnology: Principles and Techniques I</td>
<td>4</td>
</tr>
<tr>
<td>HORT/HORT 339</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGRONOMY/</td>
<td>Plant Cell Culture and Genetic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY/HORT 340</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AN SCI/DY SCI 362</td>
<td>Veterinary Genetics</td>
<td>2</td>
</tr>
<tr>
<td>BIOCHEM 501</td>
<td>Introduction to Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM 507</td>
<td>General Biochemistry I</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM 508</td>
<td>General Biochemistry II</td>
<td>3-4</td>
</tr>
<tr>
<td>BIOCHEM/</td>
<td>Nutritional Biochemistry and Metabolism</td>
<td>3</td>
</tr>
<tr>
<td>NUTR SCI 510</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 551</td>
<td>Biochemical Methods</td>
<td>4</td>
</tr>
<tr>
<td>BIOCHEM 570</td>
<td>Computational Modeling of Biological Systems</td>
<td>3</td>
</tr>
<tr>
<td>BIOCHEM/</td>
<td>Biology of Viruses</td>
<td>2</td>
</tr>
<tr>
<td>M M &amp; I 575</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 601</td>
<td>Protein and Enzyme Structure and Function</td>
<td>2</td>
</tr>
<tr>
<td>BIOCHEM/</td>
<td>Prokaryotic Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MICROBIO 612</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCHEM/</td>
<td>Eukaryotic Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/MD GENET 620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCHEM/</td>
<td>Plant Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY 621</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 625</td>
<td>Mechanisms of Action of Vitamins and Minerals</td>
<td>2</td>
</tr>
<tr>
<td>BIOCHEM/PHMCOL-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M/ZOOLOGY 630</td>
<td>Cellular Signal Transduction</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 670</td>
<td>Microbial Genetics &amp; Molecular Machines</td>
<td>3</td>
</tr>
</tbody>
</table>

### INTERMEDIATE/ADVANCED COURSES

Minimum of 13 credits required and must include one approved lab course. Approved lab courses are indicated by footnote. A course taken to meet the Foundation requirement may not also count as an Intermediate/Advanced course.

- Complete at least two credits from either category A or B.
- Complete at least two credits from either category C or D.
- Complete at least two credits from an unused category (A, B, C, D or E).
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMOLCHEM 314</td>
<td>Introduction to Human Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BMOLCHEM 504</td>
<td>Human Biochemistry Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>BMOLCHEM/MICROBIO 668</td>
<td>Microbiology at Atomic Resolution</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY/ENTOM/PL PATH 505</td>
<td>Plant-Microbe Interactions: Molecular and Ecological Aspects</td>
<td>3</td>
</tr>
<tr>
<td>CRB/B ME 670</td>
<td>Principles of Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 466</td>
<td>General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 520</td>
<td>Neurogenetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 527</td>
<td>Developmental Genetics for Conservation and Regeneration</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/MICROBIO 551</td>
<td>Human Cyto;ogenetics</td>
<td>2</td>
</tr>
<tr>
<td>MICRIBIO 607</td>
<td>Advanced Microbial Genetics</td>
<td>3</td>
</tr>
<tr>
<td>MICRIBIO 470</td>
<td>Microbial Genetics &amp; Molecular Machines</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO/ SOIL SCI 523</td>
<td>Soil Microbiology and Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 551</td>
<td>Capstone Research Project in Microbiology</td>
<td>2</td>
</tr>
<tr>
<td>M M &amp; I 341</td>
<td>Immunology</td>
<td>3</td>
</tr>
<tr>
<td>M M &amp; I/PATH-BIO 528</td>
<td>Immunology</td>
<td>3</td>
</tr>
<tr>
<td>NEURODPT/ NTP 610</td>
<td>Neuroscience</td>
<td>4</td>
</tr>
<tr>
<td>NEURODPT/NTP/ZOOLOGY 616</td>
<td>Lab Course in Neurobiology and Behavior 1</td>
<td>4</td>
</tr>
<tr>
<td>NEURODPT/ NTP 629</td>
<td>Molecular and Cellular Mechanisms of Memory</td>
<td>3</td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Stem Cell in Neurobiology)</td>
<td>1-3</td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Reproductive Neuroendocrinology)</td>
<td>1-3</td>
</tr>
<tr>
<td>NTP 675</td>
<td>Special Topics (Molecular Mechanisms of Brain Damage)</td>
<td>1-3</td>
</tr>
<tr>
<td>ONCOLOGY/PL PATH 640</td>
<td>General Virology-Multiplication of Viruses</td>
<td>3</td>
</tr>
<tr>
<td>PHM SCI 558</td>
<td>Laboratory Techniques in Pharmacology and Toxicology 1</td>
<td>2</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 555</td>
<td>Laboratory in Developmental Biology 1</td>
<td>3</td>
</tr>
<tr>
<td>ZOOLOGY 570</td>
<td>Cell Biology</td>
<td>3</td>
</tr>
<tr>
<td>ZOOLOGY 604</td>
<td>Computer-based Gene and Disease/Disorder Research Lab 1</td>
<td>2</td>
</tr>
<tr>
<td>ZOOLOGY 625</td>
<td>Development of the Nervous System</td>
<td>2</td>
</tr>
<tr>
<td>ZOOLOGY 655</td>
<td>Modeling Neurodevelopmental Disease</td>
<td>3</td>
</tr>
</tbody>
</table>

### B. Organismal Biology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN SCI/DY SCI 373</td>
<td>Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>AN SCI/DY SCI 434</td>
<td>Reproductive Physiology 1</td>
<td>3</td>
</tr>
<tr>
<td>AN SCI/PL PATH-ZOOLOGY 520</td>
<td>Ornithology</td>
<td>3</td>
</tr>
<tr>
<td>AN SCI/PL PATH-ZOOLOGY 521</td>
<td>Birds of Southern Wisconsin 1</td>
<td>3</td>
</tr>
<tr>
<td>ANATPHY 335</td>
<td>Physiology 1</td>
<td>5</td>
</tr>
<tr>
<td>ANATPHY 337</td>
<td>Human Anatomy</td>
<td>3</td>
</tr>
<tr>
<td>ANATPHY 338</td>
<td>Human Anatomy Laboratory 1</td>
<td>2</td>
</tr>
<tr>
<td>ANATPHY 435</td>
<td>Fundamentals of Human Physiology</td>
<td>5</td>
</tr>
<tr>
<td>ANTHRO/ NTP/PSYCH/ZOOLOGY 619</td>
<td>Biology of Mind</td>
<td>3</td>
</tr>
<tr>
<td>BIOCORE 486</td>
<td>Principles of Physiology Laboratory 1</td>
<td>2</td>
</tr>
<tr>
<td>BOTANY 300</td>
<td>Plant Anatomy</td>
<td>4</td>
</tr>
<tr>
<td>BOTANY 330</td>
<td>Algae 1</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY/PL PATH 332</td>
<td>Fungi 1</td>
<td>4</td>
</tr>
<tr>
<td>BOTANY/PL PATH 333</td>
<td>Biology of the Fungi</td>
<td>2</td>
</tr>
<tr>
<td>BOTANY/F&amp;W ECOL 402</td>
<td>Dendrology 1</td>
<td>2</td>
</tr>
<tr>
<td>BOTANY 500</td>
<td>Plant Physiology 1</td>
<td>3-4</td>
</tr>
<tr>
<td>CS&amp;D 503</td>
<td>Neural Mechanisms of Speech, Hearing and Language</td>
<td>3</td>
</tr>
<tr>
<td>DY SCI 378</td>
<td>Lactation Physiology 1</td>
<td>3</td>
</tr>
<tr>
<td>ENTOM/ZOOLOGY 302</td>
<td>Introduction to Entomology 1</td>
<td>4</td>
</tr>
<tr>
<td>ENTOM 321</td>
<td>Physiology of Insects</td>
<td>3</td>
</tr>
<tr>
<td>ENTOM 331</td>
<td>Taxonomy of Mature Insects 1</td>
<td>4</td>
</tr>
<tr>
<td>F&amp;W ECOL 401</td>
<td>Physiological Animal Ecology</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 545</td>
<td>Genetics Laboratory 1</td>
<td>2</td>
</tr>
<tr>
<td>GENETICS/M MD GENET 565</td>
<td>Human Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GEOSCI/ZOOLOGY 542</td>
<td>Invertebrate Paleontology</td>
<td>3</td>
</tr>
<tr>
<td>KINES 314</td>
<td>Physiology of Exercise 1</td>
<td>4</td>
</tr>
<tr>
<td>MICROBIO 303</td>
<td>Biology of Microorganisms</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 304</td>
<td>Biology of Microorganisms Laboratory 1</td>
<td>2</td>
</tr>
<tr>
<td>MICROBIO 330</td>
<td>Host-Parasite Interactions</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO 526</td>
<td>Physiology of Microorganisms</td>
<td>3</td>
</tr>
<tr>
<td>M M &amp; I 301</td>
<td>Pathogenic Bacteriology</td>
<td>2</td>
</tr>
<tr>
<td>M M &amp; I/PATH-BIO/ZOOLOGY 350</td>
<td>Parasitology</td>
<td>3</td>
</tr>
<tr>
<td>M M &amp; I 410</td>
<td>Medical Mycology</td>
<td>2</td>
</tr>
<tr>
<td>NTP/PSYCH/ZOOLOGY 611</td>
<td>Systems Neuroscience</td>
<td>4</td>
</tr>
<tr>
<td>NTP/ZOOLOGY 620</td>
<td>Neuroethology Seminar</td>
<td>2</td>
</tr>
</tbody>
</table>
### NTP/NEURODPT 630
Neuronal Mechanisms for Sensation and Memory in Cerebral Cortex 3

### NTP 675
Special Topics (Functional Brain Imaging of Cognitive Disorders) 1-3

### NUTR SCI 431
Nutrition in the Life Span 3

### NUTR SCI 631
Clinical Nutrition I 3

### NUTR SCI/PHM PRAC 672
Herbals, Homeopathy, and Dietary Supplements 2-3

### ONCOLOGY 401
Introduction to Experimental Oncology 2

### PATH 404
Pathophysiologic Principles of Human Diseases 3

### PL PATH 558
Grassland Ecology 3

### PSYCH 406
Psychology of Perception 3-4

### PSYCH 414
Cognitive Psychology 3

### PSYCH 454
Behavioral Neuroscience 3

### PSYCH 513
Hormones, Brain, and Behavior 4

### PSYCH 606
Hormones and Behavior 3

### ZOOLOGY 303
Aquatic Invertebrate Biology 3

### ZOOLOGY 430
Comparative Anatomy of Vertebrates 5

### ZOOLOGY 603
Endocrinology 3-4

### ZOOLOGY 611
Comparative and Evolutionary Physiology 3

### ZOOLOGY 612
Comparative Physiology Laboratory 1 2

#### C. Ecology

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRONOMY/BOTANY/SOIL SCI 370</td>
<td>Grassland Ecology</td>
<td>3</td>
</tr>
<tr>
<td>AGRONOMY/ENTOM/F&amp;W ECOL/ M&amp;ENVTOX 632</td>
<td>Ecotoxicology: The Chemical Players</td>
<td>1</td>
</tr>
<tr>
<td>AGRONOMY/ENTOM/F&amp;W ECOL/ M&amp;ENVTOX 633</td>
<td>Ecotoxicology: Impacts on Individuals</td>
<td>1</td>
</tr>
<tr>
<td>AGRONOMY/ENTOM/F&amp;W ECOL/ M&amp;ENVTOX 634</td>
<td>Ecotoxicology: Impacts on Populations, Communities and Ecosystems</td>
<td>1</td>
</tr>
<tr>
<td>BOTANY/ZOOLOGY 450</td>
<td>Midwestern Ecological Issues: A Case Study Approach</td>
<td>2</td>
</tr>
<tr>
<td>BOTANY/ZOOLOGY 450</td>
<td>The Vegetation of Wisconsin</td>
<td>4</td>
</tr>
<tr>
<td>BOTANY/F&amp;W ECOL 455</td>
<td>General Ecology</td>
<td>4</td>
</tr>
<tr>
<td>BOTANY/ENTOM/ZOOLOGY 473</td>
<td>Plant-Insect Interactions</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY/ENVIR ST/F&amp;W ECOL/ ZOOLOGY 651</td>
<td>Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>ENTOM 450</td>
<td>Basic and Applied Insect Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENTOM 451</td>
<td>Basic and Applied Insect Ecology Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

#### D. Evolution and Systematics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTHRO 302</td>
<td>Hominoid Evolution</td>
<td>3</td>
</tr>
<tr>
<td>ANTHRO 304</td>
<td>Heredity, Environment and Human Populations</td>
<td>3</td>
</tr>
<tr>
<td>ANTHRO/BOTANY/ZOOLOGY 410</td>
<td>Evolutionary Biology</td>
<td>3</td>
</tr>
<tr>
<td>ANTHRO 411</td>
<td>The Evolution of the Genus, Homo</td>
<td>3</td>
</tr>
<tr>
<td>ANTHRO 458</td>
<td>Primate Behavioral Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ANTHRO 603</td>
<td>Seminar in Evolutionary Theory</td>
<td>3</td>
</tr>
<tr>
<td>BIOLOGY/GENETICS 522</td>
<td>Communicating Evolutionary Biology</td>
<td>2-3</td>
</tr>
<tr>
<td>BOTANY 305</td>
<td>Plant Morphology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>BOTANY 400</td>
<td>Plant Systematics</td>
<td>4</td>
</tr>
<tr>
<td>BOTANY 401</td>
<td>Vascular Flora of Wisconsin</td>
<td>4</td>
</tr>
<tr>
<td>BOTANY 422</td>
<td>Plant Geography</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY 563</td>
<td>Phylogenetic Analysis of Molecular Data</td>
<td>3</td>
</tr>
<tr>
<td>ENTOM 432</td>
<td>Taxonomy and Bionomics of Immature Insects</td>
<td>4</td>
</tr>
<tr>
<td>ENTOM/GENETICS/ZOOLOGY 624</td>
<td>Molecular Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENVIR ST/F&amp;W ECOL/ZOOLOGY 360</td>
<td>Extinction of Species</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 468</td>
<td>General Genetics 2</td>
<td>3</td>
</tr>
<tr>
<td>GEOSCI/ZOOLOGY 541</td>
<td>Paleobiology</td>
<td>3</td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
<td>Credits</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>MICROBIO 450</td>
<td>Diversity, Ecology and Evolution of Microorganisms</td>
<td>3</td>
</tr>
<tr>
<td>PSYCH 449</td>
<td>Animal Behavior</td>
<td>3</td>
</tr>
<tr>
<td>PSYCH 450</td>
<td>Primates and Us: Insights into Human Biology and Behavior</td>
<td>3</td>
</tr>
<tr>
<td>ZOOLOGY 300</td>
<td>Invertebrate Biology and Evolution</td>
<td>3</td>
</tr>
<tr>
<td>ZOOLOGY 301</td>
<td>Invertebrate Biology and Evolution Lab</td>
<td>2</td>
</tr>
<tr>
<td>ZOOLOGY 425</td>
<td>Behavioral Ecology</td>
<td>3</td>
</tr>
</tbody>
</table>

### E. Applied Biology, Agriculture and Natural Resources

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A A E/AGRONOMY/</td>
<td>World Hunger and Malnutrition</td>
<td>3</td>
</tr>
<tr>
<td>INTER-AG/ NUTR SCI 350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGRONOMY 300</td>
<td>Cropping Systems</td>
<td>3</td>
</tr>
<tr>
<td>AGRONOMY 302</td>
<td>Forage Management and Utilization</td>
<td>3</td>
</tr>
<tr>
<td>AGRONOMY/ HORT 360</td>
<td>Genetically Modified Crops: Science, Regulation &amp; Controversy</td>
<td>2</td>
</tr>
<tr>
<td>AGRONOMY 377</td>
<td>Global Food Production and Health</td>
<td>3</td>
</tr>
<tr>
<td>AGRONOMY/DY SCI INTER-AG 471</td>
<td>Food Production Systems and Sustainability</td>
<td></td>
</tr>
<tr>
<td>AGRONOMY/ HORT 501</td>
<td>Principles of Plant Breeding</td>
<td>3</td>
</tr>
<tr>
<td>AGRONOMY/ ATM OCN/ SOIL SCI 532</td>
<td>Environmental Biophysics</td>
<td>3</td>
</tr>
<tr>
<td>AMER IND/ANTHRO/ BOTANY 474</td>
<td>Ethnobotany</td>
<td>3-4</td>
</tr>
<tr>
<td>AN SCI/DY SCI/ NUTR SCI 311</td>
<td>Comparative Animal Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>AN SCI/DY SCI 320</td>
<td>Animal Health and Disease</td>
<td>3</td>
</tr>
<tr>
<td>AN SCI/DY SCI 361</td>
<td>Introduction to Animal and Veterinary Genetics</td>
<td>2</td>
</tr>
<tr>
<td>AN SCI/DY SCI 363</td>
<td>Principles of Animal Breeding</td>
<td>2</td>
</tr>
<tr>
<td>AN SCI 503</td>
<td>Avian Physiology</td>
<td>3</td>
</tr>
<tr>
<td>AN SCI 512</td>
<td>Management for Avian Health</td>
<td>1</td>
</tr>
<tr>
<td>BIOCORE 587</td>
<td>Biological Interactions</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY 403</td>
<td>Field Collections and Identification</td>
<td>1-4</td>
</tr>
<tr>
<td>ENTOM 351</td>
<td>Principles of Economic Entomology</td>
<td>3</td>
</tr>
<tr>
<td>ENTOM/ ZOOLOGY 371</td>
<td>Medical Entomology</td>
<td>1</td>
</tr>
<tr>
<td>ENTOM/ F&amp;W ECOL 500</td>
<td>Insects in Forest Ecosystem</td>
<td>2</td>
</tr>
<tr>
<td>ENVIR ST/ POP HLTH 471</td>
<td>Introduction to Environmental Health</td>
<td>3</td>
</tr>
<tr>
<td>ENVIR ST/ POP HLTH 502</td>
<td>Air Pollution and Human Health</td>
<td>3</td>
</tr>
<tr>
<td>F&amp;W ECOL 306</td>
<td>Terrestrial Vertebrates: Life History and Ecology</td>
<td>4</td>
</tr>
<tr>
<td>F&amp;W ECOL/ HORT/LAND ARC/ PL PATH 309</td>
<td>Diseases of Trees and Shrubs</td>
<td>3</td>
</tr>
<tr>
<td>F&amp;W ECOL 318</td>
<td>Principles of Wildlife Ecology</td>
<td>3</td>
</tr>
<tr>
<td>F&amp;W ECOL/ ZOOLOGY 335</td>
<td>Human/Animal Relationships: Biological and Philosophical Issues</td>
<td>3</td>
</tr>
<tr>
<td>F&amp;W ECOL 410</td>
<td>Principles of Silviculture</td>
<td>3</td>
</tr>
<tr>
<td>F&amp;W ECOL 415</td>
<td>Tree Physiology</td>
<td>3</td>
</tr>
<tr>
<td>F&amp;W ECOL/ SURG SCI 548</td>
<td>Diseases of Wildlife</td>
<td>3</td>
</tr>
<tr>
<td>F&amp;W ECOL 561</td>
<td>Wildlife Management Techniques</td>
<td>1</td>
</tr>
<tr>
<td>FOOD SCI/ MICROBIO 324</td>
<td>Food Microbiology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>FOOD SCI/ MICROBIO 325</td>
<td>Food Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>FOOD SCI 532</td>
<td>Integrated Food Manufacturing</td>
<td>4</td>
</tr>
<tr>
<td>GENETICS 548</td>
<td>The Genomic Revolution</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>HORT/ LAND ARC 263</td>
<td>Landscape Plants</td>
<td>1</td>
</tr>
<tr>
<td>HORT 370</td>
<td>World Vegetable Crops</td>
<td>3</td>
</tr>
<tr>
<td>HORT 372</td>
<td>Colloquium in Organic Agriculture</td>
<td>1</td>
</tr>
<tr>
<td>HORT/ AGRONOMY 376</td>
<td>Tropical Horticultural Systems</td>
<td>1</td>
</tr>
<tr>
<td>HORT 378</td>
<td>Tropical Horticultural Systems International Field Study</td>
<td>2</td>
</tr>
<tr>
<td>HORT/PATH-BIO 500</td>
<td>Molecular Biology Techniques</td>
<td>3</td>
</tr>
<tr>
<td>M&amp;ENVTOX/ ONCOLOGY/ PHM SCI/PHMCOL-M/POP HLTH 625</td>
<td>Toxicology I</td>
<td>3</td>
</tr>
<tr>
<td>MED PHYS/NTP 651</td>
<td>Methods for Neuroimaging</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIO/ SOIL SCI 425</td>
<td>Environmental Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>M M &amp; I 554</td>
<td>Emerging Infectious Diseases and Bioterrorism</td>
<td>2</td>
</tr>
<tr>
<td>NUTR SCI 332</td>
<td>Human Nutritional Needs</td>
<td>3</td>
</tr>
<tr>
<td>PL PATH/ SOIL SCI 323</td>
<td>Soil Biology</td>
<td>3</td>
</tr>
<tr>
<td>PL PATH 517</td>
<td>Plant Disease Resistance</td>
<td>2-3</td>
</tr>
<tr>
<td>SOIL SCI 321</td>
<td>Soils and Environmental Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>ZOOLOGY 500</td>
<td>Undergraduate Neurobiology Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

## ADDITIONAL LAB OR FIELD RESEARCH

In addition to the Lab requirement, complete one of the following requirements:

- Complete one additional lab course and at least two credits from categories A–E in the Intermediate/Advanced course lists, or
- Complete at least two credits of directed study in a biological science discipline, or
- Complete a two-semester thesis in biological science.

## Approved Directed Study courses

To have Directed Study count for the Additional Lab/Field Research requirement, students must first complete an Introductory Biology sequence.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRONOMY 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>ANATOMY 699</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>ANESTHES 699</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>AN 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY 699</td>
<td>Directed Studies</td>
<td></td>
</tr>
<tr>
<td>BOTANY 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>BMOLCHEM 699</td>
<td>Special Research Problems</td>
<td></td>
</tr>
<tr>
<td>COMP BIO 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>CRB 699</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>DY SCI 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>ENTOM 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>FAM MED 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>FOOD SCI 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>F&amp;W ECOL 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>GENETICS 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>H ONCOL 699</td>
<td>Independent Study in Human Cancer Biology</td>
<td></td>
</tr>
<tr>
<td>HORT 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>M&amp;ENVTOX 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>MEDICINE 699</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>MED SC-V 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>MICROBIO 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>M M &amp; I 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>MOL BIOL 699</td>
<td>Directed Studies in Molecular Biology</td>
<td></td>
</tr>
<tr>
<td>NEURODPT 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>NEUROL 699</td>
<td>Directed Research in Neurology</td>
<td></td>
</tr>
<tr>
<td>NEURSURG 699</td>
<td>Neurosurgery: Directed in Study in Research</td>
<td></td>
</tr>
<tr>
<td>NURSING 699</td>
<td>Directed Study in Nursing</td>
<td></td>
</tr>
<tr>
<td>NUTR SCI 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>OBS&amp;GYN 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>ONCOLOGY 699</td>
<td>Special Research Problems</td>
<td></td>
</tr>
<tr>
<td>OPHTHALM 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>PATH 699</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>PATH-BIO 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>PEDIAT 699</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>PHM SCI 699</td>
<td>Advanced Independent Study</td>
<td></td>
</tr>
<tr>
<td>PHMCOL-M 699</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>PHYSIOL 699</td>
<td>Independent Work</td>
<td></td>
</tr>
<tr>
<td>PL PATH 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>RHAB MED 699</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>SOIL SCI 699</td>
<td>Special Problems</td>
<td></td>
</tr>
<tr>
<td>SURG SCI 699</td>
<td>Directed Study</td>
<td></td>
</tr>
<tr>
<td>SURGERY 699</td>
<td>Independent Study</td>
<td></td>
</tr>
</tbody>
</table>

**Approved Thesis sequences**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRONOMY 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; AGRONOMY 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>AN SCI 681</td>
<td>Senior Honor Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; AN SCI 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>AN SCI 691</td>
<td>Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; AN SCI 692</td>
<td>and Thesis</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOCHEM 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOCHEM 692</td>
<td>and Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOLOGY 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOLOGY 692</td>
<td>and Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>BOTANY 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; BOTANY 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>BOTANY 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; BOTANY 692</td>
<td>and Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>DY SCI 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; DY SCI 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>ENTOM 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; ENTOM 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>FOOD SCI 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; FOOD SCI 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>F&amp;W ECOL 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; F&amp;W ECOL 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>F&amp;W ECOL 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; F&amp;W ECOL 692</td>
<td>and Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>GENETICS 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; GENETICS 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>H ONCOL 681</td>
<td>Senior Honors Thesis in Human Oncology 1</td>
<td></td>
</tr>
<tr>
<td>&amp; H ONCOL 682</td>
<td>and Senior Honors Thesis in Human Oncology 2</td>
<td></td>
</tr>
<tr>
<td>H ONCOL 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; H ONCOL 692</td>
<td>and Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>HORT 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; HORT 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>M M &amp; I 691</td>
<td>First Semester Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; M M &amp; I 692</td>
<td>and Second Semester Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>MICROBIO 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; MICROBIO 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>MICROBIO 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; MICROBIO 692</td>
<td>and Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>MOL BIOL 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; MOL BIOL 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>MOL BIOL 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; MOL BIOL 692</td>
<td>and Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>NUTR SCI 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; NUTR SCI 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>NUTR SCI 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; NUTR SCI 692</td>
<td>and Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>PL PATH 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; PL PATH 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>SOIL SCI 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; SOIL SCI 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>&amp; ZOOLOGY 682</td>
<td>and Senior Honors Thesis</td>
<td></td>
</tr>
</tbody>
</table>
BIOLOGY NAMED OPTIONS

Instead of completing the requirements above, students may choose to select one of the options below.

View as list View as grid


**RESIDENCE & QUALITY OF WORK**

- 2.000 GPA in all BIOLOGY and major courses
- 2.000 GPA on at least 15 credits of Upper-Level work in the major, in Residence
- 15 credits in the major, taken on the UW–Madison campus

**HONORS IN THE MAJOR**

Students may declare Honors in the Biology major with permission of the major advisor.

**HONORS IN THE MAJOR REQUIREMENTS**

To earn Honors in the Major, students must satisfy both the requirements for the major and the following additional requirements:

- Earn a 3.300 University GPA
- Earn a 3.300 GPA in the major
- Complete 13 credits from Foundation and the Intermediate/Advanced requirements, taken for Honors
- Complete an approved two-semester Senior Honors Thesis for a total of 6 credits

**FOOTNOTES**

1. Course also approved for lab credit
2. Intermediate and Advanced level major courses are considered Upper-Level for purposes of this requirement.

**UNIVERSITY DEGREE REQUIREMENTS**

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.