

BIOLOGY, BS (L&S)

The biology major is designed for students with broad interests in the biological sciences. It is intended primarily to:

1. prepare undergraduates for graduate studies in diverse areas of biology;
2. prepare certain preprofessional students (e.g., medicine, veterinary medicine, dentistry) for advanced study in the health professions;
3. provide a broad exposure to biology for students who want a general science education as biologists; and
4. serve as initial preparation for students who later choose a more specialized major.

The major is offered by the College of Letters & Science and the College of Agricultural and Life Sciences.

HOW TO GET IN

HOW TO GET IN

Students interested in declaring the biology major should set up an appointment to speak with biology academic advisor. Information can be found at advising (<http://biologymajor.wisc.edu/advising/>).

Students who intend to major in Biology in either the College of Letters and Science (L&S) or the College of Agricultural and Life Sciences (CAL S) may not combine this major ("double major") with the Molecular and Cell Biology Major or the Neurobiology Major.

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/#requirementsforundergraduatestudytext>) 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 SCIENCE (BS)

Students pursuing a Bachelor of Science 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 the Bachelor of Arts or the Bachelor of Science degree requirements.

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

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|---|---|
| Mathematics | Complete two courses of 3+ credits at the Intermediate or Advanced level in MATH, COMP SCI, or STAT subjects. A maximum of one course in each of COMP SCI and STAT subjects counts toward this requirement. |
| Language | Complete the third unit of a language other than English. |
| LS Breadth | Complete: <ul style="list-style-type: none"> • 12 credits of Humanities, which must include at least 6 credits of Literature; and • 12 credits of Social Science; and • 12 credits of Natural Science, which must include 6 credits of Biological Science and 6 credits of Physical Science. |
| Liberal Arts and Science Coursework | Complete at least 108 credits. |
| Depth of Intermediate/Advanced Coursework | 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 | Complete both: <ul style="list-style-type: none"> • 30 credits in residence, overall, and • 30 credits in residence after the 86th credit. |
| Quality of Work | <ul style="list-style-type: none"> • 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

Students must complete a minimum of 31 credits of Biological Science courses within the Introductory Biology, Foundation Course, Upper-Level Breadth in the Major, and Additional Lab or Field Research requirements.

Unless specifically stated otherwise, courses may not be used to meet multiple requirements of the major.

In addition to the standard Biology major, there is a Named Option in Evolutionary Biology. Students may complete only one Biology major/named option and must declare the named option they are pursuing.

CORE REQUIREMENTS

Mathematics and Statistics

| Code | Title | Credits |
|--------------------------------|--|---------|
| Complete one of the following: | | 4-10 |
| MATH 221 | Calculus and Analytic Geometry 1 | |
| MATH 211 | Survey of Calculus | |
| MATH 171 & MATH 217 | Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II | |
| Complete one of the following: | | 3-4 |
| MATH 222 | Calculus and Analytic Geometry 2 | |
| STAT 240 | Data Science Modeling I | |
| STAT 301 | Introduction to Statistical Methods | |
| STAT 371 | Introductory Applied Statistics for the Life Sciences | |

Total Credits 7-14

Chemistry

| Code | Title | Credits |
|--|--|---------|
| General Chemistry (Complete one of the following): | | 5-10 |
| CHEM 103 & CHEM 104 | General Chemistry I and General Chemistry II | |
| CHEM 109 | Advanced General Chemistry | |
| CHEM 115 & CHEM 116 | Chemical Principles I and Chemical Principles II | |
| Organic Chemistry | | |
| CHEM 343 | Organic Chemistry I | 3 |
| CHEM 344 | Introductory Organic Chemistry Laboratory | 2 |
| CHEM 345 | Organic Chemistry II | 3 |

Total Credits 13-18

Physics

| Code | Title | Credits |
|---|-----------------|---------|
| First Semester Physics (complete one of the following): | | 4-5 |
| PHYSICS 103 | General Physics | |
| PHYSICS 201 | General Physics | |

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| PHYSICS 207 | General Physics | |
| Second Semester Physics (complete one of the following): | | 4-5 |
| PHYSICS 104 | General Physics | |
| PHYSICS 202 | General Physics | |
| PHYSICS 208 | General Physics | |
| Total Credits | | 8-10 |

Introductory Biology

| Code | Title | Credits |
|--------------------------------------|---|--------------|
| Select one of the following options: | | 10-13 |
| Option A: | | |
| BIOLOGY/ BOTANY/ ZOOLOGY 151 | Introductory Biology | |
| BIOLOGY/ BOTANY/ ZOOLOGY 152 | Introductory Biology | |
| Option B: | | |
| BIOCORE 381 | Evolution, Ecology, and Genetics | |
| BIOCORE 382 | Evolution, Ecology, and Genetics Laboratory | |
| BIOCORE 383 | Cellular Biology | |
| BIOCORE 384 | Cellular Biology Laboratory | |
| BIOCORE 485 | Principles of Physiology | |
| Option C: | | |
| ZOOLOGY/ BIOLOGY 101 | Animal Biology | |
| ZOOLOGY/ BIOLOGY 102 | Animal Biology Laboratory | |
| BOTANY/ BIOLOGY 130 | General Botany | |
| 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.

| Code | Title | Credits |
|---------------------------|---|---------|
| AGRONOMY/ HORT 338 | Plant Breeding and Biotechnology | 3 |
| BIOCHEM 501 | Introduction to Biochemistry | 3 |
| BIOCHEM 508 | General Biochemistry II | 3-4 |
| BIOCORE 381 & BIOCORE 383 | Evolution, Ecology, and Genetics and Cellular Biology | 6 |
| GENETICS 466 | Principles of Genetics | 3 |
| GENETICS 468 | General Genetics 2 | 3 |
| MICROBIO 470 | Microbial Genetics & Molecular Machines | 3 |

UPPER-LEVEL BREADTH IN THE MAJOR

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 Upper-Level Breadth in the Major.

- 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).

A. Cellular and Subcellular Biology

| Code | Title | Credits |
|---------------------------------------|---|---------|
| AGRONOMY/ HORT 338 | Plant Breeding and Biotechnology | 3 |
| AGRONOMY/ BOTANY/HORT 339 | Plant Biotechnology: Principles and Techniques I ¹ | 4 |
| AGRONOMY/ BOTANY/HORT 340 | Plant Cell Culture and Genetic Engineering | 3 |
| AN SCI 336 | Animal Growth and Development | 3 |
| AN SCI/DY SCI 362 | Veterinary Genetics | 2 |
| AN SCI 366 | Concepts in Genomics | 3 |
| BIOCHEM 501 | Introduction to Biochemistry | 3 |
| BIOCHEM 507 | General Biochemistry I | 3 |
| BIOCHEM 508 | General Biochemistry II | 3-4 |
| BIOCHEM/ NUTR SCI 510 | Nutritional Biochemistry and Metabolism | 3 |
| BIOCHEM/ NUTR SCI 560 | Principles of Human Disease and Biotechnology | 2 |
| BIOCHEM 570 | Computational Modeling of Biological Systems | 3 |
| BIOCHEM/ M M & I 575 | Biology of Viruses | 2 |
| BIOCHEM 601 | Protein and Enzyme Structure and Function | 2 |
| BIOCHEM/ GENETICS/ MICROBIO 612 | Prokaryotic Molecular Biology | 3 |
| BIOCHEM/ GENETICS/ MD GENET 620 | Eukaryotic Molecular Biology | 3 |
| BIOCHEM/ BOTANY 621 | Plant Biochemistry | 3 |
| BIOCHEM 625 | Mechanisms of Action of Vitamins and Minerals | 2 |
| BMOLCHEM/ MICROBIO 668 | Microbiology at Atomic Resolution | 3 |
| BOTANY/ENTOM/ PL PATH 505 | Plant-Microbe Interactions: Molecular and Ecological Aspects | 3 |
| CRB 640 | Fundamentals of Stem Cell and Regenerative Biology | 3 |
| CRB 650 | Molecular and Cellular Organogenesis | 3 |
| CRB/B M E 670 | Biology of Heart Disease and Regeneration | 3 |
| DERM 601 | Skin Biology and Skin Diseases | 3 |
| GENETICS 466 | Principles of Genetics | 3 |
| GENETICS 467 | General Genetics I | 3 |
| GENETICS 520 | Neurogenetics | 3 |
| GENETICS 527 | Developmental Genetics for Conservation and Regeneration | 3 |
| GENETICS 588 | Immunogenetics | 3 |
| GENETICS 627 | Animal Developmental Genetics | 3 |

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| GENETICS/ MD GENET 662 | Cancer Genetics | 3 |
| H ONCOL/ MED PHYS 410 | Radiobiology | 2-3 |
| MICROBIO 345 | Introduction to Disease Biology | 3 |
| MICROBIO 470 | Microbial Genetics & Molecular Machines | 3 |
| MICROBIO/ SOIL SCI 523 | Soil Microbiology and Biochemistry | 3 |
| MICROBIO 607 | Advanced Microbial Genetics | 3 |
| MICROBIO 626 | Microbial and Cellular Metabolomics | 3 |
| M M & I 341 | Immunology | 3 |
| M M & I/PATH- BIO 528 | Immunology | 3 |
| NEURODPT/ NTP 610 | Cellular and Molecular Neuroscience | 4 |
| NEURODPT/ ZOOLOGY 616 | Lab Course in Neurobiology and Behavior ¹ | 4 |
| NEURODPT/ NTP 629 | Molecular and Cellular Mechanisms of Memory | 3 |
| NTP 675 | Special Topics (Stem Cell in Neurobiology) | 1-3 |
| NTP 675 | Special Topics (Reproductive Neuroendocrinology) | 1-3 |
| NTP 675 | Special Topics (Molecular Mechanisms of Brain Damage) | 1-3 |
| ONCOLOGY/ M M & I/ PL PATH 640 | General Virology-Multiplication of Viruses | 3 |
| PHM SCI 254 | Tiny Earth Genomics - Researching Uncultured Antibiotic-Producing Microbes ¹ | 3 |
| PHM SCI 558 | Laboratory Techniques in Pharmacology and Toxicology ¹ | 2 |
| ZOOLOGY 370 | General Molecular Biology | 3 |
| ZOOLOGY 444 | Neuronal Cell Biology in Health and Disease | 2 |
| ZOOLOGY 470 | Introduction to Animal Development | 3 |
| ZOOLOGY/ PSYCH 523 | Neurobiology | 3 |
| ZOOLOGY 555 | Laboratory in Developmental Biology ¹ | 3 |
| ZOOLOGY 570 | Cell Biology | 3 |
| ZOOLOGY 604 | Computer-based Gene and Disease/Disorder Research Lab ¹ | 2 |
| ZOOLOGY 625 | Development of the Nervous System | 2 |
| ZOOLOGY 655 | Modeling Neurodevelopmental Disease | 3 |

B. Organismal Biology

| Code | Title | Credits |
|-------------------|---|---------|
| AN SCI/DY SCI 373 | Animal Physiology | 3 |
| AN SCI 377 | Integrative Animal Physiology Laboratory ¹ | 1 |
| AN SCI/DY SCI 434 | Reproductive Physiology ¹ | 3 |

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| AN SCI/F&W ECOL/ ZOOLOGY 520 | Ornithology | 3 | PATH 404 | Pathophysiologic Principles of Human Diseases | 3 |
| AN SCI/F&W ECOL/ ZOOLOGY 521 | Birds of Southern Wisconsin ¹ | 3 | PL PATH 558 | Biology of Plant Pathogens ¹ | 3 |
| ANAT&PHY 335 | Physiology ¹ | 5 | PSYCH 406 | Psychology of Perception | 3-4 |
| ANAT&PHY 337 | Human Anatomy | 3 | PSYCH 414 | Cognitive Psychology | 3 |
| ANAT&PHY 338 | Human Anatomy Laboratory ¹ | 2 | PSYCH 454 | Behavioral Neuroscience | 3 |
| ANAT&PHY 435 | Fundamentals of Human Physiology ¹ | 5 | PSYCH 513 | Hormones, Brain, and Behavior | 4 |
| ANTHRO/ NTP/PSYCH/ ZOOLOGY 619 | Biology of Mind | 3 | PSYCH 606 | Hormones and Behavior | 3 |
| BIOCORE 486 | Principles of Physiology Laboratory ¹ | 2 | ZOOLOGY 303 | Aquatic Invertebrate Biology | 3 |
| BOTANY 300 | Plant Anatomy ¹ | 4 | ZOOLOGY 430 | Comparative Anatomy of Vertebrates ¹ | 5 |
| BOTANY 330 | Algae ¹ | 3 | ZOOLOGY 603 | Endocrinology | 3-4 |
| BOTANY/ PL PATH 332 | Fungi ¹ | 4 | ZOOLOGY 611 | Comparative and Evolutionary Physiology | 3 |
| BOTANY/ PL PATH 333 | Biology of the Fungi | 2 | ZOOLOGY 612 | Comparative Physiology Laboratory ¹ | 2 |
| BOTANY/ F&W ECOL 402 | Dendrology: Woody Plant Identification and Ecology ¹ | 3 | C. Ecology | | |
| BOTANY 500 | Plant Physiology ¹ | 3-4 | Code | Title | Credits |
| CS&D 503 | Neural Mechanisms of Speech, Hearing and Language | 3 | AGRONOMY/ BOTANY/ SOIL SCI 370 | Grassland Ecology | 3 |
| DY SCI 378 | Lactation Physiology ¹ | 3 | AGRONOMY/ ENTOM/F&W ECOL/ M&ENVTOX 632 | Ecotoxicology: The Chemical Players | 1 |
| ENTOM/ ZOOLOGY 302 | Introduction to Entomology ¹ | 4 | AGRONOMY/ ENTOM/F&W ECOL/ M&ENVTOX 633 | Ecotoxicology: Impacts on Individuals | 1 |
| ENTOM 321 | Physiology of Insects | 3 | AGRONOMY/ ENTOM/F&W ECOL/ M&ENVTOX 634 | Ecotoxicology: Impacts on Populations, Communities and Ecosystems | 1 |
| ENTOM 331 | Taxonomy of Mature Insects ¹ | 4 | AN SCI 420 | Microbiomes of Animal Systems | 3 |
| F&W ECOL 401 | Physiological Animal Ecology | 3 | BOTANY/ ZOOLOGY 450 | Midwestern Ecological Issues: A Case Study Approach | 2 |
| GENETICS 545 | Genetics Laboratory ¹ | 2 | BOTANY/ F&W ECOL 455 | The Vegetation of Wisconsin ¹ | 4 |
| GENETICS/ MD GENET 565 | Human Genetics | 3 | BOTANY/ F&W ECOL/ ZOOLOGY 460 | General Ecology ¹ | 4 |
| GEOSCI/ ZOOLOGY 542 | Invertebrate Paleontology | 3 | BOTANY/ENTOM/ ZOOLOGY 473 | Plant-Insect Interactions | 3 |
| KINES 314 | Physiology of Exercise ¹ | 4 | BOTANY/ENVIR ST/ F&W ECOL/ ZOOLOGY 651 | Conservation Biology | 3 |
| MICROBIO 303 | Biology of Microorganisms | 3 | ENTOM 450 | Basic and Applied Insect Ecology | 3 |
| MICROBIO 304 | Biology of Microorganisms Laboratory ¹ | 2 | ENTOM 451 | Basic and Applied Insect Ecology Laboratory | 1 |
| MICROBIO 330 | Host-Parasite Interactions | 3 | ENTOM 490 | Biodiversity and Global Change | 3 |
| MICROBIO 526 | Physiology of Microorganisms | 3 | ENVIR ST/ LAND ARC 361 | Wetlands Ecology | 3 |
| M M & I 301 | Pathogenic Bacteriology | 2 | F&W ECOL 448 | Disturbance Ecology | 3 |
| M M & I/ENTOM/ PATH-BIO/ ZOOLOGY 350 | Parasitology | 3 | F&W ECOL 550 | Forest Ecology | 3 |
| NTP/NEURODPT/ PSYCH 611 | Systems Neuroscience | 4 | F&W ECOL/ LAND ARC/ ZOOLOGY 565 | Principles of Landscape Ecology | 2 |
| NTP/ZOOLOGY 620 | Neuroethology Seminar | 2 | | | |
| 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 | | | |
| ONCOLOGY 401 | Introduction to Experimental Oncology | 2 | | | |

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| F&W ECOL/ ZOOLOGY 660 | Climate Change Ecology | 3 |
| GENETICS 528 | Banking Animal Biodiversity: International Field Study in Costa Rica | 1 |
| MICROBIO/AN SCI/ BOTANY 335 | The Microbiome of Plants, Animals, and Humans | 3 |
| PL PATH 300 | Introduction to Plant Pathology ¹ | 4 |
| PL PATH 315 | Plant Microbiomes ¹ | 4 |
| ZOOLOGY 304 | Marine Biology | 2 |
| ZOOLOGY/ ENVIR ST 315 | Limnology–Conservation of Aquatic Resources | 2 |
| ZOOLOGY 316 | Laboratory for Limnology– Conservation of Aquatic Resources ¹ | 2-3 |
| ZOOLOGY 320 | Field Marine Biology ¹ | 3 |
| ZOOLOGY 504 | Modeling Animal Landscapes | 3-5 |
| ZOOLOGY/ ENVIR ST 510 | Ecology of Fishes | 3 |
| ZOOLOGY/ ENVIR ST 511 | Ecology of Fishes Lab ¹ | 2 |

D. Evolution and Systematics

| Code | Title | Credits |
|---------------------------------------|---|---------|
| ANTHRO 302 | Hominoid Evolution | 3 |
| ANTHRO 304 | Heredity, Environment and Human Populations | 3 |
| ANTHRO/BOTANY/ ZOOLOGY 410 | Evolutionary Biology | 3 |
| ANTHRO 411 | The Evolution of the Genus, Homo | 3 |
| ANTHRO 458 | Primate Behavioral Ecology | 3 |
| ANTHRO 603 | Seminar in Evolutionary Theory | 3 |
| BIOLOGY/ GENETICS 522 | Communicating Evolutionary Biology | 2-3 |
| BOTANY 305 | Plant Morphology and Evolution ¹ | 4 |
| BOTANY 400 | Plant Systematics ¹ | 4 |
| BOTANY 401 | Vascular Flora of Wisconsin ¹ | 4 |
| BOTANY 422 | Plant Geography | 3 |
| BOTANY/ PL PATH 563 | Phylogenetic Analysis of Molecular Data | 3 |
| ENTOM 432 | Taxonomy and Bionomics of Immature Insects ¹ | 4 |
| ENTOM/GENETICS/ ZOOLOGY 624 | Molecular Ecology | 3 |
| ENVIR ST/ F&W ECOL/ ZOOLOGY 360 | Extinction of Species | 3 |
| GENETICS 468 | General Genetics 2 | 3 |
| GEOSCI/ ZOOLOGY 541 | Paleobiology | 3 |
| MICROBIO 450 | Diversity, Ecology and Evolution of Microorganisms | 3 |
| MICROBIO 520 | Planetary Microbiology: What Life Here Tells Us About Life Out There | 3 |
| MICROBIO 525 | Field Studies of Planetary Microbiology and Life in the Universe ¹ | 3 |

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| PSYCH 449 | Animal Behavior | 3 |
| PSYCH 450 | Primate Psychology: Insights into Human Behavior | 3 |
| ZOOLOGY 300 | Invertebrate Biology and Evolution | 3 |
| ZOOLOGY 301 | Invertebrate Biology and Evolution Lab ¹ | 2 |
| ZOOLOGY 415 | Genetics of Human History | 3 |
| ZOOLOGY 425 | Behavioral Ecology | 3 |

E. Applied Biology, Agriculture and Natural Resources

| Code | Title | Credits |
|---------------------------------------|--|---------|
| A A E/AGRONOMY/ NUTR SCI 350 | World Hunger and Malnutrition | 3 |
| AGRONOMY 300 | Cropping Systems | 3 |
| AGRONOMY 302 | Forage Management and Utilization | 3 |
| AGRONOMY/ HORT 360 | Genetically Modified Crops: Science, Regulation & Controversy | 2 |
| AGRONOMY 377 | Global Food Production and Health | 3 |
| AGRONOMY/ DY SCI 471 | Food Production Systems and Sustainability | 3 |
| AGRONOMY/ HORT 501 | Principles of Plant Breeding | 3 |
| AGRONOMY/ ATM OCN/ SOIL SCI 532 | Environmental Biophysics | 3 |
| AMER IND/ ANTHRO/ BOTANY 474 | Ethnobotany | 3-4 |
| AN SCI/DY SCI/ NUTR SCI 311 | Comparative Animal Nutrition | 3 |
| AN SCI/DY SCI 320 | Animal Health and Disease | 3 |
| AN SCI/DY SCI 361 | Introduction to Animal and Veterinary Genetics | 2 |
| AN SCI/DY SCI 363 | Principles of Animal Breeding | 2 |
| AN SCI 503 | Avian Physiology ¹ | 3 |
| AN SCI 512 | Management for Avian Health ¹ | 3 |
| BIOCORE 587 | Biological Interactions | 3 |
| BOTANY 403 | Field Collections and Identification | 1-4 |
| ENTOM 351 | Principles of Economic Entomology | 3 |
| ENTOM/ ZOOLOGY 371 | Medical Entomology ¹ | 3 |
| ENTOM/ F&W ECOL 500 | Insects in Forest Ecosystem Function and Management | 2 |
| ENVIR ST/ POP HLTH 471 | Introduction to Environmental Health | 3 |
| ENVIR ST/ POP HLTH 502 | Air Pollution and Human Health | 3 |
| ENVIR ST/ LAND ARC 581 | Prescribed Fire: Ecology and Implementation ¹ | 3 |
| F&W ECOL 306 | Terrestrial Vertebrates: Life History and Ecology ¹ | 4 |
| F&W ECOL/ ZOOLOGY 335 | Human/Animal Relationships: Biological and Philosophical Issues | 3 |
| F&W ECOL 410 | Principles of Silviculture | 3 |
| F&W ECOL 415 | Tree Physiology | 3 |
| F&W ECOL 458 | Environmental Data Science | 3 |

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| F&W ECOL/ SURG SCI 548 | Diseases of Wildlife | 3 |
| F&W ECOL 561 | Wildlife Management Techniques ¹ | 3 |
| FOOD SCI/ MICROBIO 324 | Food Microbiology Laboratory ¹ | 2 |
| FOOD SCI/ MICROBIO 325 | Food Microbiology | 3 |
| FOOD SCI 532 | Integrated Food Manufacturing ¹ | 4 |
| GENETICS 548 | The Genomic Revolution | 3 |
| GENETICS/ HORT 550 | Molecular Approaches for Potential Crop Improvement | 3 |
| HORT/ LAND ARC 263 | Landscape Plants I ¹ | 3 |
| HORT 370 | World Vegetable Crops | 3 |
| HORT/ AGRONOMY 376 | Tropical Horticultural Systems | 2 |
| HORT 378 | Tropical Horticultural Systems International Field Study | 2 |
| M&ENVTOX/ ONCOLOGY/ PHM SCI/PHMCOL- M/POP HLTH 625 | Toxicology I | 3 |
| MED PHYS/ PHYSICS 265 | Introduction to Medical Physics | 2 |
| MED PHYS/NTP 651 | Methods for Neuroimaging Research | 3 |
| MICROBIO 357 | General Bioinformatics for Microbiologists | 3 |
| MICROBIO/ SOIL SCI 425 | Environmental Microbiology | 3 |
| M M & I 554 | Emerging Infectious Diseases and Bioterrorism | 2 |
| NUTR SCI 332 | Human Nutritional Needs | 3 |
| PL PATH/ SOIL SCI 323 | Soil Biology | 3 |
| PL PATH 517 | Plant Disease Resistance | 2-3 |
| SOIL SCI 321 | Soils and Environmental Chemistry | 3 |

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 Upper-Level Breadth in the Major 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.²

Approved Directed Study Courses

To have Directed Study count for the Additional Lab/Field Research requirement, students must first complete an Introductory Biology sequence.

| Code | Title | Credits |
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| AGRONOMY 699 | Special Problems | |
| ANATOMY 699 | Independent Study | |
| ANESTHES 699 | Independent Study | |

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| AN SCI 699 | Special Problems | |
| BIOCHEM 699 | Special Problems | |
| BIOLOGY 699 | Directed Studies | |
| BOTANY 699 | Directed Study | |
| BMOLCHEM 699 | Special Research Problems | |
| COMP BIO 699 | Directed Study | |
| CRB 699 | Independent Study | |
| DY SCI 699 | Special Problems | |
| ENTOM 699 | Special Problems | |
| FAM MED 699 | Directed Study | |
| FOOD SCI 699 | Special Problems | |
| F&W ECOL 699 | Special Problems | |
| GENETICS 699 | Special Problems | |
| H ONCOL 699 | Independent Study in Human Cancer Biology | |
| HORT 699 | Special Problems | |
| M&ENVTOX 699 | Special Problems | |
| MEDICINE 699 | Independent Study | |
| MED SC-V 699 | Directed Study | |
| MICROBIO 699 | Special Problems | |
| M M & I 699 | Directed Study | |
| MOL BIOL 699 | Directed Studies in Molecular Biology | |
| NEURODPT 699 | Directed Study | |
| NEUROL 699 | Directed Research in Neurology | |
| NEURSURG 699 | Neurosurgery: Directed in Study in Research | |
| NURSING 699 | Directed Study in Nursing | |
| NUTR SCI 699 | Special Problems | |
| OBS&GYN 699 | Directed Study | |
| ONCOLOGY 699 | Special Research Problems | |
| OPHTHALM 699 | Directed Study | |
| PATH 699 | Independent Study | |
| PATH-BIO 699 | Directed Study | |
| PEDIAT 699 | Independent Study | |
| PHM SCI 699 | Advanced Independent Study | |
| PHMCOL-M 699 | Independent Study | |
| PHYSIOL 699 | Independent Work | |
| PL PATH 699 | Special Problems | |
| RHAB MED 699 | Independent Study | |
| SOIL SCI 699 | Special Problems | |
| SURG SCI 699 | Directed Study | |
| SURGERY 699 | Independent Study | |

Approved Thesis Sequences

| Code | Title | Credits |
|--------------------------------|--|---------|
| AGRONOMY 681 & AGRONOMY 682 | Senior Honors Thesis and Senior Honors Thesis | |
| AN SCI 681 & AN SCI 682 | Senior Honor Thesis and Senior Honors Thesis | |
| AN SCI 691 & AN SCI 692 | Thesis and Thesis | |
| BIOCHEM 681 & BIOCHEM 682 | Senior Honors Thesis and Senior Honors Thesis | |

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| BIOCHEM 691 & BIOCHEM 692 | Senior Thesis and Senior Thesis |
| BIOLOGY 681 & BIOLOGY 682 | Senior Honors Thesis and Senior Honors Thesis |
| BIOLOGY 691 & BIOLOGY 692 | Senior Thesis and Senior Thesis |
| BOTANY 681 & BOTANY 682 | Senior Honors Thesis and Senior Honors Thesis |
| BOTANY 691 & BOTANY 692 | Senior Thesis and Senior Thesis |
| DY SCI 681 & DY SCI 682 | Senior Honors Thesis and Senior Honors Thesis |
| ENTOM 681 & ENTOM 682 | Senior Honors Thesis and Senior Honors Thesis |
| FOOD SCI 681 & FOOD SCI 682 | Senior Honors Thesis and Senior Honors Thesis |
| F&W ECOL 681 & F&W ECOL 682 | Senior Honors Thesis and Senior Honors Thesis |
| F&W ECOL 691 & F&W ECOL 692 | Senior Thesis and Senior Thesis |
| GENETICS 681 & GENETICS 682 | Senior Honors Thesis and Senior Honors Thesis |
| H ONCOL 681 & H ONCOL 682 | Senior Honors Thesis in Human Oncology 1 and Senior Honors Thesis in Human Oncology 2 |
| H ONCOL 691 & H ONCOL 692 | Senior Thesis in Human Oncology 1 and Senior Thesis in Human Oncology 2 |
| HORT 681 & HORT 682 | Senior Honors Thesis and Senior Honors Thesis |
| M M & I 691 & M M & I 692 | First Semester Senior Thesis and Second Semester Senior Thesis |
| MICROBIO 681 & MICROBIO 682 | Senior Honors Thesis and Senior Honors Thesis |
| MICROBIO 691 & MICROBIO 692 | Senior Thesis and Senior Thesis |
| MOL BIOL 681 & MOL BIOL 682 | Senior Honors Thesis and Senior Honors Thesis |
| MOL BIOL 691 & MOL BIOL 692 | Senior Thesis and Senior Thesis |
| NUTR SCI 681 & NUTR SCI 682 | Senior Honors Thesis and Senior Honors Thesis |
| NUTR SCI 691 & NUTR SCI 692 | Senior Thesis-Nutrition and Senior Thesis |
| PATH-BIO 681 & PATH-BIO 682 | Senior Honors Thesis I and Senior Honors Thesis II |
| PL PATH 681 & PL PATH 682 | Senior Honors Thesis and Senior Honors Thesis |
| SOIL SCI 681 & SOIL SCI 682 | Senior Honors Thesis and Senior Honors Thesis |
| ZOOLOGY 681 & ZOOLOGY 682 | Senior Honors Thesis and Senior Honors Thesis |
| ZOOLOGY 691 & ZOOLOGY 692 | Senior Thesis and Senior Thesis |

BIOLOGY NAMED OPTION

Instead of completing the requirements above, students may choose to select the named option below.

View as [listView](#) as [grid](#)

- **BIOLOGY: EVOLUTIONARY BIOLOGY ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/LETTERS-SCIENCE/INTEGRATIVE-BIOLOGY/BIOLOGY-BS/BIOLOGY-EVOLUTIONARY-BIOLOGY-BS/](http://guide.wisc.edu/undergraduate/letters-science/integrative-biology/biology-bs/biology-evolutionary-biology-bs/))**

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 Residence²
- 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 Upper-Level Breadth in the Major 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 Foundation and Upper-Level Breadth in the Major are considered Upper-Level for purposes of this requirement.

UNIVERSITY DEGREE REQUIREMENTS

Total Degree 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.

Residency Degree candidates are required to earn a minimum of 30 credits in residence at UW-Madison. "In residence" means on the UW-Madison campus with an undergraduate degree classification. "In residence" credit also includes UW-Madison courses offered in distance or online formats and credits earned in UW-Madison Study Abroad/Study Away programs.

Quality of Work 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.

LEARNING OUTCOMES

LEARNING OUTCOMES

1. Know and understand core concepts that unify the breadth of biological sciences including: evolution; structure and function; information flow, exchange, and storage; pathways for transformations of energy and matter; and systems.
2. Demonstrate practical skills of a professional biologist including: problem-solving by engaging the process of science; written and verbal proficiency; laboratory skills; quantitative analysis skills; and teamwork skills.
3. Graduates will be able to engage and make broader connections to other scientific disciplines and society.

FOUR-YEAR PLAN

FOUR-YEAR PLAN

This Four-Year Plan is only one way a student may complete an L&S degree with this major. Many factors can affect student degree planning, including placement scores, credit for transferred courses, credits earned by examination, and individual scholarly interests. In addition, many students have commitments (e.g., athletics, honors, research, student organizations, study abroad, work and volunteer experiences) that necessitate they adjust their plans accordingly. Informed students engage in their own unique Wisconsin Experience by consulting their academic advisors, Guide, DARS, and Course Search & Enroll for assistance making and adjusting their plan.

Four-year Plans for the Biology major are designed to support biological science major exploration and planning your academic career. Your specific program of study could, and probably will, look different. You should customize the Four-Year Plan to fit your unique interests at UW-Madison. Consult with your advisor about the best plan for you.

SAMPLE BIOLOGY MAJOR FOUR-YEAR PLAN

Freshman

| Fall | Credits Spring | Credits |
|------------------------|---|-----------|
| CHEM 103 | 4 CHEM 104 | 5 |
| MATH 221 ¹ | 5 STAT 371 ¹ | 3 |
| Communication A | 3 Literature Breadth | 3 |
| Social Science Breadth | 3 Ethnic Studies/Social Science Breadth | 4 |
| | 15 | 15 |

Sophomore

| Fall | Credits Spring | Credits |
|---|---|---------|
| BIOLOGY/BOTANY/ ZOOLOGY 151 ² | 5 BIOLOGY/BOTANY/ ZOOLOGY 152 ² | 5 |
| CHEM 343 | 3 CHEM 344 | 2 |
| Literature Breadth | 3 CHEM 345 | 3 |

| | | |
|------------------------|----------------------|-----------|
| Social Science Breadth | 3 Humanities Breadth | 3 |
| INTER-LS 210 | 1 Elective | 2 |
| | 15 | 15 |

Junior

| Fall | Credits Spring | Credits |
|-----------------------------|------------------------------------|-----------|
| Foundation Course for Major | 3 Upper-Level Breadth in the Major | 4 |
| PHYSICS 103 | 4 PHYSICS 104 | 4 |
| Social Science Breadth | 3 Humanities Breadth | 3 |
| Electives | 5 Electives | 4 |
| Declare the Major | | |
| | 15 | 15 |

Senior

| Fall | Credits Spring | Credits |
|--|------------------------------------|-----------|
| Upper-Level Breadth in the Major | 3 Upper-Level Breadth in the Major | 6 |
| Upper-Level Breadth in the Major Lab or Field Research | 3 Additional Lab or Field Research | 2 |
| Electives | 9 Electives | 7 |
| | 15 | 15 |

Total Credits 120

¹ Follow the guidance of Math placement scores when choosing a Mathematics and/or Statistics course.

² Students may complete one of three Introductory Biology sequences. See the Requirements tab for more information.

ADVISING AND CAREERS

ADVISING AND CAREERS

ADVISING

Your advisor is here to guide you through the biology major. We can address your questions and concerns, provide advice, help you create a four-year degree plan that meets your major and professional goals, and connect you to resources. It is important to remember that advising is about the process, and some questions do not have a quick and easy answer. Your advisor will challenge you to self-reflect, to critically think about your goals and strategies, and to develop decision-making skills. For more information about what to expect during your advising appointment, visit UW Undergraduate Advising (<https://advising.wisc.edu/soar/advising-101/>).

In the biology major, students are assigned to an adviser according to last name. Please visit us here (<http://biologymajor.wisc.edu/advising/>) to schedule an advising appointment.

CAREERS

The biology major encourages our students to begin working on their career exploration and preparation soon after arriving on campus. We partner with SuccessWorks at the College of Letters & Science. L&S graduates are in high demand by employers and graduate programs. It is important to us that our students are career ready at the time of graduation, and we are committed to your success.

L&S CAREER RESOURCES

Every L&S major opens a world of possibilities. SuccessWorks (<https://successworks.wisc.edu/>) at the College of Letters & Science helps students turn the academic skills learned in their major, certificates, and other coursework into fulfilling lives after graduation, whether that means jobs, public service, graduate school or other career pursuits.

In addition to providing basic support like resume reviews and interview practice, SuccessWorks offers ways to explore interests and build career skills from their very first semester/term at UW all the way through graduation and beyond.

Students can explore careers in one-on-one advising, try out different career paths, complete internships, prepare for the job search and/or graduate school applications, and connect with supportive alumni and even employers in the fields that inspire them.

- SuccessWorks (<https://careers.ls.wisc.edu/>)
- Set up a career advising appointment (<https://successworks.wisc.edu/make-an-appointment/>)
- Enroll in a Career Course (<https://successworks.wisc.edu/career-courses/>) - a great idea for first- and second-year students:
 - INTER-LS 210 L&S Career Development: Taking Initiative (1 credit)
 - INTER-LS 215 Communicating About Careers (3 credits, fulfills Comm B General Education Requirement)
- Learn about internships and internship funding (<https://successworks.wisc.edu/finding-a-job-or-internship/>)
 - INTER-LS 260 Internship in the Liberal Arts and Sciences
- Activate your Handshake account (<https://successworks.wisc.edu/handshake/>) to apply for jobs and internships from 200,000+ employers recruiting UW-Madison students
- Learn about the impact SuccessWorks has on students' lives (<https://successworks.wisc.edu/about/mission/>)

WISCONSIN EXPERIENCE

WISCONSIN EXPERIENCE

The following opportunities can help students connect with other students interested in biology, build relationships with faculty and staff, and contribute to out-of-classroom learning:

- Many study abroad programs offer a plethora of excellent upper level bioscience courses. Students often complete courses abroad that meet upper-level breadth in the major requirements (categories A-E) while others use this opportunity to focus on non-science coursework and explore other topics that interest them. Review the Biology Major advising page (<https://studyabroad.wisc.edu/academics/major-advising-pages-maps/biology/>) on the Study Abroad website to explore international academic programs.
- Students are encouraged to get involved in research in any life science department. Research can be performed for either course credit or pay, depending on the opportunity. Research opportunities can be identified by inquiring directly (<https://wisconsin.wisc.edu/resources/#ugrad>) with faculty members, reading the *Biology Major Newsletter*, or announcement on the Student Job Center (<https://studentjobs.wisc.edu/>).

PEOPLE

PEOPLE

ADVISING LEADERSHIP AND STAFF

Brian Asen
 Carley Garvens
 Sarah Kuba, Program Director
 Brittany Magrady
 Damien Parks

BIOLOGY MAJOR PROGRAM COMMITTEE

(voting members)

Joseph Dillard
 Nazan Gillie, ex officio
 Anna Kowalkowski
 Sarah Kuba, ex officio
 Kate McCulloh, L&S Co-Chair
 Timothy Paustian, ex officio
 Federico Rey
 Nathaniel Sharp, Evolutionary Biology Named Option Representative
 Jon Woods
 Jae-Hyuk Yu, CALS Co-Chair