

BIOLOGY, B.S. (CALs)

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 pre-professional 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 Agricultural and Life Sciences and the College of Letters & Science.

HOW TO GET IN

To declare this major, students must be admitted to UW–Madison and the College of Agricultural and Life Sciences (CALs). For information about becoming a CALs first-year or transfer student, see Entering the College (<http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#enteringthecollegertext>).

Students who attend Student Orientation, Advising, and Registration (SOAR) with the College of Agricultural and Life Sciences have the option to declare this major at SOAR. Students may otherwise declare after they have begun their undergraduate studies. For more information, contact the advisor listed in the Contact Box for the major.

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 (CALs) 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 AGRICULTURAL AND LIFE SCIENCES REQUIREMENTS

In addition to the University General Education Requirements, all undergraduate students in CALs must satisfy a set of college and major requirements. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies, Science, and Capstone), but courses counted toward university requirements may also be used to satisfy a college and/or a major requirement; similarly, courses counted toward college requirements may also be used to satisfy a university and/or a major requirement.

COLLEGE REQUIREMENTS FOR ALL CALS B.S. DEGREE PROGRAMS

| Code | Title | Credits |
|--|---|---------|
| Quality of Work: Students must maintain a minimum cumulative grade point average of 2.000 to remain in good standing and be eligible for graduation. | | |
| Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree. | | |
| | First Year Seminar (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALsFirstYearSeminarCourses) | 1 |
| | International Studies (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALsInternationalStudiesCourses) | 3 |
| | Physical Science Fundamentals | 4-5 |
| CHEM 103 | General Chemistry I | |
| or CHEM 108 | Chemistry in Our World | |
| or CHEM 109 | Advanced General Chemistry | |
| | Biological Science | 5 |
| | Additional Science (Biological, Physical, or Natural) | 3 |
| | Science Breadth (Biological, Physical, Natural, or Social) | 3 |
| CALs Capstone Learning Experience: included in the requirements for each CALs major (see "Major Requirements") (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALsCapstoneRequirement) | | |

REQUIREMENTS FOR THE MAJOR

A minimum of 15 credits must be completed in the major that are not used elsewhere. 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 Capstone 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 are two Named Options: Biology with a Named Option in Evolutionary Biology and Biology with a Named Option in Plant Biology. Admissions to the Named Option in Plant Biology is suspended as of Fall 2021.

Students may complete only one Biology major/named option and must declare the option they are pursuing.

CORE REQUIREMENTS

Mathematics and Statistics

| Code | Title | Credits |
|--------------------------------|--|-------------|
| Complete one of the following: | | 5-10 |
| MATH 221 | Calculus and Analytic Geometry I | |
| 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 | | 8-14 |

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 | |
| 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 an Upper-Level Breadth 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).

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 550 | 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 |
| BIOCHEM/ PHM COL-M/ ZOOLOGY 630 | Cellular Signal Transduction Mechanisms | 3 |
| 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 |
| MICROBIO 470 | Microbial Genetics & Molecular Machines | 3 |

| | | |
|------------------------------|--|-----|
| MICROBIO/ SOIL SCI 523 | Soil Microbiology and Biochemistry | 3 |
| MICROBIO 607 | Advanced Microbial Genetics | 3 |
| M M & I 341 | Immunology | 3 |
| M M & I/PATH- BIO 528 | Immunology | 3 |
| NEURODPT/NTP/ ZOOLOGY 616 | Lab Course in Neurobiology and Behavior ¹ | 4 |
| NTP/ NEURODPT 610 | Cellular and Molecular Neuroscience | 4 |
| NTP/ NEURODPT 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/ PL PATH 640 | General Virology-Multiplication of Viruses | 3 |
| PHM SCI 558 | Laboratory Techniques in Pharmacology and Toxicology ¹ | 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/DY SCI 434 | Reproductive Physiology ¹ | 3 |
| AN SCI/F&W ECOL/ ZOOLOGY 520 | Ornithology | 3 |
| AN SCI/F&W ECOL/ ZOOLOGY 521 | Birds of Southern Wisconsin ¹ | 3 |
| ANAT&PHY 335 | Physiology ¹ | 5 |
| ANAT&PHY 337 | Human Anatomy | 3 |
| ANAT&PHY 338 | Human Anatomy Laboratory ¹ | 2 |
| ANAT&PHY 435 | Fundamentals of Human Physiology ¹ | 5 |
| ANTHRO/ NTP/PSYCH/ ZOOLOGY 619 | Biology of Mind | 3 |
| BIOCORE 486 | Principles of Physiology Laboratory ¹ | 2 |
| BOTANY 300 | Plant Anatomy ¹ | 4 |
| BOTANY 330 | Algae ¹ | 3 |
| BOTANY/ PL PATH 332 | Fungi ¹ | 4 |

| | | |
|--|---|-----|
| BOTANY/ PL PATH 333 | Biology of the Fungi | 2 |
| BOTANY/ F&W ECOL 402 | Dendrology ¹ | 2 |
| BOTANY 500 | Plant Physiology ¹ | 3-4 |
| CS&D 503 | Neural Mechanisms of Speech, Hearing and Language | 3 |
| DY SCI 378 | Lactation Physiology ¹ | 3 |
| ENTOM/ ZOOLOGY 302 | Introduction to Entomology ¹ | 4 |
| ENTOM 321 | Physiology of Insects | 3 |
| ENTOM 331 | Taxonomy of Mature Insects ¹ | 4 |
| F&W ECOL 401 | Physiological Animal Ecology | 3 |
| GENETICS 545 | Genetics Laboratory ¹ | 2 |
| GENETICS/ MD GENET 565 | Human Genetics | 3 |
| GEOSCI/ ZOOLOGY 542 | Invertebrate Paleontology | 3 |
| KINES 314 | Physiology of Exercise ¹ | 4 |
| MICROBIO 303 | Biology of Microorganisms | 3 |
| MICROBIO 304 | Biology of Microorganisms Laboratory ¹ | 2 |
| MICROBIO 330 | Host-Parasite Interactions | 3 |
| MICROBIO 526 | Physiology of Microorganisms | 3 |
| M M & I 301 | Pathogenic Bacteriology | 2 |
| M M & I/ENTOM/ PATH-BIO/ ZOOLOGY 350 | Parasitology | 3 |
| NTP/NEURODPT/ PSYCH 611 | Systems Neuroscience | 4 |
| 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 |
| PATH 404 | Pathophysiologic Principles of Human Diseases | 3 |
| PL PATH 558 | Biology of Plant Pathogens ¹ | 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 ¹ | 5 |
| ZOOLOGY 603 | Endocrinology | 3-4 |
| ZOOLOGY 611 | Comparative and Evolutionary Physiology | 3 |
| ZOOLOGY 612 | Comparative Physiology Laboratory ¹ | 2 |

C. Ecology

| Code | Title | Credits |
|--|---|----------------|
| AGRONOMY/ BOTANY/ SOIL SCI 370 | Grassland Ecology | 3 |
| AGRONOMY/ ENTOM/F&W ECOL/ M&ENVTOX 632 | Ecotoxicology: The Chemical Players | 1 |
| AGRONOMY/ ENTOM/F&W ECOL/ M&ENVTOX 633 | Ecotoxicology: Impacts on Individuals | 1 |
| AGRONOMY/ ENTOM/F&W ECOL/ M&ENVTOX 634 | Ecotoxicology: Impacts on Populations, Communities and Ecosystems | 1 |
| BOTANY/ ZOOLOGY 450 | Midwestern Ecological Issues: A Case Study Approach | 2 |
| BOTANY/ F&W ECOL 455 | The Vegetation of Wisconsin ¹ | 4 |
| BOTANY/ F&W ECOL/ ZOOLOGY 460 | General Ecology ¹ | 4 |
| BOTANY/ENTOM/ ZOOLOGY 473 | Plant-Insect Interactions | 3 |
| BOTANY/ENVIR ST/ F&W ECOL/ ZOOLOGY 651 | Conservation Biology | 3 |
| ENTOM 450 | Basic and Applied Insect Ecology | 3 |
| ENTOM 451 | Basic and Applied Insect Ecology Laboratory | 1 |
| ENVIR ST/ ZOOLOGY 315 | Limnology-Conservation of Aquatic Resources | 2 |
| ENVIR ST/ LAND ARC 361 | Wetlands Ecology | 3 |
| F&W ECOL 379 | Principles of Wildlife Management | 3 |
| F&W ECOL 550 | Forest Ecology | 3 |
| F&W ECOL/ LAND ARC/ ZOOLOGY 565 | Principles of Landscape Ecology | 2 |
| 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 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 |
| PSYCH 449 | Animal Behavior | 3 |
| PSYCH 450 | Primates and Us: Insights into Human Biology and 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/ HORT 501 | Principles of Plant Breeding | 3 |
| AGRONOMY/ ATM OCN/ SOIL SCI 532 | Environmental Biophysics | 3 |
| AMER IND/ ANTHRO/ BOTANY 474 | Ethnobotany | 3-4 |

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|---|---|-----|
| 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 |
| DY SCI/ AGRONOMY 471 | Food Production Systems and Sustainability | 3 |
| 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 |
| F&W ECOL 306 | Terrestrial Vertebrates: Life History and Ecology ¹ | 4 |
| F&W ECOL/ HORT/LAND ARC/ PL PATH 309 | Diseases of Trees and Shrubs | 3 |
| 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/ 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 372 | Seminar in Organic Agriculture | 1 |
| 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 |

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|---------------------------|---|-----|
| M M & I 554 | Emerging Infectious Diseases and Bioterrorism | 2 |
| MICROBIO/ SOIL SCI 425 | Environmental Microbiology | 3 |
| NTP/MED PHYS 651 | Methods for Neuroimaging Research | 3 |
| 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 |

CAPSTONE REQUIREMENT

Code **Title** **Credits**

Two credits minimum required. With advisor approval, directed study or research-based senior thesis in a biological science discipline can also count. The experience must be completed after the first year of an introductory biology sequence above. The capstone experience will normally be completed during the student's final two or three semesters. Also, a subset of laboratory courses has been approved for capstone. The following courses, along with 682s and 692s in biological science departments (taken senior year), can be accepted as fulfilling the capstone experience.

| | | |
|-------------------------------------|--|-----|
| ANAT&PHY 435 | Fundamentals of Human Physiology | 5 |
| BIOCORE 486 | Principles of Physiology Laboratory 2 | 2 |
| BOTANY/ F&W ECOL 455 | The Vegetation of Wisconsin | 4 |
| BOTANY/ F&W ECOL/ ZOOLOGY 460 | General Ecology | 4 |
| ENVIR ST/ ZOOLOGY 511 | Ecology of Fishes Lab | 2 |
| F&W ECOL 599 | Wildlife Research Capstone (limited access) | 3 |
| GENETICS 527 | Developmental Genetics for Conservation and Regeneration | 3 |
| PL PATH 315 | Plant Microbiomes | 4 |
| ZOOLOGY 316 | Laboratory for Limnology-Conservation of Aquatic Resources | 2-3 |
| ZOOLOGY 555 | Laboratory in Developmental Biology | 3 |
| ZOOLOGY 612 | Comparative Physiology Laboratory | 2 |

BIOLOGY NAMED OPTIONS

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

View as listView as grid

- **BIOLOGY: EVOLUTIONARY BIOLOGY** ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/AGRICULTURAL-LIFE-SCIENCES/BACTERIOLOGY/BIOLOGY-BS/BIOLOGY-EVOLUTIONARY-BIOLOGY-BS/](http://guide.wisc.edu/undergraduate/agricultural-life-sciences/bacteriology/biology-bs/biology-evolutionary-biology-bs/))
- **BIOLOGY: PLANT BIOLOGY** ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/AGRICULTURAL-LIFE-SCIENCES/BACTERIOLOGY/BIOLOGY-BS/BIOLOGY-PLANT-BIOLOGY-BS/](http://guide.wisc.edu/undergraduate/agricultural-life-sciences/bacteriology/biology-bs/biology-plant-biology-bs/))

HONORS IN THE MAJOR

Students admitted to the university and to the College of Agricultural and Life Sciences are invited to apply to be considered for admission to the CALS Honors Program.

Admission Criteria for New First-Year Students:

- Complete program application including essay questions

Admission Criteria for Transfer and Continuing UW-Madison Students:

- UW-Madison cumulative GPA of at least 3.25
- Complete program application including essay questions

HOW TO APPLY

The application is available on the CALS Honors Program website (<https://cals.wisc.edu/academics/undergraduate/current-students/honors-program/>). Applications are accepted at any time.

New first-year students with accepted applications will automatically be enrolled in Honors in Research. It is possible to switch to Honors in the Major in the student's first semester on campus after receiving approval from the advisor for that major. Transfer and continuing students may apply directly to Honors in Research or Honors in the Major (after approval from the major advisor).

REQUIREMENTS

All CALS Honors programs have the following requirements:

- Earn at least a cumulative 3.25 GPA at UW-Madison (some programs have higher requirements)
- Complete the program-specific requirements listed below
- Submit completed thesis documentation to CALS Academic Affairs

REQUIREMENTS

HONORS IN THE MAJOR IN BIOLOGY: REQUIREMENTS

To earn Honors in the Major in Biology, students must satisfy the requirements for the major (above) as well as the following requirements:

- Earn a 3.300 overall university GPA
- Complete a two-semester Senior Honors Thesis for 6 credits total and present research in a public forum
- Complete at least 20 credits of Honors coursework from the following sections of the Biology curriculum:

- Introductory Biology
 - Foundation Courses
 - Upper-Level Breadth in the Major
- At least 6 of the 20 credits of Honors coursework must be from the Upper-Level Breadth in the Major requirement

FOOTNOTES

1

Course also approved for lab credit

2

To count BIOCORE 486 Principles of Physiology Laboratory for capstone, students must also complete BIOCORE 382 Evolution, Ecology, and Genetics Laboratory and BIOCORE 384 Cellular Biology Laboratory.

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

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 plans for the biology major are designed to support biological science major exploration. The four-year plan is a tool to assist you and your advisor in planning your academic career. Use it along with your DARS report and Course Search & Enroll. Your specific program of study could, and probably will, look different. You should customize your own four-year

plan to fit your unique path at UW–Madison. Consult with your advisor about the best path for you.

FOUR-YEAR PLAN SAMPLE BIOLOGY MAJOR—NO OPTION FOUR-YEAR PLAN

Freshman

| Fall | Credits | Spring | Credits |
|------------------------------------|---------|------------------------------------|---------|
| CHEM 103 or 109 | 4-5 | CHEM 104 | 5 |
| Math Course ¹ | 3-5 | Math or Statistics | 3-4 |
| Communication A or Breadth Courses | 6 | Communication A or Breadth Courses | 5-7 |
| First Year Seminar ² | 1 | | |
| 14-17 | | 13-16 | |

Total Credits 27-33

Sophomore

| Fall | Credits | Spring | Credits |
|------------------------------------|---------|------------------------------------|---------|
| CHEM 343 | 3 | CHEM 344 | 2 |
| Math or Statistics (if needed) | 3-4 | CHEM 345 | 3 |
| Intro Biology Courses ³ | 3-5 | Intro Biology Courses ³ | 3-5 |
| Breadth Course | 3 | Breadth Courses | 4-6 |
| 12-15 | | 12-16 | |

Total Credits 24-31

Junior

| Fall | Credits | Spring | Credits |
|-------------------------|---------|--|---------|
| PHYSICS 103 or 207 | 4-5 | PHYSICS 104 or 208 | 4-5 |
| Foundational or Biocore | 3 | Biocore or Upper-Level Breadth in the Major ⁴ | 3-5 |
| Elective Courses | 5-8 | Elective Courses | 5-8 |
| 12-16 | | 12-18 | |

Total Credits 24-34

Senior

| Fall | Credits | Spring | Credits |
|---|---------|---|---------|
| Upper-Level Breadth in the Major ⁴ | 3-5 | Upper-Level Breadth in the Major ⁴ | 3-5 |
| Capstone or Research Course | 2-3 | Capstone or Research Course | 2-3 |
| Elective Courses | 7-10 | Elective Courses | 7-10 |
| 12-18 | | 12-18 | |

Total Credits 24-36

1

Math determined by placement scores. Biology majors must complete MATH 171/MATH 217 or MATH 221 plus one additional math/stats course.

2

See CALS requirements (<http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirements>) for a list of approved First-Year Seminar courses.

3

Students may complete BIOLOGY/BOTANY/ZOOLOGY 151-BIOLOGY/BOTANY/ZOOLOGY 152 & a foundational course or BIOLOGY/ZOOLOGY 101-BIOLOGY/ZOOLOGY 102, BIOLOGY/BOTANY 130 & a foundational course or BIOCORE (three lectures and two labs required).

4

See Requirements tab for Upper-Level Breadth in the Major course lists.

SAMPLE BIOLOGY FOUR-YEAR PLAN—EVOLUTIONARY BIOLOGY OPTION

Freshman

| Fall | Credits | Spring | Credits |
|------------------------------------|---------|--------------------------------------|---------|
| CHEM 103 or 109 | | 4-5 CHEM 104 | 5 |
| Math Course ¹ | | 3-5 Math or Statistics | 3-4 |
| Communication A or Breadth Courses | | 6 Communication A or Breadth Courses | 6 |
| First Year Seminar ² | | 1 | |
| 14-17 | | 14-15 | |

Total Credits 28-32

Sophomore

| Fall | Credits | Spring | Credits |
|-----------------------------------|---------|-------------------------------------|---------|
| CHEM 343 | | 3 CHEM 345 | 3 |
| Math or Statistics (if needed) | | 3-5 CHEM 344 | 2 |
| Intro Biology Course ³ | | 5 Intro Biology Course ³ | 5 |
| Breadth Course | | 3 Breadth Courses | 4-6 |
| 14-16 | | 14-16 | |

Total Credits 28-32

Junior

| Fall | Credits | Spring | Credits |
|------------------------------|---------|-------------------------------|---------|
| PHYSICS 103 or 207 | | 4-5 PHYSICS 104 or 208 | 4-5 |
| Foundation Course or Biocore | | 3-5 ANTHRO/BOTANY/ZOOLOGY 410 | 3 |
| Electives | | 5 BIOLOGY/GENETICS 522 | 2-3 |
| | | Electives | 5 |
| 12-15 | | 14-16 | |

Total Credits 26-31

Senior

| Fall | Credits | Spring | Credits |
|---|---------|---|---------|
| Upper-Level Breadth in the Major ⁴ | | 5 Upper-Level Breadth in the Major ⁴ | 5 |
| Capstone or Research Course | | 2-3 Capstone or Research | 2-3 |
| Elective Courses | | 5-8 Elective Courses | 5-8 |
| 12-16 | | 12-16 | |

Total Credits 24-32

1

Math determined by placement scores. Students in the Evolutionary Biology Named Option must complete MATH 171/MATH 217 or MATH 221 plus STAT 301 or STAT 371.

2

See CALS requirements (<http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementsstext>) for a list of approved First-Year Seminar courses.

3

Students may complete BIOLOGY/BOTANY/ZOOLOGY 151-BIOLOGY/BOTANY/ZOOLOGY 152 & a foundational course or BIOLOGY/ZOOLOGY 101-BIOLOGY/ZOOLOGY 102, BIOLOGY/BOTANY 130 & a foundational course or BIOCORE (three lectures and two labs required).

4

See Requirements tab for Upper-Level Breadth in the Major course lists.

SAMPLE BIOLOGY FOUR-YEAR PLAN—PLANT BIOLOGY OPTION

Freshman

| Fall | Credits | Spring | Credits |
|---------------------------------|---------|------------------------------|---------|
| CHEM 103 or 109 | | 4-5 CHEM 104 | 5 |
| Math ¹ | | 3-5 Math or Statistics | 3-5 |
| Communication A or Breadth | | 6 Communication A or Breadth | 5-6 |
| First Year Seminar ² | | 1 | |
| 14-17 | | 13-16 | |

Total Credits 27-33

Sophomore

| Fall | Credits | Spring | Credits |
|-----------------------------------|---------|---------------------------------------|---------|
| CHEM 343 | | 3 CHEM 345 | 3 |
| Math or Statistics (if needed) | | 3-5 CHEM 344 | 2 |
| Intro Biology Course ³ | | 3-5 Intro Biology Course ³ | 3-5 |
| Breadth Course | | 3 Breadth Course | 4-6 |
| 12-16 | | 12-16 | |

Total Credits 24-32

Junior

| Fall | Credits | Spring | Credits |
|------------------------------|---------|--|---------|
| PHYSICS 103 or 207 | | 4-5 PHYSICS 104 or 208 | 4-5 |
| Foundation Course or Biocore | | 3-5 Biocore or Upper-Level Breadth in the Major ⁴ | 3-5 |
| Electives | | 5-6 Plant Science Seminar | 1 |
| | | Electives | 5 |
| 12-16 | | 13-16 | |

Total Credits 25-32

Senior

| Fall | Credits | Spring | Credits |
|---|---------|---|---------|
| Upper-Level Breadth in the Major ⁴ | | 5 Upper-Level Breadth in the Major ⁴ | 5 |
| Capstone or Research | | 2-3 Capstone or Research | 2-3 |
| Plant Science Seminar (if needed) | | 1 Plant Science Seminar (if needed) | 1 |

| Electives | 5-8 Electives | 5-8 |
|-----------|---------------|--------------|
| | 13-17 | 13-17 |

Total Credits 26-34

1

Math determined by placement scores. Biology majors must complete MATH 171/MATH 217 or MATH 221 plus one additional math/stats course.

Stats recommended.

2

See CALS requirements (<http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext>) for a list of approved First-Year Seminar courses.

3

Students may complete BIOLOGY/BOTANY/ZOOLOGY 151-BIOLOGY/BOTANY/ZOOLOGY 152 & a foundational course or **(recommended)** BIOLOGY/ZOOLOGY 101-BIOLOGY/ZOOLOGY 102, BIOLOGY/BOTANY 130 & a foundational course or BIOCORE (three lectures and two labs required).

4

See Requirements tab for Upper-Level Breadth in the Major course lists.

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 advisor according to last name. Please schedule an advising appointment here (<http://biologymajor.wisc.edu/advising/>).

CAREERS

The biology major encourages students to begin working on their career exploration and preparation soon after arriving on campus. We partner with the CALS Career Services office to help you leverage the academic skills learned in your major and liberal arts degree, explore and try out different career paths, participate in internships, prepare for the job search and/or graduate school applications, and network with professionals in the field (alumni and employers).

College of Agricultural and Life Sciences 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.

Career Resources:

- Schedule a Career Advising appointment (<https://cals.wisc.edu/academics/undergraduate-students/career-services/students/>)

- Explore CALS Career Services for Students (<https://cals.wisc.edu/academics/undergraduate-students/career-services/resources/>)

PEOPLE

ADVISING LEADERSHIP AND STAFF

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

BIOLOGY MAJOR PROGRAM COMMITTEE

(voting members)

Briana Burton
Joseph Dillard
Stephen Gammie, L&S Co-Chair
Irwin Goldman, Plant Biology Named Option Representative
Anna Kowalkowski
Sarah Kuba, ex officio
Timothy Paustian, ex officio
Nathaniel Sharp, Evolutionary Biology Named Option Representative
Sharon Thoma, ex officio
Jon Woods
Jae-Hyuk Yu, CALS Co-Chair

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 biological science courses. Students often complete courses abroad that meet major requirements while others use this opportunity to focus on non-science coursework and explore other topics that interest them. Students can explore studying abroad as a Biology major utilizing the Biology Major Advising Page (<https://studyabroad.wisc.edu/academics/major-advising-pages-maps/biology/>). Students work with their advisor and the CALS study abroad office (<https://cals.wisc.edu/academics/undergraduate-students/studyabroad/>) to identify appropriate 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://biology.wisc.edu/finding-mentor/>) with faculty members, reading the Biology Major Newsletter (<https://biologymajor.wisc.edu/newsletters/>), or announcement on the Student Job Center (<https://jobcenter.wisc.edu/>).