BIOLOGY: EVOLUTIONARY BIOLOGY

The Evolutionary Biology Named Option allows biology majors to concentrate their studies in evolution and to have this reflected on their transcript. Since there is no evolutionary biology major available at UW–Madison, this is the only mechanism to indicate specialization in this rapidly growing and popular field. In taking this named option, students will be able to fulfill their intermediate/advanced biology requirement with courses that emphasize evolutionary biology, ranging from required courses in fundamental evolutionary biology to more advanced optional courses that cover a wide range of evolutionary biology topics. They will also take a seminar course in evolutionary biology.

Who should enroll in this option? Students with broad interest in the biological sciences who want to:

- Prepare for graduate study in evolutionary biology or related fields
- Prepare for professional studies (e.g. medical school, veterinary school, dentistry)
- Concentrate their biological studies in evolutionary biology

REQUIREMENTS

REQUIREMENTS FOR THE NAMED OPTION

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, Capstone, and Evolutionary Biology Seminar requirements. Unless specifically stated otherwise, courses may not be used to meet multiple requirements of the major.

CORE REQUIREMENTS

Mathematics and Statistics

Code	Title	Credits
Complete one of the following:		4-10
MATH 171 & MATH 217	Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II	
MATH 221	Calculus and Analytic Geometry 1	
MATH 211	Survey of Calculus 1	
Complete one of the following:		3-4
STAT 240	Data Science Modeling I	
STAT 301	Introduction to Statistical Methods	
STAT 324	Introduction to Statistics for Science and Engineering	
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	
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
Complete one sequence:		10-13
Option A:		10
BIOLOGY/ BOTANY/ ZOOLOGY 151	Introductory Biology	
BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology	
Option B:		13
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:		10
ZOOLOGY/ BIOLOGY 101	Animal Biology	
ZOOLOGY/ BIOLOGY 102	Animal Biology Laboratory	
BOTANY/ BIOLOGY 130	General Botany	

Foundation Course (complete one of the following):

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

Code	Title	Credits
BIOCORE 381 & BIOCORE 383	Evolution, Ecology, and Genetics and Cellular Biology	6
GENETICS 466	Principles of Genetics	3
GENETICS 468	General Genetics 2	3

UPPER-LEVEL BREADTH IN THE MAJOR

Minimum of 13 credits required as follows 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 the Evolutionary Biology course listed below.
- Complete at least two credits from either category A or B.
- Complete at least two credits from category C.
- Complete at least two credits from category D.
- Additional courses needed to reach 13 credits of Upper-Level Breadth in the Major may be taken from any category (A, B, C, D, E).

Required Evolutionary Biology Course

Code	Title	Credits
ZOOLOGY/ ANTHRO/ BOTANY 410	Evolutionary Biology	3

A. Cellular and Subcellular Biology

Code	Title	Credits
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/ 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/ GENETICS 631	Plant Genetics and Development	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/B M E 670	Biology of Heart Disease and Regeneration	3
DERM 601	Skin Biology and Skin Diseases	3
DERM 602	Advances in Skin Biology and Skin Diseases	2
GENETICS 466	Principles of Genetics	3
GENETICS 467	General Genetics 1	3
GENETICS 520	Neurogenetics	3
GENETICS 527	Developmental Genetics for Conservation and Regeneration	3
GENETICS 588	Immunogenetics	3
GENETICS 605	Clinical Cases in Medical Genetics	3
GENETICS 627	Animal Developmental Genetics	3
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 626	Microbial and Cellular Metabolomics	3
M M & I 341	Immunology	3
M M & I/PATH-BIO 528	Immunology	3
NEURODPT 629	Molecular and Cellular Mechanisms of Memory	3
NTP/ NEURODPT 610	Cellular and Molecular Neuroscience	4
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
PLANTSCI 340	Plant Genome Engineering and Editing	3
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 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
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	2
ANAT&PHY 435	Fundamentals of Human Physiology [1]	5
ANTHRO/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: Woody Plant Identification and Ecology [1]	3
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 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
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
PSYCH 406	Psychology of Perception	3-4
PSYCH 414	Cognitive Psychology	3
PSYCH 454	Behavioral Neuroscience	3
PSYCH 513	Hormones, Brain, and Behavior	4
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
ZOOLOGY 620	Neuroethology Seminar	2

C. Ecology

Code	Title	Credits
AGROECOL 370	Grassland Ecology	3
AN SCI 420	Microbiomes of Animal Systems	3
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 516	Conservation Biology	3
ENTOM 344	From Flowers to Food: Pollinator Ecology and Conservation	3
ENTOM 450	Basic and Applied Insect Ecology	3
ENTOM 490	Biodiversity and Global Change	3
ENVIR ST/ LAND ARC 361	Wetlands Ecology	3
F&W ECOL 448	Disturbance Ecology	3
F&W ECOL 550	Forest Ecology	3
F&W ECOL 551	Forest Ecology Lab [1]	1
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/ 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/ 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 411	The Evolution of the Genus, Homo	3
ANTHRO 458	Primate Behavioral Ecology	3
ANTHRO 603	Seminar in Evolutionary Theory	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
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
PATH-BIO 307	Superbugs, Sex, & Drugs: Why Modern Medicine Needs Evolutionary Biology	2
PSYCH 449	Animal Behavior	3-4
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/ NUTR SCI 350	World Hunger and Malnutrition	3
AGROECOL 377	Global Food Production and Health	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
BIOCORE 587	Biological Interactions	3
BOTANY 403	Field Collections and Identification	1-4
DY SCI 471	Food Production Systems and Sustainability	3
ENTOM 351	Principles of Economic Entomology	3
ENTOM/ ZOOLOGY 371	Medical Entomology: Biology of Vector and Vector-borne Diseases (4th credit meets lab requirement) [1]	3-4
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 458	Environmental Data Science	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
GENETICS 548	The Genomic Revolution	3
M M & I 554	Emerging Infectious Diseases and Bioterrorism	2
MED PHYS/ PHYSICS 265	Introduction to Medical Physics	2
MED PHYS 651	Methods for Neuroimaging Research	3
MICROBIO 357	General Bioinformatics for Microbiologists	3
MICROBIO/ SOIL SCI 425	Environmental Microbiology	3
NUTR SCI 332	Human Nutritional Needs	3
PHM SCI/ M&ENVTOX/ ONCOLOGY/ PHMCOL-M/ POP HLTH 625	Toxicology I	3
PLANTSCI/ LAND ARC 263	Woody Landscape Plant Identification, Culture, and Use	4
PLANTSCI 300	Cropping Systems	3

PLANTSCI 302	Forage Management and Utilization	3
PLANTSCI 338	Plant Breeding and Biotechnology	3
PLANTSCI 360	Genetically Modified Crops: Science, Regulation & Controversy	2
PLANTSCI 370	World Vegetable Crops	3
PLANTSCI 376	Tropical Horticultural Systems	2
PLANTSCI 378	Tropical Horticultural Systems International Field Study	2
PLANTSCI 501	Principles of Plant Breeding	3
PLANTSCI/ ATM OCN 532	Environmental Biophysics	3
PLANTSCI 550	Molecular Approaches for Crop Improvement	3
PL PATH 517	Plant Disease Resistance	2-3
SOIL SCI 323	Soil Biology	3
SOIL SCI 621	Soil and Environmental Chemistry	3

EVOLUTIONARY BIOLOGY SEMINAR

Code	Title	Credits
BIOLOGY/ GENETICS 522	Communicating Evolutionary Biology	2-3

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

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.

FOUR-YEAR PLAN

FOUR-YEAR PLAN

SAMPLE BIOLOGY FOUR-YEAR PLAN– EVOLUTIONARY BIOLOGY OPTION

First Year

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**

Second Year

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**

Third Year

Fall	Credits	Spring	Credits
Physics Course	4-5	Physics Course	4-5
Foundational or Biocore	3-5	ANTHRO/BOTANY/ ZOOLOGY 410	3
Electives	5	BIOLOGY/ GENETICS 522	2-3
		Electives	5
	12-15		**14-16**

Fourth Year

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 106-127

1 Math determined by placement scores. Students in the Evolutionary Biology Named Option must complete MATH 171/MATH 217, MATH 211, or MATH 221 plus STAT 240, STAT 301, or STAT 371.

[2] See CALS requirements (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext) for a list of approved CALS 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.