



# Ecology and Evolutionary Biology Major Requirements

Program in Biology Student Services

📍: 1140 Undergrad. Science Bldg. (USB)

✉: lsa-biology-advising@umich.edu

🌐: <http://www.lsa.umich.edu/biology>

☎: 734-763-7984

## Why study Biology?

"Pursuing a career in biology can be immensely rewarding and exciting. Studying biology teaches us to ask questions, make observations, evaluate evidence, and solve problems. Biologists learn how living things work, how they interact with one another, and how they evolve. They may study cells under a microscope, insects in a rainforest, viruses that affect human beings, plants in a greenhouse, or lions in the African grasslands. Their work increases our understanding about the natural world in which we live and helps us address issues of personal well-being and worldwide concern, such as environmental depletion, threats to human health, and maintaining viable and abundant food supplies."

[from: <http://www.aibs.org/careers>]

## Who should major in Ecology and Evolutionary Biology?

The Ecology and Evolutionary Biology (EEB) major provides a comprehensive foundation in the biological sciences, places an emphasis on undergraduate research experience, and provides an integrated perspective on the origins and complex interactions of the earth's biodiversity and ecosystems. It focuses on numerous levels of biological organization over multiple time scales, including studies of genes and genomes, individual organisms, populations, communities and ecosystems. The major is highly suitable for students who wish to pursue career pathways in a wide variety of disciplines. These include graduate studies in the biological, public health and medical, dental, and veterinary professions, conservation and natural resource management, teaching at the K-12 level, positions in the local, state and federal governments, non-profit/non-governmental organizations, and private sector opportunities such as environmental consulting agencies. Students intending to go to medical school should compare degree requirements to the med. school requirements found here: <http://www.lsa.umich.edu/advising/academicplanning/prehealth>. It is strongly recommended that pre-med and other pre-health students meet with an LSA pre-health advisor.

**Exclusions:** Students who elect a major in Ecology and Evolutionary Biology may not elect the following majors: Biology; General Biology; Ecology, Evolution, and Biodiversity; Microbiology; Plant Biology; or Biochemistry. They also may not elect an academic minor in Biology; Ecology and Evolutionary Biology; Plant Biology; Chemistry; or Biochemistry.

## How do I declare?

Students interested in any major in the biological sciences are encouraged to meet with an advisor to discuss their academic plans as soon as possible! Students need not have completed all of the major prerequisites to declare, but should have completed the biology introductory sequence with a 2.0 or better and be in good academic standing. Make an advising appointment online through the Biology website: [www.lsa.umich.edu/biology](http://www.lsa.umich.edu/biology).

## What courses should I take first?

The biological science introductory sequence consists of: BIOLOGY 171, BIOLOGY 172 or 174, and BIOLOGY 173. (Students with an appropriate AP score receive credit for BIOLOGY 195, which is the equivalent of BIO 171 & 172/174, but does NOT grant credit for 173.) Students should take 171 or 172/174 first and then follow with the second lecture course and 173. (Note that the introductory biology sequence courses cannot be taken pass/fail.)

<p><b>BIOLOGY 171</b> ...focuses on ecology, biodiversity, and genetics and evolutionary processes. Students engage with biological hypotheses dealing with prominent current issues such as human evolutionary origins, emerging diseases, conservation biology, and global change.</p>	<p><b>BIOLOGY 172 or 174</b> (prerequisite: prior or concurrent credit for CHEM 130) ...focuses on how cells, organs, and organisms work. (174 covers the same material as 172 but is geared toward students who prefer a more problem-solving approach to understand biology, rather than a more traditional lecture-based course.)</p>
<p><b>BIOLOGY 173</b> (prerequisite = BIOLOGY 171, 172, 174, or 195) ...is the accompanying lab component to the introductory sequence. The course provides an integrated introduction to experimental biology. Topics focus on biochemistry, molecular genetics, evolution, and ecology.</p>	

### How do I get involved in research?

Independent research is a wonderful opportunity to take an active role in studying what you enjoy! Students participate in a lab, field, or modeling project in which they themselves have a say in the design, implementation, and interpretation of experiments. Please visit the Undergraduate Research web pages for the specific requirements for independent research and advice on how to choose a research area and mentor: <http://www.lsa.umich.edu/biology/studentresearch>.

### What are the requirements for Honors?

The Program in Biology administers an Honors Program to train students to conduct independent research in the biological sciences. Participating in the honors program allows students to develop their research skills, deepen their understanding of the field, and form productive relationships with faculty and other students. The achievement is noted on the diploma and official transcript.

In addition to completing all the requirements for the major, an honors degree requires:

- (1) a major GPA of at least 3.4, and
- (2) the completion of a significant piece of independent research that is
- (3) reported in an honors thesis and
- (4) presented in a public forum.

For more information, consult the Program in [Biology Honors Program information page](#) or a Program in Biology advisor.

### How do I find out about internships, study abroad, or summer programs?

Information about study abroad, faculty-led intercultural internships, faculty-led courses and field experiences, and Spring/Summer language study is available through the Center for Global and Intercultural Study. Please refer to [www.lsa.umich.edu/cgis](http://www.lsa.umich.edu/cgis) for detailed information about options.

### Can I transfer courses from another institution?

The Program in Biology will review classes taken at other institutions to determine equivalency to University of Michigan Biology, EEB, and MCDB courses. If an external class is determined to be equivalent to a U-M course, it can be posted to your transcript as the U-M Biology, EEB, or MCDB course (with a "T") when you successfully complete the course *and* the transfer steps listed on the Biology website: [www.lsa.umich.edu/biology/transferecredit](http://www.lsa.umich.edu/biology/transferecredit). Approved equivalent courses may count toward major requirements, but transfer students are encouraged to meet with a major advisor to develop a major plan.

[Note: You are welcome to request review of a course *before you take it*. You will need to provide a detailed syllabus, and must obtain one from the instructor in advance.]

### How can I get involved with student organizations?

There are several student organizations pertinent to biology-related majors. More detailed information is available on the Program in Biology website: [www.lsa.umich.edu/biology](http://www.lsa.umich.edu/biology).

- **Biology Student Alliance (BSA):** intended for Biology, CMB, Microbiology, Plant Biology, Neuroscience, and Biochemistry majors, as well as pre-med or science oriented students interested in learning more about MCDB-related topics. Email [BSA-Board@umich.edu](mailto:BSA-Board@umich.edu) for more information.
- **Botany Undergrads Doing Stuff (BUDS):** an extremely informal group of people dedicated to botany. Contact Faculty Advisors Robyn Burnham or Laura Olsen if interested.
- **Neuroscience Students Association (NSA):** an organization for students with an interest in neuroscience. Email [nsaleadteam@umich.edu](mailto:nsaleadteam@umich.edu) for more information.
- **Society of Biology Students (SBS):** an informal group for students interested in Biology in general. Website: <http://www.sitemaker.umich.edu/sbs/home> or contact the Faculty Advisor, Robyn Burnham at [rburnam@umich.edu](mailto:rburnam@umich.edu) for information.
- **Student Society for Stem Cell Research (SSSCR), University of Michigan – Ann Arbor Chapter:** an international network dedicated to the advancement of scientific research for cures. Website: [www.umich.edu/~umssscr/index.html](http://www.umich.edu/~umssscr/index.html). Email [ssscrexec@umich.edu](mailto:ssscrexec@umich.edu).

# ECOLOGY AND EVOLUTIONARY BIOLOGY MAJOR REQUIREMENTS

## ECOLOGY AND EVOLUTIONARY BIOLOGY ELECTIVE COURSE LISTS

*UMBS Option: Core + Field / Research* - The following courses, **taken at the UM Biological Station**, satisfy the core \*and\* count toward the field/research requirement: (1) EEB 381 (General Ecology) and (2) EEB 392 (Evolution)

**EEB ELECTIVES:** Courses marked "UL" count as Upper-Level Electives / Courses marked "BD" satisfy the Biodiversity requirement  
Courses marked "FR" satisfy the Field/Research requirement (most of these are courses taught SP/SU at the UM Biological Station)

BIOLOGY 207 Microbiology (BD)	EEB 441 The Biology of Fishes Laboratory (UL)
BIOLOGY 230 Introduction to Plant Biology (BD)	EEB 442 Biology of Insects (UL, BD)
BIOLOGY 252 Vertebrate Evolution and Diversity (BD)	EEB 443 Biology of Insects at UMBS (UL, BD, FR)
BIOLOGY 255 Plant Diversity (BD)	EEB 445 Biogeography (UL)
BIOLOGY 256 Environmental Physiology of Animals (BD)	EEB 446 Microbial Ecology (UL)
BIOLOGY 288 Animal Diversity (BD)	EEB 450 Biology of Amphibians and Reptiles (UL, BD)
EEB 300 Independent Research (FR* if 3 credits)	EEB 451 Biology of Mammals (UL, BD)
EEB 313 Geobiology (UL)	EEB 453 Field Mammalogy (UL, BD, FR)
EEB 315 The Ecology and Evolution of Infectious Diseases (UL)	EEB 455 Ethnobotany (UL, FR)
EEB 316 Introduction to Food Systems (UL)	EEB 457 Algae in Freshwater Ecosystems (UL, BD, FR)
EEB 318 Food, Land, and Society (UL)	EEB 459 Systematic Botany (UL, BD)
EEB 320 Rivers, Lakes, and Wetlands (UL)	EEB 463 Neotropical Plant Families (UL, BD)
EEB 321 Rivers, Lakes, and Wetlands at UMBS (UL, FR)	EEB 466 Mathematical Ecology (UL)
EEB 330 Biology of Birds (UL, BD, FR)	EEB 468 Biology of Fungi (UL, BD)
EEB 335 Biodiversity Research Seminar (UL)	EEB 470 Microbial Diversity (UL, BD)
EEB 341 Parasitology (UL, BD)	EEB 472 Plant-Animal Interactions (UL)
EEB 348 Forest Ecosystems (UL, FR)	EEB 476 Ecosystem Ecology (UL)
EEB 362 Primate Evolutionary Ecology (UL)	EEB 477 Laboratory in Field Ecology (UL)
EEB 380 Oceanography: Marine Ecology (UL, BD)	EEB 480 Model-based Statistical Inference for Ecology (UL)
EEB 400 Independent Research (FR* if 3 credits)	EEB 482 Freshwater Ecosystems: Limnology at UMBS (UL, FR)
EEB 401 Advanced Topics in Biology (UL)	EEB 483 Freshwater Ecosystems: Limnology (UL)
EEB 404 Genetics, Development, and Evolution (UL)	EEB 485 Population and Community Ecology (UL)
EEB 405 Biological Station Special Topics (UL, FR)	EEB 486 Biology and Ecology of Fish (UL, BD)
EEB 408 Modeling for Ecology and Evolutionary Biology (UL)	EEB 487 Ecology of Fishes (UL)
EEB 412 Molecular Ecology (UL)	EEB 489 Soil Ecology (UL)
EEB 414 Molecular Approaches in EEB (UL)	EEB 490 Evolution at the Population Level (UL)
EEB 416 Introduction to Bioinformatics (UL)	EEB 491 Phylogenetic Methods and Theory (UL)
EEB 420 Plant Evolution (UL, BD)	EEB 492 Behavioral Ecology (UL) *No credit for EEB 424*
EEB 424 Behav. Ecol. and Conserv. Biol. (UL) *No credit for EEB 492*	EEB 493 Behavioral Ecology at UMBS (UL, FR)
EEB 425 Field Skills in Wildlife Behavior (UL)	EEB 494 Teaching College Science (UL)
EEB 430 Modeling Infectious Diseases (UL)	EEB 498 The Ecology of Agroecosystems (UL)
EEB 431 Ecology of Animal Parasites (UL, FR, BD)	EEB 556 Field Botany of Northern Michigan (UL, BD, FR)
EEB 433 Ornithology (UL, BD)	
EEB 436 Woody Plants: Biology and Identification (UL, BD)	<b>*3 credits must be taken in one term to fulfill the FR req. See the Independent Research credit rules; 6 cr. max. applies.</b>
EEB 440 Biology of Fishes (UL, BD)	

### COGNATES: Courses from other units that are currently approved for the EEB major as "Additional Courses"

ANTHRBIO 365 - Human Evolution	ENVIRON 310 - Toxicology: Study of Environ. Chems. & Disease
ANTHRBIO 368/Psych 338 - Primate Social Behavior I	ENVIRON 317 - Conservation of Biological Diversity
ANTHRBIO/ENVIRON 461 - Primate Conservation Biology	EPID 543 - Virus Diseases
BIOLCHEM 415* - Introductory Biochemistry	EPID 560 - Mechanisms of Bacterial Pathogenesis
BIOMEDE 231 - Introduction of Biomechanics	HUMGEN 541 - Molecular Genetics
CHEMISTRY* - Any course numbered 230 or above	MATHEMATICS* - Courses numbered 200 or above
CLIMATE/EARTH/SPACE 320 - Earth Systems Evolution	MICRBIOL 405 - Medical Microbiology and Infectious Disease
CMPLXSYS 501 - Introduction to Complex Systems	MICRBIOL 415 - Virology
CMPLXSYS 530 - Computer Modeling of Complex Systems	MICRBIOL/INTMED 460 - Eukaryotic Microbiology
EARTH 418 - Paleontology	PHYSICS/BIOPHYS 290* - Physics of the Body and Mind
EARTH 436 - Studies in Stratigraphy, Paleon., and Sedimentology	PSYCH 337 - Hormones and Behavior
EARTH 437 - Evolution of Vertebrates	STATS 250 or 280* - Intro. to Statistics and Data Analysis
EARTH/ENVIRON 450 - Ecosystem Science in the Rockies	STATS 401* - Applied Statistical Methods II
EARTH/ENVIRON 453 - Tropical Conservation & Resource Mgmt.	

**\*Courses used as prerequisites or core options may not double-count as additional courses.**

**ECOLOGY & EVOLUTIONARY BIOLOGY PREQUISITES:****TERM:****COURSE:****CREDITS:****Introductory Biology Sequence:** Choose Sequence A or B:

A: BIO 171, 172 or 174, &amp; 173

B: BIO 195 (AP) &amp; 173

**Chemistry Sequence:** CHEM 210 & 211 CHEM 215 & 216**Quantitative Analysis Sequence:** Quantitative Analysis 1: MATH 115, 120 (AP), 175, 185, or 295 Quantitative Analysis 2: One course from: MATH 116, 121 (AP), 156, 176, 186, or 296; STATS 180 (AP), 250 or 280; STATS 400-level or above (min. 3 credits); BIOLOGY 202; BIOPHYS/PHYSICS 290; EECS 203 or 280; EARTH 468; or other course with a MATH 115 prereq. approved by a major advisor [Note: Any course used to fulfill this requirement cannot also be used as a major elective; i.e., a course cannot "double-count."]**Physics Sequence:** PHYSICS I (lecture + lab): One of the following combinations: PHYSICS 125 & 127; 135 & 136; 140 & 141; or 160 & 161. [PHYSICS 139 (AP) will also fulfill this requirement.] PHYSICS II (lecture + lab): One of the following combinations: PHYSICS 126 & 128; 235 & 236; 240 & 241; or 260 & 261. [PHYSICS 239 (AP) will also fulfill this requirement.]**ECOLOGY & EVOLUTIONARY BIOLOGY MAJOR:****EEB Major Core:** Ecology: BIOLOGY 281 and EEB 372 \*OR\* EEB 381 (UMBS) Genetics: BIOLOGY 305 Evolution: EEB 390, 391, or 392 Biochemistry or Quantitative Analysis 3 (min. 3 credits): MCDB 310; BIOLCHEM 415; CHEM 351; STATS 401, 403, 412, or 425; EECS 281 or 376; EEB 408, 430, or 490; or a second (non-AP) course at the 200-level or above from the QA2 options above EEB Capstone: EEB 410**Upper-Level Electives for EEB (UL) (2 courses, minimum 6 credits):** EEB 300-level or above (EEB 300/400, 301, 302, 397, 399, 499, 800, and non-specific (departmental) transfer courses are EXCLUDED.) EEB or MCDB 300-level or above (EEB/MCDB 300/400, 301, 302, 397, 399, 499, 800, and non-specific (departmental) transfer courses are EXCLUDED.)**EEB Requirements (these may overlap with the Major Core or Electives):** Biodiversity Focus (BD): One course from the approved list (attached). Field or Research Experience (FR): One course from the approved list (attached).

- EEB/MCDB 300 or 400 (Independent Research), elected for a min. of 3 credits in a single term, may be used to fulfill the FR req. (6 credit max. applies; see CONSTRAINTS below.)

**Additional Courses:** Choose additional BIOLOGY, EEB, and MCDB courses at the 200-level and above, to reach 30 major credit hours.

- BIO 241, EEB/MCDB 301, 302, 800, MCDB 412, and non-specific (departmental) transfer courses are EXCLUDED.
- A max. of 2 approved cognate courses may be used as additional courses; see attached list.

**CONSTRAINTS:**

- Prerequisites, introductory science courses, and non-specific (departmental) transfer courses are EXCLUDED from the 30 cr. required for the major.
- A maximum of 6 credits of independent research (BIO 200, EEB/MCDB 300 or 400) may be counted toward the major.

**Total Credits and GPA Requirement for EEB:** Minimum 30 cr. in Major Minimum 2.0 GPA in Major: GPA is calculated from all mandatory prerequisites, all courses used for major requirements (including cognates), and all courses in BIOLOGY, EEB, and MCDB.