



Ecology, Evolution, and Biodiversity Major Requirements (Through FA22)

Program in Biology Student Services

📍: 1140 Undergrad. Science Bldg. (USB)

🌐: <http://www.lsa.umich.edu/biology>

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Why study Biology?

Biology as a discipline is connected to many aspects of our everyday lives. From development and disease, to the food we eat, to the environment around us, studying biology brings us a deeper understanding of the world around us and allows us to benefit society through medicine, agriculture and environmental stewardship. Biology is a rapidly advancing area as we learn more every day about biological concepts ranging from our cells to our planet. Mastering biology opens up diverse careers in health science (medicine, dentistry, public health), biotechnology and pharmaceutical sciences, biological research, environmental policy, conservation and wildlife biology, ecological monitoring, and farming.

Who should major in Ecology, Evolution, and Biodiversity?

The Ecology, Evolution, and Biodiversity (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: <https://lsa.umich.edu/advising/plan-your-path/pre-health>. 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, Evolution, and Biodiversity may not elect the following majors: Biology; Biology, Health, and Society (BHS); Microbiology; Plant Biology; or Biochemistry. They also may not elect an academic minor in Biology; Ecology and Evolutionary 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 introductory biology 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.

What courses should I take first?

The introductory biology sequence consists of: BIOLOGY 171, BIOLOGY 172 or 174, and BIOLOGY 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.)**

- Students with an appropriate AP/IB score receive credit for BIOLOGY 195, which is the equivalent of BIOLOGY 171 & 172/174, but does NOT grant credit for 173.
- Transfer students who receive credit for BIOLOGY 191 should take BIOLOGY 192 and BIOLOGY 173 to complete the introductory biology sequence.

<p>BIOLOGY 171 ...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>BIOLOGY 172 or 174 (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>BIOLOGY 173 (prerequisite = BIOLOGY 171, 172, 174, 191, 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) an overall **and** major GPA of at least 3.4,
- (2) participation in at least two terms of independent research, and
- (3) the completion of a significant piece of independent research that is
 - (a) reported in an honors thesis and
 - (b) presented in a public forum.

Note that undergraduate research students typically register for an independent research course (as appropriate for their major) during each term of research. Formal course registration is encouraged, but not required. For more information, including the Honors Program application, consult the [Program in Biology Honors Information page](#).

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 (www.lsa.umich.edu/cgis). The Opportunity Hub (<https://lsa.umich.edu/opportunityhub>) also provides information on fellowships, internships and other student opportunities.

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 courses. (**Note that 300- and 400-level courses will not be evaluated for equivalent credit.**) 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 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. Approved equivalent courses may count toward major requirements, but transfer students are encouraged to meet with a major advisor to develop a major plan. **At least 20 of the 30 credits required for the EEB major must be taken in-residence.**

[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.

- **Biology Student Alliance (BSA):** a student org. open to all Program in Biology & Neuro. majors as well as pre-med or other science-oriented students interested in biology research and outreach, and in collaborating and socializing with other biology-interested students. Email bsa-eboard@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.
- **Michigan Ecology and Evolutionary Biology Society (MEEBS):** The Michigan Ecology and Evolutionary Biology Society (MEEBS) is an informal club designed to create a community for EEB-interested students from any major. Contact faculty advisor Catherine Badgley or check out the MEEBS Facebook page for more information.
- **Neuroscience Students Association (NSA):** an organization for students with an interest in neuroscience. Email nsaleadteam@umich.edu for more information.

ECOLOGY, EVOLUTION, AND BIODIVERSITY 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: EEB 381 (General Ecology) or EEB 373 (General Ecology Lab); and 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 443 Biology of Insects at UMBS (UL, BD, FR)
BIOLOGY 230 Introduction to Plant Biology (BD)	EEB 445 Biogeography (UL)
BIOLOGY 256 Environmental Physiology of Animals (BD)	EEB 446 Microbial Ecology (UL)
BIOLOGY 288 Animal Diversity (BD)	EEB 447 Microbes in the Wild: Environ. Micro. Lab (UL)
EEB 300 Independent Research (FR* if 3 credits)	EEB 450 Biology of Amphibians and Reptiles (UL, BD)
EEB 313 Geobiology (UL)	EEB 451 Biology of Mammals (UL, BD)
EEB 315 The Ecology and Evolution of Infectious Diseases (UL)	EEB 453 Field Mammalogy (UL, BD, FR)
EEB 316 Introduction to Food Systems (UL)	EEB 455 Ethnobotany (UL, FR)
EEB 320 Rivers, Lakes, and Wetlands (UL)	EEB 457 Algae in Freshwater Ecosystems (UL, BD, FR)
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 480 Model-based Statistical Inference for Ecology (UL)
EEB 380 Oceanography: Marine Ecology (UL, BD)	EEB 482 Freshwater Ecosystems: Limnology at UMBS (UL, FR)
EEB 400 Independent Research (FR* if 3 credits)	EEB 483 Freshwater Ecosystems: Limnology (UL)
EEB 401 Advanced Topics in Biology (UL)	EEB 485 Population and Community Ecology (UL)
EEB 404 Genetics, Development, and Evolution (UL)	EEB 486 Biology and Ecology of Fish (UL, BD, FR)
EEB 405 Biological Station Special Topics (UL, FR)	EEB 487 Ecology of Fishes (UL)
EEB 408 Modeling for Ecology and Evolutionary Biology (UL)	EEB 489 Soil Ecology (UL)
EEB 413 Evolutionary Foundations of Medicine (UL)	EEB 490 Evolution at the Population Level (UL)
EEB 414 Molecular Approaches in EEB (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 430 Modeling Infectious Diseases (UL)	EEB 494 Teaching College Science (UL)
EEB 431 Ecology of Animal Parasites (UL, FR, BD)	EEB 497 Complex Systems in Ecology (UL)
EEB 433 Ornithology (UL, BD)	EEB 498 The Ecology of Agroecosystems (UL)
EEB 435 Ecological Networks (UL)	EEB 556 Field Botany of Northern Michigan (UL, BD, FR)
EEB 436 Woody Plants: Biology and Identification (UL, BD)	*3 credits must be taken in one term to fulfill the FR req. See the Independent Research credit rules; 6 cr. max. applies.
EEB 440 Biology of Fishes (UL, BD)	
EEB 441 The Biology of Fishes Laboratory (UL)	
EEB 442 Biology of Insects (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	MATH* - 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 206, 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, EVOLUTION, AND BIODIVERSITY MAJOR REQUIREMENTS

ECOLOGY, EVOLUTION, AND BIODIVERSITY PREREQUISITES:

TERM: COURSE: CREDITS:

Introductory Biology Sequence:

<input type="checkbox"/> Choose Sequence A, B, or C: A: BIO 171, BIO 172 or 174, & BIO 173 B: BIO 195 (AP/IB) & BIO 173 C: BIO 191 (transfer credit), BIO 192, & BIO 173 *Students may declare the major after completing the intro bio sequence with a C average*		

Chemistry:

<input type="checkbox"/> CHEM 210 & 211		

Quantitative Analysis Sequence:

<input type="checkbox"/> Quantitative Analysis 1: MATH 115, 120 (AP), 175, 185, or 295		
<input type="checkbox"/> Quantitative Analysis 2: One course from: MATH 116, 121 (AP), 156, 176, 186, or 296; STATS 180 (AP), 206, 250, or 280; STATS 400-level or above (min. 3 credits); BIOLOGY 202; BIOPHYS/PHYSICS 290; EECS 183, 203, or 280; EARTH 468; or other course with a MATH 115 prereq. approved by a major advisor [Note: Any course used here cannot also be used as a major elective; i.e., a course cannot "double-count."]		

Physics:

<input type="checkbox"/> PHYSICS I (lecture + lab): One of the following combinations: PHYSICS 125 & 127; 135 & 136; 140 & 141; 150 & 151; or 160 & 161. [PHYSICS 139 (AP) will also fulfill this requirement.]		

ECOLOGY, EVOLUTION, AND BIODIVERSITY MAJOR:

EEB Major Core:

<input type="checkbox"/> Ecology Lecture & Lab: (BIOLOGY 281 or 282) & (EEB 372 or 373); *OR* EEB 381		
<input type="checkbox"/> Genetics: BIOLOGY 305		
<input type="checkbox"/> Evolution: EEB 390, 391, or 392		
<input type="checkbox"/> 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, 480, or 490; or a second (non-AP) course at the 200-level or above from the QA2 options above		
<input type="checkbox"/> EEB Capstone: EEB 410		

Upper-Level Electives for EEB (UL) (2 courses, minimum 6 credits):

<input type="checkbox"/> EEB 300-level or above [Exclusions: EEB 300/400, 301, 302, 397, 399, 499, 600, 800, and non-specific (departmental) transfer courses are EXCLUDED.]		
<input type="checkbox"/> EEB or MCDB 300-level or above [Exclusions: EEB/MCDB 300/400, 301, 302, 397, 399, 499, 600, 800; MCDB 360, 412, 460, and 461; and non-specific (departmental) transfer courses are EXCLUDED.]		

EEB Requirements (these may overlap with the Major Core or Electives):

<input type="checkbox"/> Biodiversity Focus (BD): One course from the approved list (attached).		
<input type="checkbox"/> Field or Research Experience (FR): One course from the approved list (attached). <ul style="list-style-type: none"> • 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:

<input type="checkbox"/> Choose additional BIOLOGY, EEB, and MCDB courses at the 200-level and above, to reach 30 major credit hours. <ul style="list-style-type: none"> • Exclusions: BIO 241, BIO 299, EEB/MCDB 301, 302, 600, 800, MCDB 412, and non-specific (departmental) transfer courses are EXCLUDED. • <u>A max. of 2 approved cognate courses</u> may be used as additional courses; see attached list. 		

CONSTRAINTS:

<ul style="list-style-type: none"> • Prerequisites, introductory science courses, and non-specific (departmental) transfer courses are EXCLUDED from the 30 cr. required for the major. • <u>A maximum of 6 credits of independent research</u> (BIO 200, EEB/MCDB 300 or 400, et al.) may be counted toward the major. 		
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Total Credits and GPA Requirement for EEB:

<input type="checkbox"/> Minimum 30 cr. in Major		
<input type="checkbox"/> 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.		