



Biology Major Requirements

Program in Biology Student Services

📍: 2200 Biological Sciences Bldg. (BSB)

🌐: <http://www.lsa.umich.edu/biology>

✉: lsa-biology-advising@umich.edu

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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 Biology?

This major program develops an appreciation of the levels of organization of life, its diversity, and the processes by which life has achieved its present forms. The program is recommended for those who wish to study biology as part of a liberal arts education, to prepare for a teaching career in secondary schools, or to prepare for graduate study in biology or the health professions. 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 Biology may not elect the following majors: Biology, Health, and Society; Cellular & Molecular Biomedical Science (CMBS); Ecology, Evolution, and Biodiversity (EEB); Microbiology; Molecular, Cellular, and Developmental Biology (MCDB); Plant Biology; Neuroscience; Biochemistry; or Biomolecular Science. 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.

<u>BIOLOGY 171</u> ...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.	<u>BIOLOGY 172 or 174</u> (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.)
<u>BIOLOGY 173</u> (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.	

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:

lsa.umich.edu/biology/undergraduates/student-research.html.

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) completion of the thesis program application via the Program in Biology web page,
- (3) participation in at least two terms of independent research, and
- (4) 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/transfercredit. 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 Biology 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
- **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.
- **Microbiology Club:** An organization striving to introduce students to different topics within microbiology and explore the many opportunities within the field. Email olacomm@umich.edu for more information.

BIOLOGY ELECTIVES

Group I – MCDB focus

BIO 205 (4) Developmental Biology
BIO 207* (4) Microbiology
BIO 225 (3) Principles of Human and Animal Physiology (lecture)
BIO 230* (4) Introduction to Plant Biology
BIO 272 (4) Fundamentals of Cell Biology
BIO 290 (4) Biotechnology & Bioenvironmental Science

*also satisfies lab req.

Group II – EEB focus

BIO 207* (4) Microbiology
BIO 230* (4) Introduction to Plant Biology
BIO 252* (4) Vertebrate Evolution & Diversity
BIO 256 (3) Environmental Physiology of Animals
BIO 281 (3) General Ecology Lecture
BIO 282 (3) General Ecology Lecture (UMBS)
BIO 288* (4) Introduction to Animal Diversity

Biology Labs

BIO 202 Biological Data Analysis & Prog. *(only if not used as prereq.)*
BIO 207 Microbiology
BIO 226 Animal Physiology Laboratory
BIO 230 Introduction to Plant Biology
BIO 252 Vertebrate Evolution & Diversity
BIO 288 Introduction to Animal Diversity
EEB/MCDB 300 (3) Undergraduate Research**
MCDB 306 Intro. Genetics Laboratory
EEB 313 Geobiology
EEB 321 Rivers, Lakes, and Wetlands (UMBS)
EEB 330 Biology of Birds (UMBS)
EEB 348 Forest Ecosystems (UMBS)
EEB 372 General Ecology Laboratory
EEB 373 General Ecology Laboratory (UMBS)
EEB 391 Evolutionary Processes & Macroevolution
EEB 392 Evolution (UMBS)
EEB/MCDB 400 (3) Advanced Research**
EEB 405 Biological Station Special Topics (UMBS)
MCDB 423 Cellular and Molecular Neurobio. Laboratory

MCDB 424 Behavioral Neurobiology Laboratory
MCDB 429 Cell and Molecular Biology Laboratory
EEB 429 Intro. to Statistical Model Building in R
EEB 431 Ecology of Animal Parasites (UMBS)
EEB 433 Ornithology
EEB 436 Woody Plants
EEB 441 Biology of Fishes Laboratory
EEB 443 Biology of Insects (UMBS)
EEB 447 Microbes in the Wild: Environ. Micro. Lab (UMBS)
EEB 450 Biology of Amphibians and Reptiles
EEB 451 Biology of Mammals
EEB 453 Field Mammalogy (UMBS)
EEB 455 Ethnobotany (UMBS)
EEB 457 Algae in Freshwater Ecosystems (UMBS)
EEB 468 Biology of Fungi
EEB 482 Limnology (UMBS)
EEB 486 Field Studies of Freshwater Fishes (UMBS)
EEB 489 Soil Ecology
EEB 493 Behavioral Ecology (UMBS)
EEB 556 Field Botany of Northern Michigan (UMBS)

**EEB/MCDB 300 or 400 (Independent Research), elected for a minimum of 3 credits in a single term, may be used to fulfill a lab requirement. (3 credit max. applies; see CONSTRAINTS.)

BIOLOGY Cognates

ANTHRBIO 365 – Human Evolution
ANTHRBIO 368/PSYCH 338 – Primate Social Behavior
ANTHRBIO 450 – Molecular Anthropology
ANTHRBIO/ENVIRON 461 – Primate Conservation Biology
BIOLCHEM 650 – Eukaryotic Gene Expression
BIOMEDE 231 – Introduction to Biomechanics
CHEMISTRY – Any course numbered 230 or above
CLIMATE/EARTH/SPACE 320 – Earth Systems Evolution
CMPLXSYS 501 – Introduction to Complex Systems
CMPLXSYS 530 – Computer Modeling of Complex Systems
EARTH 418 – Paleontology
EARTH 436 – Fld Std in Stratigraphy, Paleont., & Sedimentology
EARTH 437 – Evolution of Vertebrates
EARTH/ENVIRON 450 – Ecosystem Science in the Rockies
EARTH/ENVIRON 453 – Tropical Conservation & Resource Mgt.
ENVIRON 310 – Toxicology: Study of Environ. Chems. & Disease
ENVIRON 317 – Conservation of Biological Diversity

EPID 543 – Virus Diseases
EPID 560 – Mechanisms of Bacterial Pathogenesis
HUMGEN 541 – Molecular Genetics
MATH – Any course numbered 200 or above*
MICRBIOL 405 – Medical Microbiology and Infectious Disease
MICRBIOL 415 – Virology
MICRBIOL 430 – Microbial Symbiosis
MICRBIOL/IMMUN 440 – Immunology
MICRBIOL/INTMED 460 – Eukaryotic Microbiology
PHRMACOL 310 – Pharmacology and Therapeutics
PHRMACOL 425 – Development of New Medications
PHYSICS 290 - Physics of the Body and Mind*
PSYCH 337 – Hormones and Behavior
STATS 401 – Applied Statistical Methods II*
STATS 412 – Introduction to Probability and Statistics*
STATS 425 – Introduction to Probability*

*Courses used as prerequisites may not double-count as additional courses.

BIOLOGY MAJOR REQUIREMENTS

BIOLOGY PREREQUISITES:

Introductory Biology Sequence:

	TERM:	COURSE:	GRADE:
<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 <i>*Students may declare the major after completing the intro bio sequence with a C average*</i>			

Chemistry Sequence:

<input type="checkbox"/> CHEM 210 & 211			
<input type="checkbox"/> CHEM 215 & 216			

Quantitative Analysis Sequence:

Choose four courses from the following options: <i>[Note: Any course used to fulfill this requirement cannot also be used as a major elective; i.e., a course cannot "double-count."]</i> <input type="checkbox"/> Calculus 1: MATH 115, 120 (AP), 175, 185, or 295 <input type="checkbox"/> Calculus 2: MATH 116, 121 (AP), 156, 176, 186, or 296 <input type="checkbox"/> PHYSICS I: PHYSICS 125, 135, 139 (AP), 140, 150, or 160 <input type="checkbox"/> PHYSICS II: PHYSICS 126, 235, 239 (AP), 240, 250, or 260 <input type="checkbox"/> Computer Programming: EECS 183, 203, and/or 280 <input type="checkbox"/> Statistics: [STATS 180 (AP), 206, 250, or 280]; and/or STATS 400-level or above (min. 3 credits) <input type="checkbox"/> BIOLOGY 202; BIOLOGY 131/COMPFOR 131/BIOPHYS 117 (only one of BIOLOGY 131/COMPFOR 131 or BIOPHYS 117 may be used) <input type="checkbox"/> BIOPHYS/PHYSICS 290			
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BIOLOGY MAJOR:

Biology Group Options (Courses with an asterisk (*) may overlap with the lab requirement):

<input type="checkbox"/> Group I - MCDB Elective: Choose one course from the Group I Course List			
<input type="checkbox"/> Group II - EEB Elective: Choose one course from the Group II Course List			

Required Courses (Courses with an asterisk (*) may overlap with the lab requirement):

<input type="checkbox"/> Genetics: BIO 305			
<input type="checkbox"/> Biochemistry: MCDB 310, BIOLCHEM 415, or CHEM 351			
<input type="checkbox"/> Evolution: EEB 390, 391*, or 392*			

Upper-Level Elective (May overlap with the lab requirement):

<input type="checkbox"/> Choose <u>one course</u> in EEB or MCDB at the 300- or 400-level <ul style="list-style-type: none"> • Exclusions: EEB/MCDB 301, EEB/MCDB 302, BIO/EEB 312, EEB/MCDB 399, EEB/MCDB 499, MCDB 412, MCDB 461, and non-specific (departmental) transfer courses are EXCLUDED. • EEB/MCDB 300 or 400 (Independent Research), elected for a min. of 3 credits in a single term, may be used to fulfill this requirement. (3 credit max. applies; see CONSTRAINTS below.) 			
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Lab Courses for Biology (This requirement may OVERLAP with other major reqs.):

<input type="checkbox"/> Lab Requirement (<u>3 courses</u> from the approved list are required; see 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 a lab requirement. (3 credit max. applies; see CONSTRAINTS below.) 			
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Additional Course(s):

<input type="checkbox"/> Choose additional BIOLOGY, EEB, or MCDB courses at the 200-, 300-, or 400-level, to reach 30 major credit hours. <ul style="list-style-type: none"> • Exclusions: BIO 241, BIO 299, EEB/MCDB 301, EEB/MCDB 302, BIO/EEB 312, MCDB 412, EEB/MCDB 600/800, 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. 			
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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 3 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 Biology:

<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.			