



# Biology Major Requirements

## Program in Biology Student Services

📍: 1140 Undergrad. Science Bldg. (USB)

🌐: <http://www.lsa.umich.edu/biology>

✉: [lsa-biology-advising@umich.edu](mailto: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; General Biology; Cellular and Molecular Biology (CMB); CMB:BME; Cellular & Molecular Biomedical Science (CMBS); Ecology and Evolutionary Biology; Ecology, Evolution, and Biodiversity; 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; 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 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](http://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><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> <b>(prerequisite: prior or concurrent credit for CHEM 130)</b> ...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> <b>(prerequisite = BIOLOGY 171, 172, 174, 191, or 195)</b> ...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:

[lsa.umich.edu/biology/undergraduates/student-research.html](http://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) 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](http://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](http://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](http://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](mailto: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](mailto:nsaleadteam@umich.edu) for more information.

## BIOLOGY ELECTIVES

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### Group I – MCDB focus

BIO 205 (3) Developmental Biology  
BIO 207\* (4) Microbiology  
BIO 222 (4) Principles of Cellular and Molecular Neuroscience  
BIO 225 (3) Principles of Human and Animal Physiology (lecture)  
BIO 230\* (4) Introduction to Plant Biology  
BIO 272 (4) Fundamentals of Cell Biology

### Group II – EEB focus

BIO 207\* (4) Microbiology  
BIO 230\* (4) Introduction to Plant Biology  
BIO 252\* (4) Vertebrate Evolution and Diversity  
BIO 255\* (4) Plant Diversity  
BIO 256 (3) Environmental Physiology of Animals  
BIO 281 (3) General Ecology  
BIO 288\* (4) Introduction to Animal Diversity  
EEB 381\* (5) General Ecology (Su at UMBS)

\*also satisfies lab req.

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### Biology Labs *(Note: An EEB course taken at the U-M BioStation counts as a laboratory class.)*

BIO 207 (4) Microbiology  
BIO 226 (2) Animal Physiology Laboratory  
BIO 230 (4) Introduction to Plant Biology  
BIO 252 (4) Vertebrate Evolution and Diversity  
BIO 255 (4) Plant Diversity  
BIO 288 (4) Introduction to Animal Diversity  
EEB/MCDB 300 (3) Undergraduate Research\*\*  
MCDB 306 (3) Intro. Genetics Laboratory  
MCDB 308 (3) Developmental Biology Laboratory  
EEB 313 (4) Geobiology  
EEB 320 (4) Rivers, Lakes, and Wetlands  
EEB 321 (5) Rivers, Lakes, and Wetlands (UMBS)  
EEB 330 (5) Biology of Birds (UMBS)  
EEB 341 (4) Parasitology  
EEB 348 (5) Forest Ecosystems (UMBS)  
EEB 372 (3) General Ecology Laboratory  
EEB 381 (5) General Ecology (UMBS)  
EEB 392 (5) Evolution (UMBS)  
EEB/MCDB 400 (3) Advanced Research\*\*  
EEB 405 (5) Biological Station Special Topics (UMBS)  
EEB/MCDB 416 (4) Introduction to Bioinformatics  
MCDB 419 (3) Endocrinology Laboratory

MCDB 423 (3) Cellular and Molecular Neurobiology Laboratory  
MCDB 424 (2) Behavioral Neurobiology Laboratory  
MCDB 429 (3) Cell and Molecular Biology Laboratory  
EEB 431 (5) Ecology of Animal Parasites (UMBS)  
EEB 433 (4) Ornithology  
EEB 436 (4) Woody Plants  
EEB 441 (1) Biology of Fishes Laboratory  
EEB 443 (5) Biology of Insects (UMBS)  
EEB 450 (4) Biology of Amphibians and Reptiles  
EEB 451 (4) Biology of Mammals  
EEB 453 (5) Field Mammalogy (UMBS)  
EEB 455 (5) Ethnobotany (UMBS)  
EEB 457 (5) Algae in Freshwater Ecosystems (UMBS)  
EEB 468 (4) Biology of Fungi  
EEB 477 (5) Laboratory in Field Ecology  
EEB 482 (5) Limnology (UMBS)  
EEB 483 (4) Limnology: Freshwater Ecology  
EEB 486 (5) Biology and Ecology of Fishes (UMBS)  
EEB 489 (3) Soil Ecology  
EEB 493 (5) Behavioral Ecology (UMBS)  
EEB 556 (5) Field Botany of Northern Michigan (Su at 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.)

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### BIOLOGY Cognates

ANTHRBIO 365 – Human Evolution  
ANTHRBIO 368/PSYCH 338 – Primate Social Behavior  
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 – Field Studies in Stratigraphy, Paleontology, & 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 *(Cannot be used to fulfill both a prereq. and major elective)*  
PSYCH 337 – Hormones and Behavior  
STATS 401 – Applied Statistical Methods II  
STATS 412 – Introduction to Probability and Statistics  
STATS 425 – Introduction to Probability

# BIOLOGY MAJOR REQUIREMENTS

## BIOLOGY PREREQUISITES:

### Introductory Biology Sequence:

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\**

**TERM:    COURSE:    GRADE:**



### 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), 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 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.]


## BIOLOGY MAJOR:

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

Group I - MCDB Elective: Choose 1 from: BIO 205, BIO 207\*, BIO 222, BIO 225, BIO 230\*, or BIO 272

Group II - EEB Elective: Choose 1 from: BIO 207\*, BIO 230\*, BIO 252\*, BIO 255\*, BIO 256, BIO 281, BIO 288\*, or EEB 381\*


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

Genetics: BIO 305

Biochemistry: Choose from: MCDB 310, BIOLCHEM 415, or CHEM 351

Evolution: EEB 390, 391, or 392\*


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

Choose one course in EEB or MCDB at the 300- or 400-level

- EEB/MCDB 301, EEB/MCDB 302, 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.)


**Lab Courses for Biology** (This requirement may OVERLAP with other major reqs.):

Lab Requirement (3 courses from the approved list are required; see attached.)

- 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.)


### Additional Course(s):

Choose additional BIOLOGY, EEB, or MCDB courses at the 200-, 300-, or 400-level, to reach 30 major credit hours.

- **BIO 241, BIO 299, EEB/MCDB 301, EEB/MCDB 302, EEB/MCDB 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 3 credits of independent research (BIO 200, EEB/MCDB 300 or 400, et al.) may be counted toward the major.


### Total Credits and GPA Requirement for Biology:

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.
