Effective Fall 2026

Biotechnology and Bioenvironmental Sciences (BBS) Major Requirements

Program in Biology Student Services
: 2200 Biological Sciences Bldg. (BSB) : http://www.lsa.umich.edu/biology
: lsa-biology-advising@umich.edu : 734-763-7984

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 Biotechnology and Bioenvironmental Sciences?

The curriculum in Biotechnology and Bioenvironmental Sciences (BBS) offers students an integrated program of study and training to prepare students for future careers in the biotechnology industry, while also providing students with the educational background for biology-based Master's programs, Ph.D. programs, and medical school. BBS majors will become well-versed in current biotechnology methods, including applications of plant biology towards environmental health and the development of biology-based fuels. Students completing the BBS major will complete the Introductory Biology series of courses and two core courses in either Genetics (BIOLOGY 305), Biochemistry (MCDB 310/CHEM 351/BIOLCHEM 415), or Ecology (BIOLOGY 281/BIOLOGY 282). BBS majors will complete laboratory courses, and opportunities for independent study are encouraged as part of the curriculum. Students intending to go to medical school should compare degree requirements to the medical 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 BBS may not elect the following majors: Biology; Biology, Health, and Society (BHS); Molecular, Cellular, and Developmental Biology (MCDB); Cellular & Molecular Biomedical Science (CMBS); Ecology, Evolution, and Biodiversity (EEB); Microbiology; Neuroscience; Biochemistry; or Biomolecular Science. They may also not elect an academic minor in Biology; Ecology, Evolution, and Biology (EEB); 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 must have completed the introductory biology sequence, one term in residence with a major/minor GPA of 2.0 or better, and be in good academic standing in order to declare. Make an advising appointment online through the Program in 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, followed by the second lecture course and then 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. Students with an appropriate AP/IB score receive credit for BIOLOGY 196, which is the equivalent of BIOLOGY 173.
- Transfer students who receive credit for BIOLOGY 191 should take BIOLOGY 192 (offered in fall term only) and BIOLOGY 173 to complete the introductory biology sequence.

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.	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.)
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.	

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 contribute to the design, implementation, and interpretation of experiments. Please visit the Student Research web page under the Undergraduates tab at the Program in Biology home page for enrollment request forms, policies for independent research, and information/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) 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 BBS 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 in student organizations?

There are several student organizations pertinent to biology-related majors. More detailed information is available on the Program in Biology website: lsa.umich.edu/biology/undergraduates/student-involvement.html. Student groups include:

- **Biology Student Alliance (BSA):** a student org. open to all Program in Biology & Neuroscience majors as well as pre-ed or other science-oriented students interested in biology research and outreach, and in collaborating and socializing with other biology-interested students. Please e-mail bsa-eboard@umich.edu for details.
- **Michigan Ecology and Evolutionary Biology Society (MEEBS)**: MEEBS is an informal club designed to create a community for EEB-interested students from any major.
- **Michigan Synthetic Biology Team (MSBT)**: The MSBT is a student-led club where students work together to design a project in synthetic biology using cutting-edge technology and carry out self-led experiments to perfect its design. The team participates annually in the International Genetically Engineered Machines (iGEM) competition.
- **Michigan Microbiology and Immunology Club (MMIC)**: MMIC is centered around promoting microbiology and immunology, discussing scientific research, and constructing peer mentorship for students in the sciences.
- **Neuroscience Students Association (NSA)**: The NSA is an organization for students interested in Neuroscience, providing networking opportunities, seminars, and community outreach.
- **Michigan Synthetic Bio Team iGEM (MSBT):** MSBT is a student-run biology and engineering team.

BBS MAJOR COURSES AND ELECTIVES

Required Core Biology Courses: (three courses)
BIOLOGY 290: Biotechnology and Bioenvironmental Sciences
And two of the following three course options:
BIOLOGY 305: Genetics
MCDB 310: Intro Biochemistry or BIOLCHEM 415: Intro Biochem or CHEM 351: Biochem Fundamentals
BIOLOGY 281: General Ecology or BIOLOGY 282: General Ecology

Group I: Gateway Courses: (two courses required from the following list)
BIOLOGY 207: Microbiology
BIOLOGY 225: Human and Animal Physiology
BIOLOGY 230: Plant Biology
BIOLOGY 256: Environmental Physiology of Animals
BIOLOGY 288: Animal Diversity

Group II: Biotechnology Elective: (one course required from the following list)
MCDB 408: Genomic Biology
MCDB 411: Protein Structure and Function
MCDB 415: Microbial Genetics
MCDB 430: Molecular Biology of Plants
MCDB 472: Building a Synthetic Cell
MCDB 489: Microbial Genes and Genomes
BIOPHYSICS 440: Biophysics of Disease

Group III: Bioenvironmental Sciences Elective: (one course required from the following list)
EEB 313 or EARTH 313: Geobiology
EEB 315 or ENVIRON 315: The Ecology and Evolution of Infectious Diseases
EEB 349: Coastal Ecology & Sustainability
EEB 380: Oceanography
EEB 390: Evolution or EEB 391: Evol Proc & Macroevolution
EEB 436: Woody Plants: Biology and Identification
EEB 446: Microbial Ecology
EEB 468: The Biology of Fungi
EEB 498: The Ecology of Agroecosystems

Group IV: Advanced Laboratory Course: (one course required from the following list)
MCDB 306: Genetics Lab
MCDB 429: Lab in Cell and Molecular Biology
EEB 372/ENVIRON 372 or EEB 373: Ecology Lab
EEB 401: Machine learning/artificial intelligence for EEB
EEB 429: Intro. Stat. Model R
EEB 496: Experimental Evolution
MCDB 400 or EEB 400: Advanced Research (must be taken for three or more credits in a single term; a maximum of three credits of independent research may be applied towards the major)

Additional Courses: (choose one or more courses from the following to reach 30 credits in major)
Additional courses from Groups II, III, or IV not used to fulfill another requirement
CHEM 230: Physical Chemical Principles and Applications or CHEM 260: Chemical Principles
PUBHLTH305: The Environment and Human Health
BIOPHYS 370: Physical and Chemical Principles Behind Biology and Medicine
BIOMEDE 504: Cellular Biotechnology
EARTH 331 / ENVIRON 332: Climate and Climate Change

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BIOTECHNOLOGY AND BIOENVIRONMENTAL SCIENCES MAJOR REQUIREMENTS

BIOTECHNOLOGY & BIOENVIRONMENTAL SCIENCES PREREQUISITES:

Introductory Biology Sequence:	**TERM:**	**COURSE:**	**GRADE:**
□ Choose Sequence A, B, or C: A: BIOLOGY 171; BIOLOGY 172 or 174; and BIOLOGY 173 or BIOLOGY 196 (AP/IB) B: BIOLOGY 195 (AP/IB); & BIOLOGY 173 or BIOLOGY 196 (AP/IB) C: BIOLOGY 191 (transfer credit); BIOLOGY 192; and BIOLOGY 173 ** Students must have completed the introductory biology sequence, one term in residence with a major GPA of 2.0 or better, and be in good academic standing in order to declare.**			

Chemistry Sequence:			
□ CHEM 210 & 211			
□ CHEM 215 & 216			

Quantitative Analysis Sequence:			
Choose three courses from the following options: □ Calculus I: MATH 115, 120 (AP), 175, 185, or 295 □ Calculus II: MATH 116, 121 (AP), 156, 176, 186, or 296 □ Physics I: PHYSICS 125, 135, 139 (AP), 140, 150, or 160 □ Physics II: PHYSICS 126, 235, 239 (AP), 240, 250, or 260 □ Computer Programming: EECS 180 (AP) or EECS 183; EECS 203; EECS 280 □ Statistics: STATS 180 (AP) or STATS 250; STATS 280; DATASCI 101; STATS 400-level or above (min. 3 credits) □ BIOLOGY 202; BIOLOGY/BIOPHYS/COMPFOR 131 □ BIOPHYS/PHYS 290 *(Any course used to fulfill this requirement cannot also be used as a major elective)*			

BIOTECHNOLOGY AND BIOENVIRONMENTAL SCIENCES MAJOR:

Required Core Biology Courses: (three courses)			
□ BIOLOGY 290: Biotechnology and Bioenvironmental Sciences ***And*** two of the following courses: □ BIOLOGY 305: Genetics □ MCDB 310 or BIOLCHEM 415 or CHEM 351: Biochemistry □ BIOLOGY 281 or BIOLOGY 282: General Ecology			

Group I: Gateway Biology Courses:			
□ Choose two courses from the Group I: Gateway Biology course list			

Group II: Biotechnology Elective:			
□ Choose one course from the Group II: Biotechnology Electives course list.			

Group III: Bioenvironmental Sciences Elective:			
□ Choose one course from the Group III: Bioenvironmental Sciences Electives course list.			

Group IV: Advanced Laboratory Course:			
□ Choose one class from the Group IV: Advanced Laboratory course list.			

Additional Course(s):			
□ Choose one or more courses from the Additional Courses list to reach 30 credits in the BBS major			

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 (EEB/MCDB 400, et al.) may be counted toward the major.

Total Credits and GPA Requirement for Biotechnology and Bioenvironmental Sciences:

- □ 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.