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: [http://www.lsa.umich.edu/advising/academicplanning/prehealth](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 Biology may not elect the following majors: General Biology; Cellular and Molecular Biology; CMB:BME; Ecology and Evolutionary Biology; Ecology, Evolution, and Biodiversity; Microbiology; 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 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.)

<table>
<thead>
<tr>
<th>BIOLOGY 171</th>
<th>BIOLOGY 172 or 174</th>
</tr>
</thead>
<tbody>
<tr>
<td>...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.</td>
<td>(prerequisite: prior or concurrent credit for CHEM 130)</td>
</tr>
<tr>
<td>(prerequisite = BIOLOGY 171, 172, 174, or 195)</td>
<td>...focuses on how cells, organs, and organisms work.</td>
</tr>
<tr>
<td>...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.</td>
<td>(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.)</td>
</tr>
</tbody>
</table>
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, and
(2) the completion of a significant piece of independent research that is
   (a) reported in an honors thesis and
   (b) 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 (www.lsa.umich.edu/cgis). The Opportunity Hub (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, 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/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.

[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): 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 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 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 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. Email ssscrexec@umich.edu.
### BIOLOGY MAJOR REQUIREMENTS

#### BIOLOGY & GENERAL BIOLOGY ELECTIVES

<table>
<thead>
<tr>
<th>Group I – MCDB focus</th>
<th>Group II – EEB focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 205 (3) Developmental Biology</td>
<td>BIO 230* (4) Introduction to Plant Biology</td>
</tr>
<tr>
<td>BIO 207* (4) Microbiology</td>
<td>BIO 252* (4) Vertebrate Evolution and Diversity</td>
</tr>
<tr>
<td>BIO 222 (4) Principles of Cellular and Molecular Neuroscience</td>
<td>BIO 255* (4) Plant Diversity</td>
</tr>
<tr>
<td>BIO 225 (3) Principles of Human and Animal Physiology (lecture)</td>
<td>BIO 256 (3) Environmental Physiology of Animals</td>
</tr>
<tr>
<td>BIO 230* (4) Introduction to Plant Biology</td>
<td>BIO 281 (3) General Ecology</td>
</tr>
</tbody>
</table>

*B also satisfies lab req.

#### Biology Labs

*(Note: A course taken at the U-M BioStation counts as a laboratory class.)*

<table>
<thead>
<tr>
<th>Biology Labs</th>
<th>Group I – MCDB focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 207 (4) Microbiology</td>
<td>MCDB 423 (3) Cellular and Molecular Neurobiology Laboratory</td>
</tr>
<tr>
<td>BIO 226 (2) Animal Physiology Laboratory</td>
<td>MCDB 424 (2) Behavioral Neurobiology Laboratory</td>
</tr>
<tr>
<td>BIO 230 (4) Introduction to Plant Biology</td>
<td>MCDB 429 (3) Cell and Molecular Biology Laboratory</td>
</tr>
<tr>
<td>BIO 252 (4) Vertebrate Evolution and Diversity</td>
<td>EEB 431 (5) Ecology of Animal Parasites (Su at UMBS)</td>
</tr>
<tr>
<td>BIO 255 (4) Plant Diversity</td>
<td>EEB 433 (4) Ornithology</td>
</tr>
<tr>
<td>BIO 288 (4) Introduction to Animal Diversity</td>
<td>EEB 436 (4) Woody Plants</td>
</tr>
<tr>
<td>EEB/MCDB 300 (3) Undergraduate Research</td>
<td>EEB 442 (4) Biology of Insects</td>
</tr>
<tr>
<td>MCDB 306 (3) Intro. Genetics Laboratory</td>
<td>EEB 443 (5) Biology of Insects (Su at UMBS)</td>
</tr>
<tr>
<td>MCDB 308 (3) Developmental Biology Laboratory</td>
<td>EEB 450 (4) Biology of Amphibians and Reptiles</td>
</tr>
<tr>
<td>EEB 313 (4) Geobiology</td>
<td>EEB 451 (4) Biology of Mammals</td>
</tr>
<tr>
<td>EEB 320 (4) Rivers, Lakes, and Wetlands</td>
<td>EEB 453 (5) Field Mammalogy (Su at UMBS)</td>
</tr>
<tr>
<td>EEB 321 (5) Rivers, Lakes, and Wetlands (Su at UMBS)</td>
<td>EEB 455 (5) Ethnobotany (Sp at UMBS)</td>
</tr>
<tr>
<td>EEB 330 (5) Biology of Birds (Sp at UMBS)</td>
<td>EEB 457 (5) Algae in Freshwater Ecosystems (Su at UMBS)</td>
</tr>
<tr>
<td>EEB 341 (4) Parasitology</td>
<td>EEB 459 (4) Systematic Botany</td>
</tr>
<tr>
<td>EEB 348 (5) Forest Ecosystems (Su at UMBS)</td>
<td>EEB 463 (3) Neotropical Plant Families</td>
</tr>
<tr>
<td>EEB 372 (3) General Ecology Laboratory [formerly BIO 282*]</td>
<td>EEB 468 (4) Biology of Fungi</td>
</tr>
<tr>
<td>EEB 381 (5) General Ecology (Su at UMBS)</td>
<td>EEB 477 (5) Laboratory in Field Ecology</td>
</tr>
<tr>
<td>EEB 392 (5) Evolution (Su at UMBS)</td>
<td>EEB 482 (5) Limnology (Su at UMBS)</td>
</tr>
<tr>
<td>EEB/MCDB 400 (3) Advanced Research</td>
<td>EEB 483 (4) Limnology: Freshwater Ecology</td>
</tr>
<tr>
<td>EEB 405 (5) Biological Station Special Topics (Su at UMBS)</td>
<td>EEB 485 (5) Biology and Ecology of Fishes (Su at UMBS)</td>
</tr>
<tr>
<td>MCDB 413 (3) Plant Molecular Biology Laboratory</td>
<td>EEB 489 (3) Soil Ecology</td>
</tr>
<tr>
<td>EEB/MCDB 416 (4) Introduction to Bioinformatics</td>
<td>EEB 493 (5) Behavioral Ecology (Su at UMBS)</td>
</tr>
<tr>
<td>MCDB 419 (3) Endocrinology Laboratory</td>
<td>EEB 556 (5) Field Botany of Northern Michigan (Su at UMBS)</td>
</tr>
</tbody>
</table>

#### BIOLOGY Cognates (not approved for General Biology)

- ANTHRIO 365 – Human Evolution
- ANTHRIO 368/PSYCH 338 – Primate Social Behavior
- ANTHRIO/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
- 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/IMMUN 440 – Immunology
- MICRBIOL/INTMED 460 – Eukaryotic Microbiology
- PHRMACOL 425 – Development of New Medications
- PHYS 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 PREREQUISITES:

Introductory Biology Sequence:

□ Choose Sequence A or B:
A: BIO 171, 172 or 174, & 173
B: BIO 195 (AP) & 173

Chemistry Sequence:

□ CHEM 210 & 211

□ CHEM 215 & 216

Quantitative Analysis Sequence:

□ CALCULUS I: MATH 115, 120 (AP), 175, 185, or 295

□ 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.]

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, or BIO 230*

□ Group II - EEB Elective: Choose 1 from: 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, 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-level and above, to reach 30 major credit hours.
  • BIO 241, BIO 262, 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) 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.