Biology, Health, and Society (BHS) Major Requirements

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 a great range of areas, including: health science (medicine, dentistry, public health), biotechnology and pharmaceutical sciences, biological research, environmental policy, conservation and wildlife biology, ecological monitoring, and farming (among others).

Who should major in Biology, Health, and Society?

Biology, Health, and Society is recommended for students interested in a broad view of biology and the interactions between science and society, whether focused on health, education, or the environment. The major is appropriate for pre-health students, as well as those who wish to pursue professional school (e.g., law school) or other non-biology-specific career options where knowledge of the natural sciences would be beneficial. BHS also works well when paired with a (non-science) field of study in a dual major. It differs from other Biology majors in that it requires fewer credits, less laboratory work, and has more breadth. 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, Health, and Society may not elect the following majors: Biology; Cell and Molecular Biology (CMB); CMB:BME; Cellular & Molecular Biomedical Science (CMBS); Ecology, Evolution, and Biodiversity; Microbiology; Molecular, Cellular, and Developmental Biology (MCDB); Plant Biology; Neuroscience; Evolutionary Anthropology; Biochemistry; or Biomolecular Science. They also may not elect an academic minor in Biology; Ecology and Evolutionary Biology; or Plant Biology.

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.

Students with AP credit for 195 or students who have completed the Intro. Bio. sequence should consider a gateway Biology course (Group A) or a health and society course (Group B) as an introduction to the major.

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 project in which they themselves have a say in the design, implementation, and interpretation of experiments or research. 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 or related fields. 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.

BHS majors pursuing research in a biology lab should follow the traditional honors path, which includes working with a sponsor or co-sponsor and readers from research-related EEB or MCDB faculty. However, BHS is unique among Program in Biology-supervised majors in that students have the opportunity to undertake an honors thesis *outside* of a biology laboratory if it is appropriate for the theme of the major (biology's impacts on health and society). Students who want to pursue an honors thesis more interdisciplinary in approach (i.e., with a faculty member outside of biology) will need to conduct original research on the topic. Literature surveys or reviews are **not** eligible. Students considering a BHS interdisciplinary (BHS-ID) thesis should apply to the Program in Biology Honors Program as early as possible to ensure that their research will qualify for an honors thesis. For more information, including the Honors Program application, visit lsa.umich.edu/biology/undergraduates/honors-program.html.

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 (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 16 of the 24 credits required for the BHS 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.

BIOLOGY, HEALTH, AND SOCIETY COURSE LISTS

Group A – Gateway Biology [2 courses, min. 6 credits required]

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 252* (4) Vertebrate Evolution and Diversity
BIO 255* (4) Plant Diversity
BIO 256 (3) Environmental Physiology of Animals
BIO 272 (4) Fundamentals of Cell Biology
BIO 288* (4) Introduction to Animal Diversity

**Indicates a bio lab course*

Group B—Health and Society [2 courses, min. 6 credits required]

AAS 322 (4) Introduction to Environment Politics
BIOLOGY 212 (3) Plants and Human Health
BIOLOGY/AMCULT 241 (4) What is Cancer?
MCDB 396 (3) Science Outreach for Biology
EEB/ENVIRON 318 (4) Food, Land and Society
EEB/ANTHROBIO/ENVIRON 362 (4) Primate Evolutionary Ecology
EEB 498 (3) The Ecology of Agroecosystems
AMCULT/WOMENSTD 233 (3) Genes and Society
AMCULT/HISTORY 284 (3-4) Sickness and Health in Society
AMCULT 365 (3) AIDS and America
ANTHRBIO 363 (4) Genes, Disease, Culture
ANTHRBIO 364 (3-4) Nutrition and Evolution
ANTHRBIO 373 (3) Humans and Environmental Change
ANTHRBIO 467 (3-4) Human Behavioral Ecology
ANTHRCUL 327 /WOMENSTD 307 (4) Critical Theory in Medicine & Healing
ANTHRCUL 341 (4) The Globalization of Biomedicine
ANTHRCUL 344 (4) Medical Anthropology
ENVIRON/ANTHRCUL 256 (3) Culture, Adaptation, and Environment
ENVIRON 270 (4) Our Common Future: Ecol., Econ. & Ethics of Sust. Devel.
ENVIRON 308 (3) Sustainability and Health
ENVIRON 310 (3) Toxicology: The Study of Environ. Chemicals & Disease
ENVIRON 312 / POLSCI 380 / PUBPOL 312 (3) Environ. Politics & Policy
ENVIRON/PSYCH 360 (3) Behavior and Environment
HISTORY 233 (3-4) Hist. of Sexually Trans. Diseases from Syphilis to AIDS
HISTORY 234 (3-4) Medicine in the Western World
HISTORY 285 (4) Science, Technology, Medicine, and Society
HISTORY/AAS/ANTHRCUL 355 (3-4) Health & Illness in African Worlds
HISTORY/WOMENSTD 356 (3-4) Health in America
HISTORY 376 (3-4) Epidemics
IHS 340 Germs Wars, Asthma and the Rise of the Food Allergy Epidemic
PHIL 320 (3) The World-View of Modern Science
PHIL 356 (3-4) Issues in Bioethics
PHIL 381 (3-4) Science & Objectivity
PHIL 425 (3) Philosophy of Biology
PUBHLTH 200 / PUBPOL 210 (4) Health & Society: Intro. to Public Health
PUBHLTH 305 (3) The Environment and Human Health
PUBHLTH 310 (3) Nutrition in the Life Cycle
PUBHLTH 350 (4) Global Public Health
PUBHLTH 381 (3) Public Health Systems
PUBHLTH 403 (3) Obesity: From Cells to Society
SOC 302 (4) Health and Society: An Introduction to Sociology
SOC 475 (3) Intro. to Medical Sociology
SOC 476 (3) Sociology of Bioethics
WOMENSTD 220 (3) Perspectives in Women's Health
WOMENSTD 300 (3) Men's Health
WOMENSTD 324 (4) Childbirth & Culture
WOMENSTD 400 (3) Women's Reproductive Health

Group C – Core Biology [2 courses, min. 6 credits required]

Genetics: BIO 305 (4)
Biochemistry: MCDB 310 (4), BIOLCHEM 415 (4), or CHEM 351 (4)
General Ecology: BIOLOGY 281 (3) or 381* (5)
Evolution: EEB 390 (3), 391 (4), or 392* (5)

Group D – Biology Elective [1 course, min. 3 credits required]

BIOLOGY, EEB, or MCDB course at the 200-level, 300-level, or 400-level (***excluding*** BIOLOGY 200, 212, 241, 299; MCDB/EEB 300, 301, 302, 360, 396, 397, 399, 400, 412, 460, 461, 494, 499)

Group E – Additional Course(s) [Add.'l courses as necessary to reach 24 credits]

Any Add.'l Course from Groups A, B, C, or D listed above
BIO 200**, 299**
EEB/MCDB 300**, 397, 399, 400**, 494, 499
CHEM 230 and above
MATH 200-level or above
PHYSICS 200-level or above
STATS 250, 400-level or above *(only if not used to fulfill prereq.)*

Biology Lab List *(Note: An EEB course taken in spring or summer at the U-M BioStation [UMBS] counts as a laboratory course.)*

BIO 207 (4) Introductory 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 Bio. Laboratory
EEB 313 (4) Geobiology
EEB 320 (4) Rivers, Lakes, & Wetlands
EEB 321 (5) Rivers, Lakes, & 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) Bio. Station Special Topics (UMBS)
EEB/MCDB 416 (4) Intro. to Bioinformatics
MCDB 419 (3) Endocrinology Laboratory
MCDB 423 (3) Cellular and Molecular Neurobiology Laboratory
MCDB 424 (2) Behavioral Neurobiology Lab.
MCDB 429 (3) Cell and Molecular Biology Lab.
EEB 431 (5) Ecol. 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) Biol. and Ecol. of Fishes (UMBS)
EEB 489 (3) Soil Ecology
EEB 493 (5) Behavioral Ecology (UMBS)
EEB 556 (5) 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, HEALTH, AND SOCIETY MAJOR REQUIREMENTS

BIOLOGY, HEALTH, AND SOCIETY PREREQUISITES:

Introductory Biology Sequence:	**TERM:**	**COURSE:**	**GRADE:**
□ 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:

□ CHEM 210 & 211			

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), 250, or 280; STATS 400-level or above (min. 3 credits); BIOLOGY 202; BIOPHYS/PHYSICS 290; EECS 183, 203, or 280; EARTH 468; PHYSICS 125, 135, 139, 140, or 160; 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."]*.			

BIOLOGY, HEALTH, AND SOCIETY MAJOR:

Group A: Gateway Biology Courses [2 courses, min. 6 credits] (Courses with an asterisk (*) may overlap with the lab requirement):

□ Choose two courses from the Group A Course List			

Group B: Health and Society Courses [2 courses, min. 6 credits]:

□ Choose two courses from the Group B Course List			

Group C: Core Biology Courses [2 courses, min. 6 credits] (Courses with an asterisk (*) may overlap with the lab requirement):

□ Genetics: BIO 305			
□ Biochemistry: Choose from: MCDB 310, BIOLCHEM 415, or CHEM 351			
□ Ecology: BIOLOGY 281 or EEB 381*			
□ Evolution: EEB 390, 391, or 392*			

Group D: Biology Elective [1 course, min. 3 credits]:

□ BIOLOGY, EEB, or MCDB course at the 200-level, 300-level, or 400-level (***excluding*** BIOLOGY 200, 212, 241, 299; MCDB/EEB 300, 301, 302, 396, 397, 399, 400, 412, 494, 499; MCDB 360, 460; 461)			

Lab Course for Biology, Health, and Society (This requirement may OVERLAP with other major reqs.):

□ Lab Requirement (<u>1 course</u> from the approved Bio Lab list is 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 courses from Group E, if needed, to reach 24 major credit hours.			

CONSTRAINTS:

- Prerequisites, introductory science courses, and non-specific (departmental) transfer courses are EXCLUDED from the 24 cr. required for the major.
- <u>A maximum of 3 credits of independent research</u> (BIO 200, BIO 299, EEB/MCDB 300 or 400, et al.) may be counted toward the major.

Total Units and GPA Requirement for Biology, Health, and Society

□ Minimum 24 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.