BIOLOGY MAJOR

ADMISSION TO THE MAJOR

Students are encouraged to begin their major in the first year so that they can take maximum advantage of upper-level biology courses and research opportunities in later years. However, the major can certainly be successfully completed if begun during sophomore year, and many students are able to combine the biology major with a semester abroad.

A prospective biology major begins with a series of two core introductory courses. Students should begin the core series with BIOL181 and its associated laboratory course, BIOL191, which are offered in the fall semester. BIOL181 is offered in a number of small sections rather than a single large lecture class. These small sections allow for problem-based learning at a more individualized pace as students master the first semester of university-level biology. Students should enroll separately for the lab course, BIOL191. These courses do not have prerequisites or corequisites, but it is useful to have some chemistry background or to take chemistry concurrently. In the spring semester, the prospective major should take BIOL182 and its laboratory course, BIOL192. An optional spring course, BIOL194, is offered to students of BIOL182 who wish a challenging reading and discussion experience in addition to the lectures.

MAJOR REQUIREMENTS

The biology major's program of study consists of the following:

- The two introductory courses, BIOL181-BIOL182, with their labs, BIOL191-BIOL192.
- At least six elective biology courses at the **200** and **300** levels, including:
  - one mid-level cell/molecular course (either MB&B208, BIOL210, BIOL212, or BIOL218) and
  - one mid-level organismic/population course (either NS&B213/BIOL213, BIOL214, BIOL215, or BIOL216).

NOTE: Among the 6 Biology elective courses, 3 must be used exclusively for the Biology Major

  - No more than three of these mid-level courses (listed above) may be counted towards the six advanced elective requirement.
  - IMPORTANT INFORMATION FOR DOUBLE MAJORS: At least two elective courses (200-level and above) that are counted toward the biology major cannot be simultaneously used to fulfill any other major.
  - In addition, if a student is double-majoring in biology and NS&B, NS&B/BIOL213 cannot count toward the six electives required for the biology major; however, NS&B/BIOL213 will fulfill the Column 2 breadth requirement.
  - Two semesters of general chemistry (CHEM141-CHEM142 or CHEM143-CHEM144)
  - Any three additional semesters of related courses from at least two different departments:
    - organic chemistry (CHEM251 or CHEM252)
    - physics (PHYS111, PHYS112, PHYS113, or PHYS116 and PHYS207
    - mathematics (MATH117 or higher)
    - statistics (MATH132, BIOL242/BIOL542, ECON300 or PSYC200)
    - QAC (QAC201 or QAC231
    - computer science (COMP112, COMP114, COMP115, COMP211, or higher)
    - Earth and Environmental Science E&ES270,or E&ES280 or E&ES380)

NOTE: Two Statistics courses, even from different Departments cannot both be counted as cognates.
Students cannot use E&ES280 if they use QAC231.

- **Biology majors are allowed to apply at most one elective course or one cognate course taken credit/unsatisfactory toward fulfilling the major requirements; however, this is discouraged because good performance in major courses is an important aspect of a student's transcript.**
- A strong chemistry background is especially recommended for students planning to enter graduate or medical school. Most medical and other health-related graduate schools require two years of college-level chemistry, including laboratory components, as well as a course in biochemistry.
- Students planning to go on to medical, dental, or other health professions graduate school should note that a year each of introductory biology, physics, and math (such as calculus or statistics) and two years of chemistry (general and organic) are required for admission, including any laboratory components.

Electives may be chosen from among the following courses at the **200**, **300**, or **500** levels. See WesMaps for current course offerings. The courses are grouped thematically for your convenience only.

CAPSTONE EXPERIENCE WILL BE REQUIRED FOR BIOLOGY MAJORS DECLARING IN 2020
STUDENTS MUST COMPLETE AT LEAST ONE OF THE FOLLOWING:

1. **Lab research (preferably starting sophomore year) leading to a senior thesis (BIOL409, BIOL410)**
2. **Participation in journal club junior or senior year (FALL BIOL505, 507 or 509), (SPRING BIOL506, 508 or 510**
3. **Summer Research Internship**
4. **Additional 300 level seminar**
5. **Upper level lab or field course**
6. **Attendance at weekly Biology and MB&B seminars (FALL BIOL338, SPRING BIOL339)**

CELL AND DEVELOPMENT BIOLOGY

Code	Title	Hours
MB&B/BIOL232	Immunology	1
MB&B/BIOL237	Signal Transduction	1
BIOL334	Shaping the Organism	1
BIOL325	Stem Cells: Basic Biology to Clinical Application	1
BIOL340/540	EvoDevo: Origins of Variation in the Phenotype	1
BIOL343/543	Muscle and Nerve Development	1
BIOL/NS&B345	Developmental Neurobiology	1
BIOL241	Cell-Cell Interactions in Development	1

BIOL295	Physiology and Cell Biology of Cancer	1
BIOL332	Genomics Era Cell and Development	1

EVOLUTION, ECOLOGY, AND CONSERVATION BIOLOGY

Code	Title	Hours
BIOL220	Conservation Biology	1
BIOL226	Invasive Species: Biology, Policy, and Management	1
BIOL235	Comparative Vertebrate Anatomy	1
BIOL290	Plant Form and Diversity	1
BIOL316/516	Plant-Animal Interactions	1
BIOL318/518	Nature and Nurture: The Interplay of Genes and Environment	1
BIOL327/527	Evolutionary and Ecological Bioinformatics	1
BIOL337	The Origins of Bacterial Diversity	0.5
BIOL346	The Forest Ecosystem	1
BIOL365	Calderwoods Seminar in Public Writing: 21st-Century Biology	1
ENVS353	Agricultural Food Webs	1
ENVS369	Ecological Resilience: The Good, the Bad, and the Mindful	1.25

GENETICS, GENOMICS, AND BIOINFORMATICS

Code	Title	Hours
BIOL/MB&B265/ COMP113/CIS265	Bioinformatics Programming	1
BIOL327/527	Evolutionary and Ecological Bioinformatics	1
MB&B/BIOL231	Microbiology	1
BIOL310	Genomics Analysis	1
BIOL257	Neurogenetics	1
MB&B333/533	Gene Regulation	1
MB&B394	Advanced Laboratory in Molecular Biology and Genetics	1
E&ES280	Introduction to GIS	1
E&ES380	Advanced GIS and Spatial Analyses	1
MB&B306	Epigenetics	1

NEUROBIOLOGY AND BEHAVIOR

Code	Title	Hours
BIOL/NS&B224	Hormones, Brain, and Behavior	1
BIOL/NS&B239	Functional Anatomy of the Human Brain	1
NS&B/BIOL243	Neurohistology	1
BIOL244	Neuropharmacology	1
BIOL/NS&B245	Cellular Neurophysiology	1
BIOL/NS&B250	Laboratory in Cellular and Behavioral Neurobiology	1
BIOL/NS&B252	Cell Biology of the Neuron	1
NS&B/BIOL254	Comparative Animal Behavior	1
BIOL/NS&B299	Waves, Brains, and Music	1
NS&B/BIOL328	Chemical Senses	1
BIOL/NS&B345	Developmental Neurobiology	1
BIOL347	Mammalian Cortical Circuits	1
BIOL/NS&B351	Neurobiology of Learning and Memory	1
NS&B/BIOL353	Neurobiology of Neurological Disorders	1
BIOL356	Neurodevelopmental Disorders	1
BIOL357	Sex and Gender: From Synapse to Society	1
NS&B/BIOL360	Calderwood Seminar in Public Writing: Neuroplasticity and the Brain	1

FULFILLING THE BIOLOGY MAJOR

Cross-listed courses that are included on the list above are automatically credited to the biology major. At least two elective courses (**200**-level and above) that are counted toward the biology major must be used to fulfill only the biology major and cannot be simultaneously used to fulfill another major.

Depending on the student's specific program, and with prior permission of the chair, up to two biology courses from outside the department may be counted toward the major. Two Wesleyan courses that fall into this category are ANTH202 and ANTH349.

Additional courses that may be credited to the major: BIOL242, E&ES234, MB&B228, CHEM323, CHEM342, CHE383

NOTE: MB&B228 Introduction to Biochemistry may be counted as long as neither MB&B208 nor MB&B383 is counted toward the major.

Biology majors are allowed to apply at most one elective course taken credit/unsatisfactory toward fulfilling the major requirements; however, this is discouraged because good performance in major courses is an important aspect of a student's transcript.

Courses in the **BIOL 400** series (such as research tutorials) contribute toward graduation but do not count toward the major.

COURSES FOR NON-MAJORS

The following courses do not have prerequisites and, as such, are appropriate for non-majors.

Code	Title	Hours
BIOL106	The Biology of Sex	1
BIOL140	Classic Studies in Animal Behavior	1
BIOL145F	Primate Behavior: The Real Monkey Business (FYS)	1
BIOL173	Global Change and Infectious Disease	1
BIOL181	Principles of Biology I: Cell Biology and Molecular Basis of Heredity	1
BIOL182	Principles of Biology II	1
BIOL197	Introduction to Environmental Studies	1

STUDENT LEARNING GOALS

The Biology Department expects its majors to develop a broad and integrative understanding of the theory and practice of biology across a range of disciplines and levels of biological organization. The curricular requirements of the major are designed to provide enough flexibility for each student to choose a disciplinary emphasis of most interest and fulfill the additional expectation of achieving some depth of knowledge in a particular area through a relatively intensive classroom or laboratory experience. In this context, we want our students to develop skills in critical and quantitative thinking, creative problem-solving, and intuition for the process of scientific reasoning. We also encourage

our students to engage in ethical thinking about biological research and the role of biology in society and sustainability. A complete program of study in biology entails the application of these skills to designing or conducting original research (including scholarly research via scientific databases), writing about and orally communicating scientific concepts, as well as the comprehension and critical interpretation of primary scientific literature. Our ultimate goal is, therefore, to train students to use their biological knowledge and skills to become effective, scientifically informed citizens and professionals.

ADVANCED PLACEMENT

Students who have received a grade of 4 or 5 on the AP exam may receive **one** University credit toward graduation.

Students with a score of 4 or 5 may place out of ***one*** of the two Introductory Biology courses - BIOL181 or BIOL182 but ***must first consult*** with an instructor teaching these courses.

Students interested in placing out of MB&B181 in the fall semester should contact Professor Michelle Murolo (mmurolo@wesleyan.edu***) regarding the placement exam.***

No follow-up course is required. These courses are considered essential background for our upper-level courses; ***students are highly encouraged to enroll in both semesters.***

However, we recommend against this for almost all students, especially those who may be interested in the biology major. Although some of the MB&B181/BIOL181 material will be familiar from a high school AP course, the depth and rigor of MB&B181/BIOL181 provide a strong foundation as you move forward to more advanced courses. Alternatively, students with AP 4 or 5 may consult individually with the BIOL182 faculty regarding placing out of this second-semester introductory course. However, both courses are considered essential background for our upper-level courses; students are highly encouraged to enroll in both semesters.

PRIZES

Dr. Neil Clendeninn Prize. Established in 1991 by George Thornton, Class of 1991, and David Derryck, Class of 1993, for the African American student who has achieved academic excellence in biology and/or molecular biology and biochemistry. This student must have completed his or her sophomore year and in that time have exemplified those qualities of character, leadership, and concern for the Wesleyan community as shown by Dr. Neil Clendeninn, Class of 1971.

The Peirce Prize. Awarded in successive years for excellence in biology, chemistry, and geology.

TRANSFER CREDIT

Up to two outside credits for biology courses may also be applied from another institution (during a study abroad program, for example). Prior permission must be obtained from the departmental liaison Professor Michael Singer (msinger@wesleyan.edu) to ensure creditability of specific courses from other institutions. Information and a downloadable form can be found here https://www.wesleyan.edu/studentaffairs/pdfs/ptcapril2016.pdf

RELATED PROGRAMS OR CERTIFICATES

Environmental Studies Certificate. The Environmental Studies (ENVS) program is interdisciplinary and offers both a certificate and a linked major. The ENVS linked major is a secondary major and requires a student to also have a primary major in another department, program, or college. ENVS majors write a senior thesis or essay in environmental studies that is mentored by a professor in another department, program, or college (e.g., biology). There is also an opportunity to earn an ENVS certificate, which does not require a senior thesis or essay. See: wesleyan.edu/coe/academics/ (https://wesleyan.edu/coe/academics/).

Informatics and Modeling Minor. The Integrative Genomic Science pathway within this minor will be of particular interest for life science majors. See wesleyan.edu/imcp/igs.html (https://wesleyan.edu/imcp/igs.html).

Neuroscience and Behavior Program. Several faculty members in the Biology and Psychology Departments also participate in the Neuroscience and Behavior Program that, at the undergraduate level, constitutes a separate major. Information about that program can be found at wesleyan.edu/nsb (https://wesleyan.edu/nsb/).

The graduate program is an integral part of the Biology Department's offerings. Not only are graduate students active participants in the undergraduate courses, but, also, upper-level undergraduates are encouraged to take graduate-level courses and seminars (**500** series). Research opportunities are also available for undergraduates, and, frequently, these involve close interaction with graduate students.

BA/MA PROGRAM

[wesleyan.edu/grad/degree-programs/bama.html (http://www.wesleyan.edu/grad/degree-programs/bama.html)]

This program provides an attractive option for life science majors to substantially enrich their research and course background and to earn an advanced degree while at Wesleyan. Students are advised to begin research by their junior year if they intend to pursue the BA/MA in biology. Seniors can apply by December 1 and will be notified of their status by the end of January. Admission is competitive and based on GPA, faculty recommendations, and research experience.

All degree-seeking graduate students are required to register for at least one credit in each semester that they are enrolled in the university.

ADDITIONAL INFORMATION

The seminar series features distinguished scientists from other institutions who present lectures on their research findings. One objective of these seminars is to relate material studied in courses, tutorials, and research to current scientific activity. These seminars are usually held on Thursdays at noon and are open to all members of the University community. Undergraduates are especially welcome.

HONORS

To be considered for departmental honors, a student must

- Be a biology major and be recommended to the department by a faculty member. It is expected that the student will have at least a B average (grade point average 85) in courses credited to the major.
- Submit a thesis based on laboratory research, computational research, or mathematical modeling. The thesis is carried out under the supervision of a faculty member of the department.

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