

# BIOLOGY

## Biology Major

### Requirements for Biology Majors

Students can pursue either a B.A. or B.S. degree in Biology (distinctions between the two degrees are outlined below). For either degree, students should aim to complete the three Biology core courses by the end of their second year: BIOL 210 - Molecular Biology and Unicellular Life, BIOL 220 - Multicellular Life, and BIOL 230 - Ecology and Evolution. Students who have completed comparable course work at other accredited institutions may petition to have such courses transferred to Denison and credited toward the major, at the discretion of the department. In contrast, students with credit-earning scores on Advanced Placement (4 or 5) or International Baccalaureate (6 or 7) tests in Biology will be granted academic credit for BIOL 100 - Modern Topics in Biology, but typically will be required to complete all three major core courses.

Majors must achieve a grade point average of 2.0 or higher across the three core courses (BIOL 210 - Molecular Biology and Unicellular Life, BIOL 220 - Multicellular Life, BIOL 230 - Ecology and Evolution) upon completion of the core sequence before proceeding to 300-level elective courses. Students who do not meet the GPA requirement must repeat one or more core courses to achieve the standard; the highest grade awarded for any repeated core course will be exclusively used in calculating the "biology core GPA", but all biology grades will be used to calculate the overall major GPA for graduation, as per university policy. This policy applies only to students pursuing a biology major; it does not apply to students pursuing the biology minor or other non-biology degrees.

The major additionally requires two semesters of introductory level chemistry (CHEM 131 - Atoms and Molecules: Structure and Dynamics and CHEM 132 - Organic Structure and Reactivity; grades of C or better are strongly recommended). CHEM 131 - Atoms and Molecules: Structure and Dynamics must be completed before undertaking 300-level electives, but CHEM 132 - Organic Structure and Reactivity can be taken concurrently.

Biology majors subsequently complete five 300-level advanced courses. Any combination of advanced courses may be taken, but one of these electives must be designated a "biological diversity" course (see description below). BIOL 452 - Advanced Senior Research is credited as a 300-level course, but BIOL 361 - Directed Study, BIOL 362 - Directed Study, BIOL 363 - Independent Study, BIOL 364 - Independent Study, and BIOL 451 - Senior Research are not counted as 300-level advanced courses toward the requirements for the major. Students are encouraged to consult with an advisor in the Biology Department in order to select the most appropriate suite of advanced courses.

Biology majors preparing for medical school or most graduate programs are additionally advised to take CHEM 251 - Intermediate Organic Chemistry, and CHEM 258 - Intermediate Biochemistry, PHYS 121 - General Physics I and PHYS 122 - General Physics II, and two semesters of college-level math (e.g., MATH 130 - Essentials of Calculus, MATH 135 - Single Variable Calculus, or MATH 145 - Multi-variable Calculus) or MATH 120 - Elements of Statistics). These courses can count toward the "science cognate" requirement that is part of the B.S. degree (see requirements below).

Lastly, students majoring in Biology must satisfactorily complete BIOL 300 - Biology Assessment I (core curriculum assessment exam taken during the term immediately following completion of the biology

core) and BIOL 301 - Biology Assessment II (senior writing assessment and survey; administered during the final semester prior to graduating) in order to fulfill the requirements for the degree.

### Bachelor of Arts in Biology

The requirements for the Bachelor of Arts degree in Biology include a total of ten courses:

- three biology core courses (BIOL 210 - Molecular Biology and Unicellular Life, BIOL 220 - Multicellular Life, BIOL 230 - Ecology and Evolution),
- five 300-level biology courses (one of which must be a designated as a "biological diversity" course),
- and one year of introductory level chemistry (CHEM 131 - Atoms and Molecules: Structure and Dynamics and CHEM 132 - Organic Structure and Reactivity).

### Bachelor of Science in Biology

The requirements for the Bachelor of Science degree in Biology include a total of fourteen courses:

- three biology core courses (BIOL 210 - Molecular Biology and Unicellular Life, BIOL 220 - Multicellular Life, BIOL 230 - Ecology and Evolution),
- five 300-level biology courses (one of which must be designated a "biological diversity" course),
- one year of introductory level chemistry (CHEM 131 - Atoms and Molecules: Structure and Dynamics and CHEM 132 - Organic Structure and Reactivity),
- and four "science cognate" courses. The science cognate requirement is the lone distinction between the B.A. and B.S. degrees, serving as a means for B.S. majors to become more broadly trained in the sciences. Any non-biology course within the science division will count toward this requirement, as will any environmental studies (ENVS) science course, or Applied Anatomy HESS 202 - Applied Anatomy. Students are encouraged to select courses that "do" science, such as classes that include laboratory sections. No more than two courses within a single department or program can be used to fulfill this requirement (note that CHEM 131 - Atoms and Molecules: Structure and Dynamics and CHEM 132 - Organic Structure and Reactivity do not count toward the cognate requirement, nor do they count toward the "two courses per department" stipulation).

### Biology Minor

The requirements for the Biology Minor include a total of seven courses:

- three biology core courses
  - (BIOL 210 - Molecular Biology and Unicellular Life, BIOL 220 - Multicellular Life, BIOL 230 - Ecology and Evolution),
- three 300-level biology courses (one of which is a "biological diversity" course),
- and one semester of chemistry (CHEM 131 - Atoms and Molecules: Structure and Dynamics). CHEM 131 - Atoms and Molecules: Structure and Dynamics must be completed prior to undertaking 300-level electives. BIOL 452 - Advanced Senior Research is credited as a 300-level course, but BIOL 361 - Directed Study, BIOL 362 - Directed Study, BIOL 363 - Independent Study, BIOL 364 - Independent Study, and BIOL 451 - Senior

Research are not counted as 300-level advanced courses toward the requirements for the minor.

## Additional Points of Interest

### Biological Diversity Courses

Courses that fulfill the biological diversity requirement emphasize the importance of scientific studies at the level of the whole organism. In these courses students gain a holistic perspective on the study of organisms, explore a variety of living forms through a broad survey of taxa, and evaluate the role of phylogenetic history in taxonomy. Students also use careful observation to learn morphology and diagnostic traits, identify organisms into meaningful taxonomic units, and learn the principles of scientific nomenclature. The biological diversity courses that are regularly offered include:

Code	Title
BIOL 308	Biodiversity Through Time
BIOL 312	Herpetology
BIOL 313	Vertebrate Zoology
BIOL 317	Diversity of Microorganisms
BIOL 320	Plant Systematics
BIOL 326	Plant Evolution and Reproduction
BIOL 327	Biology of Insects
BIOL 336	Invertebrate Zoology

### Off-Campus Study

Students may complement their major in biology through off-campus study. Denison University is a member of several consortia that offer course credit through off-campus programs. Those with course offerings relevant to Biology students include:

- the School for Field Studies,
- the Organization of Tropical Studies,
- the Duke University Marine Laboratory,
- the Semester in Environmental Science,
- the Oak Ridge National Laboratory,
- the Institute for Study Abroad,
- Denmark's International Study Program, and
- the Associated Colleges of the Midwest Wilderness Field Station.

The Department of Biology is committed to awarding credit for courses offered through these programs that provide a sufficient focus on biological concepts and methods (lecture and laboratory). With prior approval from the department, a maximum of two off-campus courses may be counted toward the requirements of the major. The Richard C. and Linda G. Seale Scholarship provides support to qualified Denison students for participation in summer courses at the Duke University Marine Laboratory. Financial aid may be available for other off-campus programs.

### General Education Credit in Biology

Students receive a lab science general education requirement by completing nearly any course offered by the Biology Department. While the 200-level courses are generally recommended for Biology and related majors, non-majors are welcome to take the initial biology major core course (BIOL 210 - Molecular Biology and Unicellular Life), and they can also consider taking one of our non-majors courses. The various versions of Modern Topics in Biology (BIOL 100 - Modern Topics in Biology: lab science GE; BIOL 103 - Modern Topics in Biology: lab science

and quantitative reasoning GEs), and BIOL 110 - Biology and Politics of Women's Health (lab science and oral communication GEs) are designed for students to explore scientific inquiry and biological concepts through specific topics in the instructor's area of expertise. In addition, students who have had extensive biology training in secondary school may petition the Biology department for BIOL 100 - Modern Topics in Biology credit without General Education credit. However, such petitions must be made before the completion of the student's third year at Denison.

### Advanced Placement

Students with credit-earning scores on Advanced Placement (4 or 5) or International Baccalaureate (6 or 7) tests in Biology will be granted academic credit for BIOL 103 - Modern Topics in Biology. However, as noted above, students granted such AP/IB credit typically will be required to complete all three major core courses for the major.

### Biology and Computational Science

Students with an interest in both Biology and Computational Science may pursue a major in Biology with a concentration in Computational Science. Students interested in this option should refer to the description of the Computational Science concentration in the Computer Science section of the catalog, and should consult with a faculty member early in planning their Denison curriculum.

### Biology and Environmental Studies

Students with an interest in both Biology and Environmental Studies may pursue a major in Biology with a minor in Environmental Studies, or a major in Environmental Studies with a concentration in biology. Students are advised to choose the program path that best suits their post-graduate goals, and to seek early consultation with faculty in Biology and/or Environmental Studies. Specifics regarding these options can be found in the Environmental Studies section of the catalog.

### Biology and Neuroscience

Students with an interest in both Biology and Neuroscience may pursue a major in Biology with a concentration in Neuroscience. Students interested in this option should consult with a Neuroscience faculty member early in their career. Specifics regarding this concentration can be found in the Neuroscience section of the catalog.