BIOLOGY MAJOR, B.S.

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Biology is the study of life from both basic and applied perspectives across a broad range of analytical levels, from the molecule and cell to the organism and ecosystem. This program is designed for students who intend to continue graduate study in biological or health sciences.

Department Programs

Majors
- Biology Major, B.S. (p. 1)
- Biology Major, B.A. (http://catalog.unc.edu/undergraduate/programs-study/biology-major-ba)

Minor
- Biology Minor (http://catalog.unc.edu/undergraduate/programs-study/biology-minor)

Graduate Programs
- M.A. in Biology (http://catalog.unc.edu/graduate/departments/biology)
- M.S. in Biology (http://catalog.unc.edu/graduate/departments/biology)
- Ph.D. in Biology (http://catalog.unc.edu/graduate/departments/biology)

Student Learning Outcomes
Upon completion of the biology (B.A., B.S.) program, students should be able to:
- Knowledge Base: Demonstrate knowledge of major concepts, theoretical perspectives, empirical findings, and historical trends in the broad field of Biology
- Research Methods: Apply basic research methods in the biological sciences, including research design, data analysis, and data interpretation
- Critical Thinking Skills: Demonstrate the use of critical and creative thinking skills in upper-level biology courses and in their approach to undergraduate research
- Application of Knowledge, Research Methods, and Critical Thinking: Apply knowledge of the field of biology, research skills, and critical thinking skills to undertake a course-based, field, or laboratory research project

Requirements
In addition to the program requirements listed below, students must
- attain a final cumulative GPA of at least 2.0
- complete a minimum of 45 academic credit hours earned from UNC–Chapel Hill courses
- take at least half of their major course requirements (courses and credit hours) at UNC–Chapel Hill
- earn a minimum of 18 hours of C or better in the major core requirements (some majors require 21 hours).

For more information, please consult the degree requirements section of the catalog (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements/#degreerequirementstext).

Gateway Course
BIOL 101 Principles of Biology and Introductory Biology Laboratory $1, H$

Core Requirements

Core Courses:
- BIOL 201 Ecology and Evolution $H$
- BIOL 202 Molecular Biology and Genetics $H$
- BIOL 205 Cellular and Developmental Biology $H$
- One organismal structure and diversity course chosen from: $2$

BIOL 271 Plant Biology
& 271L and Plant Biology Laboratory

BIOL 272 Local Flora

BIOL 273 Horticulture

BIOL 274 Plant Diversity
& 274L and Plant Diversity Laboratory

BIOL 277 Vertebrate Field Zoology
& 277L and Vertebrate Field Zoology Laboratory

BIOL 278 Animal Behavior
& 278L and Animal Behavior Laboratory

BIOL 279 Seminar in Organismal Biology
& 279L and Topics in Organismal Biology Laboratory

BIOL 471 Evolutionary Mechanisms
& 471L and Evolutionary Mechanisms Laboratory

BIOL 472 Introduction to Plant Taxonomy

BIOL 474 Evolution of Vertebrate Life
& 474L and Vertebrate Structure and Evolution Laboratory $H$

BIOL 475 Biology of Marine Animals
& 475L and Biology of Marine Animals Laboratory

BIOL 476 Avian Biology
& 476L and Avian Biology Laboratory
Biology Major, B.S.

**BIOL 479**
Topics in Organismal Biology at an Advanced Level

& **479L**
and Laboratory in Organismal Biology: Advanced Topics

**BIOL 579**
Organismal Structure and Diversity in the Southern Appalachian Mountains

Four biology electives (each of three or more credits) numbered above 205 (not including BIOL 213, BIOL 253, BIOL 291, BIOL 292, BIOL 293, BIOL 294, BIOL 296, BIOL 353, and BIOL 495), at least two of them with a laboratory.

**Remaining General Education (http://catalog.unc.edu/course_list_below)**

A choice of two additional allied sciences electives selected from the course list below

- CHEM 101 General Descriptive Chemistry I
  - CHEM 101L and Quantitative Chemistry Laboratory I
  - CHEM 102 General Descriptive Chemistry II
  - CHEM 241 Modern Analytical Methods for Separation and Characterization
  - CHEM 241L and Quantitative Chemistry Laboratory II

- MATH 231 Calculus of Functions of One Variable I
  - or MATH 241 BioCalculus I
  - One of the following:
    - MATH 232 Calculus of Functions of One Variable II
    - MATH 283 BioCalculus II
    - COMP 110 Introduction to Programming
    - COMP 116 Introduction to Scientific Programming
    - STOR 155 Introduction to Data Models and Inference
    - STOR 215 Foundations of Decision Sciences
    - One of the following:
      - PHYS 104 General Physics I
      - PHYS 114 General Physics I: For Students of the Life Sciences
      - PHYS 116 Mechanics
      - PHYS 118 Introductory Calculus-based Mechanics and Relativity
    - One of the following:
      - PHYS 105 General Physics II
      - PHYS 115 General Physics II: For Students of the Life Sciences
      - PHYS 117 Electromagnetism and Optics
      - PHYS 119 Introductory Calculus-based Electromagnetism and Quanta

A choice of two additional allied sciences electives selected from the course list below

Remaining General Education (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements) requirements and enough free electives to accumulate 123 academic hours.

Total Hours 123

H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

1. With a C grade or better in BIOL 101
2. At least two courses out of the five courses (four electives and one organismal course) must be numbered above 400 (not including BIOL 501 and BIOL 692H).
3. A total of six hours from BIOL 295 (inactive fall 2017), BIOL 395, and/or BIOL 692H count as a laboratory course requirement. One additional elective may consist of a total of three hours of courses numbered above 600 (not including BIOL 692H).
4. A grade of C or better in CHEM 101 or CHEM 102 is required for BIOL 201 and BIOL 202.

**Allied Science Electives**

All allied science elective courses need to have a minimum of three credit hours.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 143</td>
<td>Human Evolution and Adaptation</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 148</td>
<td>Human Origins</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 298</td>
<td>Biological Anthropology Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 315</td>
<td>Human Genetics and Evolution</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 317</td>
<td>Evolutionary Perspectives on Human Adaptation and Behavior</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 318</td>
<td>Human Growth and Development</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 412</td>
<td>Paleoenvironmental Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 414</td>
<td>Laboratory Methods: Human Osteology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 415</td>
<td>Laboratory Methods: Zoolarchaeology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 416</td>
<td>Bioarchaeology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 470</td>
<td>Medicine and Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 623</td>
<td>Human Disease Ecology</td>
<td>3</td>
</tr>
<tr>
<td>Any ASTR course above 99</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Any BIOL course above 101, except BIOL 213, BIOL 291, BIOL 292, BIOL 294, BIOL 296, and BIOL 495</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Any BIOS course</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>BMME 510</td>
<td>Biomaterials</td>
<td>3</td>
</tr>
<tr>
<td>Any CHEM course above 101</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Any COMP course above 100, except COMP 380</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>ENEC 202</td>
<td>Introduction to the Environmental Sciences</td>
<td>4</td>
</tr>
<tr>
<td>ENEC 256</td>
<td>Mountain Biodiversity</td>
<td>4</td>
</tr>
<tr>
<td>ENEC 403</td>
<td>Environmental Chemistry Processes</td>
<td>3</td>
</tr>
<tr>
<td>ENEC 406</td>
<td>Atmospheric Processes II</td>
<td>4</td>
</tr>
<tr>
<td>ENEC 410</td>
<td>Earth Processes in Environmental Systems</td>
<td>4</td>
</tr>
<tr>
<td>ENEC 411</td>
<td>Oceanic Processes in Environmental Systems</td>
<td>4</td>
</tr>
<tr>
<td>ENEC 415</td>
<td>Environmental Systems Modeling</td>
<td>3</td>
</tr>
<tr>
<td>ENEC 471</td>
<td>Human Impacts on Estuarine Ecosystems</td>
<td>4</td>
</tr>
<tr>
<td>ENEC 489</td>
<td>Ecological Processes in Environmental Systems</td>
<td>4</td>
</tr>
<tr>
<td>EXSS 175</td>
<td>Human Anatomy</td>
<td>3</td>
</tr>
<tr>
<td>EXSS 276</td>
<td>Human Physiology</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 110</td>
<td>The Blue Planet: An Introduction to Earth’s Environmental Systems</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 111</td>
<td>Weather and Climate</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 212</td>
<td>Environmental Conservation and Global Change</td>
<td>3</td>
</tr>
</tbody>
</table>
Majors

Suggested Program of Study for B.S. Majors

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 253</td>
<td>Introduction to Atmospheric Processes</td>
<td>4</td>
</tr>
<tr>
<td>GEOG 445</td>
<td>Medical Geography</td>
<td>3</td>
</tr>
<tr>
<td>Any GEOL course above 100</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Any MASC course above 100</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Any MATH course above 110, except MATH 129P</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>MATH 231 or MATH 241</td>
<td>Calculus of Functions of One Variable I or BioCalculus I</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Plus a second course in mathematics, computer science, or statistics/operations research.

Lifetme Fitness | 1 |

Elective | 3 |

Total Hours | 123 |

H | Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

Sample Plan of Study

Sample plans can be used as a guide to identify the courses required to complete the major and other requirements needed for degree completion within the expected eight semesters. The actual degree plan may differ depending on the course of study selected (second major, minor, etc.). Students should meet with their academic advisor to create a degree plan that is specific and unique to their interests. The sample plans represented in this catalog are intended for first-year students entering UNC-Chapel Hill in the fall term. Some courses may not be offered every term.

Senior Year

Biology electives (two courses) | 8 |

Natural science or biology electives (two courses) | 6 |

Approaches (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements) and Connections (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements) (two courses) | 6 |

Free electives as needed to complete 123 academic hours | 11 |

Total Hours | 123 |

H | Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.
Biology Major, NUS Joint Degree

Biology B.S. majors may wish to consider applying for the Joint Degree Program, an innovative joint undergraduate degree program between the University of North Carolina at Chapel Hill and the National University of Singapore. UNC—Chapel Hill undergraduates spend anywhere from two to four semesters at the National University of Singapore and receive a joint bachelor of science degree from both institutions. For further information, contact the Study Abroad Office.

Special Opportunities in Biology

Students are encouraged to speak with their advisor about opportunities to serve as peer advisors in the Health Professions Advising Office, or to join Tri-Beta, the National Biological Sciences Honor Society.

Honors in Biology

Candidates for honors or highest honors must secure approval from the departmental honors advisor. They must have three hours of BIOL 395, take BIOL 692H, and maintain a grade point average of 3.3, both overall and in biology courses (exclusive of BIOL 692H and including only one semester of BIOL 395), calculated at the end of the semester preceding the semester in which they graduate. Other requirements are detailed on the department Web site (http://bio.unc.edu/undergraduate/honors-info).

Experiential Education

After completing BIOL 201 or BIOL 202, students are encouraged to consider how they plan to meet the experiential education requirement. BIOL 293 and BIOL 395 fulfill this requirement and also connect students’ academic coursework to current biological research and inquiry.

UNC–BEST

The UNC Baccalaureate Education in Science and Teaching (UNC–BEST) Program is a collaboration between the School of Education and the College of Arts and Sciences and is designed to allow undergraduate science majors interested in teaching high school science the opportunity to earn their science degree and obtain licensure as a North Carolina high school science teacher in four years. UNC–BEST students meet all the degree requirements for their biology degree using BIOL 410 as one of their upper-level biology courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 410</td>
<td>Principles and Methods of Teaching Biology</td>
<td>4</td>
</tr>
<tr>
<td>EDUC 689</td>
<td>Foundations of Special Education (may substitute EDUC 516)</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 532</td>
<td>Introduction to Development and Learning (may substitute EDUC 403)</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 615</td>
<td>Schools and Community Collaboration (may substitute EDUC 533)</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 593</td>
<td>Internship/Student Teaching</td>
<td>12</td>
</tr>
<tr>
<td>EDUC 601</td>
<td>Education Workshops</td>
<td>1</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>26</td>
</tr>
</tbody>
</table>

For more details on admission requirements, application deadlines, and submitting an online application, visit the program's Web site (http://soe.unc.edu/academics/uncbest) or catalog description (http://catalog.unc.edu/undergraduate/schools-college/education/#licensuretext).

Laboratory Teaching Apprenticeships and Assistantships

Opportunities exist for assisting graduate instructors (and for instruction in undergraduate laboratories). Interested students should contact the instructor of the course or obtain approval from either the departmental director of undergraduate studies or the department chair.

Undergraduate Awards

All awards include a personal plaque, a monetary gift, and a place on Coker Hall's list of department honorees. The awards include

- The Stephen G. Brantley Award in honor of Henry Van Peters Wilson, given annually to a senior biology major for excellence in research in molecular and cellular biology.
- The Robert Ervin Coker Award, given annually to a senior biology major for excellence in research in organismal biology and ecology.
- The John N. Couch Award, given annually to a senior biology major with interests in plant biology who has demonstrated the highest ideals of scholarship and research.
- The Irvine R. Hagadorn Award, given annually to the junior biology major based on academic and research excellence. This award is also recognized by the UNC—Chapel Hill chancellor at the Annual Chancellor’s Awards Ceremony.
- The Francis J. LeClair Award, given annually to a senior biology major for academic excellence in biology with an emphasis in plant sciences.

Undergraduate Research

An undergraduate research experience is extremely valuable to a student who intends to pursue postgraduate work in the biological sciences. Undergraduates may participate directly in the research of faculty in the Department of Biology. This research opportunity allows students to put their knowledge of biology into practice through participation in a biological research program and is encouraged by faculty. Students’ participation in research can begin as early as their second year by registration in BIOL 395.

Undergraduates with a 3.0 or higher grade point average in biology courses are encouraged to enroll in BIOL 395. Information concerning the procedure for enrolling in a research course can be obtained from the chair of the department’s undergraduate honors research program. Additional information can be found on the department’s Web site (http://bio.unc.edu/undergraduate/research).