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.S.—Quantitative Biology Track (http://catalog.unc.edu/undergraduate/programs-study/biology-major-bs-quantitative-biology-track)
• 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/schools-departments/biology)
• M.S. in Biology (http://catalog.unc.edu/graduate/schools-departments/biology)
• Ph.D. in Biology (http://catalog.unc.edu/graduate/schools-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 & 101L Principles of Biology and Introductory Biology Laboratory \(^1, H\)

Core Requirements
Core Courses:
BIOL 201 Ecology and Evolution \(^H\) 4
BIOL 202 Molecular Biology and Genetics \(^H\) 4
BIOL 205 Cellular and Developmental Biology \(^H\) 4
One organismal structure and diversity course chosen from: \(^2\) 4
BIOL 271 & 271L Plant Biology and Plant Biology Laboratory
BIOL 272 Local Flora
BIOL 273 Horticulture
BIOL 274 & 274L Plant Diversity and Plant Diversity Laboratory
BIOL 277 & 277L Vertebrate Field Zoology and Vertebrate Field Zoology Laboratory
BIOL 278 & 278L Animal Behavior and Animal Behavior Laboratory
BIOL 279 & 279L Seminar in Organismal Biology and Topics in Organismal Biology Laboratory
BIOL 471 & 471L Evolutionary Mechanisms and Evolutionary Mechanisms Laboratory
BIOL 472 Introduction to Plant Taxonomy
BIOL 474 & 474L Evolution of Vertebrate Life and Vertebrate Structure and Evolution Laboratory \(^H\)
BIOL 475 & 475L Biology of Marine Animals and Biology of Marine Animals Laboratory
BIOL 476 & 476L Avian Biology and Avian Biology Laboratory
Biology Major, B.S.

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.

Allied Science Electives

Any ASTR course above 99
Any BIOL course above 101, except BIOL 213, BIOL 291, BIOL 292, BIOL 293, BIOL 294, BIOL 296, and BIOL 495
Any BIOS course
BMME 510 Biomaterials
Any CHEM course above 101
Any COMP course above 100, except COMP 380
ENEC 202 Introduction to the Environmental Sciences
ENEC 256 Mountain Biodiversity
ENEC 403 Environmental Chemistry Processes
ENEC 406 Atmospheric Processes II
ENEC 410 Earth Processes in Environmental Systems
ENEC 411 Oceanic Processes in Environmental Systems
ENEC 415 Environmental Systems Modeling
ENEC 471 Human Impacts on Estuarine Ecosystems
ENEC 489 Ecological Processes in Environmental Systems
EXSS 175 Human Anatomy
EXSS 276 Human Physiology
GEOG 110 The Blue Planet: An Introduction to Earth’s Environmental Systems
GEOG 111 Weather and Climate
GEOG 212 Environmental Conservation and Global Change

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

With a C grade or better in BIOL 101
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).
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).
A grade of C or better in CHEM 101 or CHEM 102 is required for BIOL 201 and BIOL 202.

Additional Requirements

CHEM 101 General Descriptive Chemistry I
CHEM 102 General Descriptive Chemistry II
CHEM 241 Modern Analytical Methods for Separation and Characterization and Laboratory in Separations and Analytical Characterization of Organic and Biological Compounds
CHEM 261 Introduction to Organic Chemistry I
CHEM 262 Introduction to Organic Chemistry 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 science 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
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.

Suggested Program of Study for B.S. Majors

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BIOL 101</td>
<td>Principles of Biology and Introductory Biology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 101L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 101</td>
<td>General Descriptive Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 101L</td>
<td>and Quantitative Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 102</td>
<td>General Descriptive Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 102L</td>
<td>and Quantitative Chemistry Laboratory II H</td>
<td></td>
</tr>
<tr>
<td>ENGL 105</td>
<td>English Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Language levels 2 and 3</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>MATH 231</td>
<td>Calculus of Functions of One Variable I</td>
<td>3-4</td>
</tr>
<tr>
<td>or</td>
<td>or BioCalculus I</td>
<td></td>
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<tr>
<td>MATH 241</td>
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Plus a second course in mathematics, computer science, or statistics/operations research.

Lifetime Fitness

Elective 3

Hours 31

Sophomore Year

Two of the three biology core courses:

BIOL 201  Ecology and Evolution H

BIOL 202  Molecular Biology and Genetics H

BIOL 205  Cellular and Developmental Biology H

CHEM 241 & 241L or Introductory Calculus-based Mechanics and Relativity

CHEM 261  Introduction to Organic Chemistry I H

CHEM 262 & 262L  Introduction to Organic Chemistry II and Laboratory in Organic Chemistry H

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

Elective 6

Hours 30

Junior Year

Remaining biology core course

Organismal biology course 4

Biology electives (three courses) 9

PHYS 114 or General Physics I: For Students of the Life Sciences

PHYS 115 or General Physics II: For Students of the Life Sciences

PHYS 119 or Introductory Calculus-based Electromagnetism and Quanta

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)

Hours 31

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)

Free electives as needed to complete 123 academic hours 11

Hours 31

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></td>
<td>Total Hours</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).