ENVIRONMENTAL SCIENCE, B.S.

Contact Information
Curriculum for the Environment and Ecology
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This major is designed for students focusing on such topics as how material and energy are moved and transformed in complex environmental systems, the role of society in perturbing those processes, and scientific techniques that might be used to improve environmental quality. The program provides interdisciplinary preparation for graduate or professional training as well as for jobs in government, consulting, and industry.

Department Programs
Majors
- Environmental Studies, B.A. (http://catalog.unc.edu/undergraduate/programs-study/environmental-studies-major-ba)
- Environmental Science, B.S. (p. 1)
- Dual Bachelor’s-Master’s Degree Programs (http://catalog.unc.edu/undergraduate/programs-study/environmental-studies-major-ba/#opportunitiestext)

Minors
- Environmental Science and Studies Minor (http://catalog.unc.edu/undergraduate/programs-study/environmental-science-studies-minor)
- Sustainability Studies Minor (http://catalog.unc.edu/undergraduate/programs-study/sustainability-studies-minor)

Graduate Programs
- Doctor of Philosophy (http://catalog.unc.edu/graduate/schools-departments/environment-ecology/#programtext)
- Master of Science (http://catalog.unc.edu/graduate/schools-departments/environment-ecology/#programtext)
- Master of Arts (http://catalog.unc.edu/graduate/schools-departments/environment-ecology/#programtext)

Student Learning Outcomes
Upon completion of the environmental sciences program (B.S.), students should be able to:
- Demonstrate knowledge of a marketable skill (e.g. GIS, communication, statistics) to enhance their ability to apply concepts from the program in the real world
- Demonstrate mastery of research and problem-solving skills through individual or team-based projects working for a researcher or client in a social or natural science

Requirements
The environmental science program provides two options:
- Environmental Science, B.S. (p. 1) (with several concentration areas)
- Environmental Science, B.S.–Quantitative Energy Systems Track (p. 3)

Environmental Science, B.S.
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/#degerequirementstext).

Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENEC 201</td>
<td>Introduction to Environment and Society[^H]</td>
<td>4</td>
</tr>
<tr>
<td>ENEC 203</td>
<td>Introduction to Environmental Science Problem Solving</td>
<td>3</td>
</tr>
<tr>
<td>ENEC 698</td>
<td>Capstone: Analysis and Solution of Environmental Problems</td>
<td>3</td>
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</tbody>
</table>

One of the following earth system science courses: 3-4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 201</td>
<td>Ecology and Evolution[^1,H]</td>
<td></td>
</tr>
<tr>
<td>ENEC 202</td>
<td>Introduction to the Environmental Sciences</td>
<td></td>
</tr>
<tr>
<td>ENEC 222</td>
<td>Estuarine and Coastal Marine Science[^1]</td>
<td></td>
</tr>
<tr>
<td>ENEC 489</td>
<td>Ecological Processes in Environmental Systems[^1]</td>
<td></td>
</tr>
<tr>
<td>ENEC/MASC 448</td>
<td>Coastal and Estuarine Ecology[^1]</td>
<td></td>
</tr>
<tr>
<td>ENEC/ENVR 403</td>
<td>Environmental Chemistry Processes[^1]</td>
<td></td>
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</tbody>
</table>

ENEC 324 & 324L Water in Our World: Introduction to Hydrologic Science and Environmental Problems and Water in Our World Laboratory[^1]

GEOL 324 & 324L Water in Our World: Introduction to Hydrologic Science and Environmental Problems and Water in Our World Laboratory[^1]

GEOL 215 Energy Resources

Two courses from one analytical skills option: 6-7

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 233</td>
<td>Calculus of Functions of Several Variables[^H]</td>
<td></td>
</tr>
<tr>
<td>MATH 383</td>
<td>First Course in Differential Equations[^H]</td>
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</table>

GIS and Remote Sensing:
Total Hours 120

**Statistics:**

- BIOL/ENEC 562: Statistics for Environmental Scientists ¹
- BIOS 511: Introduction to Statistical Computing and Data Management
- BIOS 550: Basic Elements of Probability and Statistical Inference
- GEOL 520: Data Analysis in the Earth Sciences
- GEOL 525: Inverse Theory: Advanced Data Analysis and Geophysical Modeling
- STOR 455: Statistical Methods I
- STOR 556: Advanced Methods of Data Analysis

**Basic Science:**

- BIOL 202: Molecular Biology and Genetics ²
- CHEM 261: Introduction to Organic Chemistry I ¹, ²

Five courses chosen from one of the following concentrations ¹²: 15-20

**Additional Requirements**

- BIOL 101: Principles of Biology & 101L: Principles of Biology Laboratory ²
- CHEM 101: General Descriptive Chemistry I & 101L: General Descriptive Chemistry Laboratory I
- CHEM 102: General Descriptive Chemistry II & 102L: General Descriptive Chemistry Laboratory II ²
- COMP 110: Introduction to Programming or COMP 116: Introduction to Scientific Programming
- MATH 231: Calculus of Functions of One Variable I
- MATH 232: Calculus of Functions of One Variable II

Select one of the following: ³:

- PHYS 114: General Physics I: For Students of the Life Sciences & PHYS 115: General Physics II: For Students of the Life Sciences

Students are required to earn a minor in an allied science, such as biology, chemistry, computer science, geography, geology, information science, marine science, mathematics, mathematical decision sciences, or physics. Enough free electives to accumulate minimum of 120 credit hours varies.

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

¹ This course appears on a core requirement list as well as a concentration requirement list, but can only be counted toward one of the two.

² Recommended courses are ECON 101; ENEC 202; one of the following PH courses: COMM 375/ENEC 375, ENEC 325, or ENEC/PHIL 368; and one of the following statistics courses: BIOL 511 or ENEC 562 or STOR 455.

**Concentrations**

- Ecology and Natural Resources (p. 2)
- Environment and Health (p. 3)
- Water and Climate (p. 3)

**Ecology and Natural Resources**

- BIOL 201: Ecology and Evolution ¹, ²
- BIOL 272: Local Flora
- BIOL 277: Vertebrate Field Zoology & 277L: Vertebrate Field Zoology Laboratory
- BIOL 402: Infectious Disease in the Developing World
- BIOL 463: Field Ecology
- BIOL 464: Global Change Ecology
- BIOL 465: Global Biodiversity and Macroecology
- BIOL 469: Behavioral Ecology
- BIOL 471: Evolutionary Mechanisms & 471L: Evolutionary Mechanisms Laboratory
- BIOL 476: Avian Biology & 476L: Avian Biology Laboratory
- BIOL 561: Ecological Plant Geography
- BIOL 565: Conservation Biology ²
- BIOL 568: Disease Ecology and Evolution
- BIOL/ENEC 256: Mountain Biodiversity
- BIOL/ENEC 461: Fundamentals of Ecology
- BIOL/ENEC 562: Statistics for Environmental Scientists ²
- BIOL/ENEC 563: Statistical Analysis in Ecology and Evolution
- BIOL 657/ENVR 520/MASC 504: Biological Oceanography
- BIOL 462/MASC 440: Marine Ecology
- ENEC 222: Estuarine and Coastal Marine Science ²
- ENEC 304: Restoration Ecology
- ENEC 370: Agriculture and the Environment ²
- ENEC 462: Ecosystem Management
- ENEC 479: Landscape Analysis ²
- ENEC 485: Coastal Resource Economics and Policy
- ENEC 489: Ecological Processes in Environmental Systems ²
- ENEC/GEOG 264: Conservation of Biodiversity in Theory and Practice
- ENEC 324/ENEC 324L: Water in Our World: Introduction to Hydrologic Science and Environmental Problems and Water in Our World Laboratory ²
Environmental Science, B.S.

**Environment and Health**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GEOL 324 &amp; 324L</td>
<td>Water in Our World: Introduction to Hydrologic Science and Environmental Problems and Water in Our World Laboratory</td>
<td>4</td>
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<tr>
<td>ENEC/GEOL/ MASC 450</td>
<td>Biogeochemical Processes</td>
<td>4</td>
</tr>
<tr>
<td>ENEC/MASC 352</td>
<td>Marine Fisheries Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENEC/MASC 433</td>
<td>Wetland Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>ENEC/MASC 441</td>
<td>Marine Physiological Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENEC/MASC 444</td>
<td>Marine Phytoplankton</td>
<td>3</td>
</tr>
<tr>
<td>ENEC/MASC 448</td>
<td>Coastal and Estuarine Ecology</td>
<td>4</td>
</tr>
<tr>
<td>ENEC/MASC 471</td>
<td>Human Impacts on Estuarine Ecosystems</td>
<td>4</td>
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<tr>
<td>GEOG 444</td>
<td>Landscape Biogeography</td>
<td>3</td>
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<tr>
<td>MASC 443</td>
<td>Marine Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>MASC 445</td>
<td>Marine Invertebrate Biology</td>
<td>4</td>
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</tbody>
</table>

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: This course appears on a core requirement list as well as a concentration requirement list, but can only be counted toward one of the two.

**Water and Climate**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 350/ ENVR 417/ GEOL 403/ MASC 401</td>
<td>Oceanography</td>
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<tr>
<td>ENEC 222</td>
<td>Estuarine and Coastal Marine Science</td>
<td>4</td>
</tr>
<tr>
<td>ENEC/ENVR 403</td>
<td>Environmental Chemistry Processes</td>
<td>3</td>
</tr>
<tr>
<td>ENEC/GEOG 253</td>
<td>Introduction to Atmospheric Processes</td>
<td>4</td>
</tr>
<tr>
<td>ENEC/GEOL 324</td>
<td>Water in Our World: Introduction to Hydrologic Science and Environmental Problems</td>
<td>3</td>
</tr>
<tr>
<td>ENEC/GEOL 417</td>
<td>Geomorphology</td>
<td>3</td>
</tr>
<tr>
<td>ENEC/GEOL/ MASC 411</td>
<td>Oceanic Processes in Environmental Systems</td>
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<tr>
<td>ENEC/GEOL/ MASC 415</td>
<td>Environmental Systems Modeling</td>
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<tr>
<td>ENEC/GEOL/ MASC 450</td>
<td>Biogeochemical Processes</td>
<td>4</td>
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<tr>
<td>ENVR 413</td>
<td>Limnology</td>
<td>3</td>
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<tr>
<td>ENVR 416</td>
<td>Aerosol Physics and Chemistry</td>
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<tr>
<td>ENVR 419</td>
<td>Chemical Equilibria in Natural Waters</td>
<td>3</td>
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<tr>
<td>ENVR 453</td>
<td>Groundwater Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 370</td>
<td>Introduction to Geographic Information</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 412</td>
<td>Synoptic Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 414</td>
<td>Climate Change</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 416</td>
<td>Applied Climatology: The Impacts of Climate and Weather on Environmental and Social Systems</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 440/ GEOL 502</td>
<td>Earth Surface Processes</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 202</td>
<td>Earth Systems History</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 432</td>
<td>Paleoclimatology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 435</td>
<td>Groundwater</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 436</td>
<td>Geochemistry of Natural Waters</td>
<td>3</td>
</tr>
<tr>
<td>GEOL/MASC 483</td>
<td>Geologic and Oceanographic Applications of Geographical Information Systems</td>
<td>4</td>
</tr>
<tr>
<td>GEOL/MASC 503</td>
<td>Marine Geology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL/MASC 506</td>
<td>Physical Oceanography</td>
<td>4</td>
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<tr>
<td>GEOL 508</td>
<td>Global Hydrology</td>
<td>3</td>
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<tr>
<td>MASC 312</td>
<td>From the Equator to the Poles: Case Studies in Global Environmental Change</td>
<td>3</td>
</tr>
<tr>
<td>MASC 314</td>
<td>Earth Systems in a Changing World</td>
<td>3</td>
</tr>
<tr>
<td>MASC 432</td>
<td>Major World Rivers and Global Change: From Mountains to the Sea</td>
<td>3</td>
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<tr>
<td>MASC 433</td>
<td>Wetland Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>MASC 460</td>
<td>Fluid Dynamics of the Environment</td>
<td>3</td>
</tr>
</tbody>
</table>

1: This course appears on a core requirement list as well as a concentration requirement list, but can only be counted toward one of the two.

**Environmental Science, B.S.–Quantitative Energy Systems Track**

This major is designed for students with a strong interest in water, energy, and sustainable natural resources, and interdisciplinary approaches to analytics, informatics, or business. The degree provides...
Environmental Science, B.S.

interdisciplinary preparation for graduate or professional training as well as for jobs in government, consulting, and industry.

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/#degreerequirements#text).

Core Requirements

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<th>Credits</th>
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<tbody>
<tr>
<td>ENEC 201</td>
<td>Introduction to Environment and Society H</td>
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</tr>
<tr>
<td>ENEC 203</td>
<td>Introduction to Environmental Science Problem Solving</td>
<td>3</td>
</tr>
<tr>
<td>ENEC 698</td>
<td>Capstone: Analysis and Solution of Environmental Problems</td>
<td>3</td>
</tr>
</tbody>
</table>

Two courses each from two of the following quantitative skills (4 courses total)

Informatics
- INLS 151 Retrieving and Analyzing Information
- INLS 161 Tools for Information Literacy
- STOR 215 Foundations of Decision Sciences
- STOR 305 Decision Making Using Spreadsheet Models

Applied Mathematics
- MATH 381 Discrete Mathematics H
- MATH 383 First Course in Differential Equations H
- MATH 528 Mathematical Methods for the Physical Sciences I
- MATH 535 Introduction to Probability
- MATH 547 Linear Algebra for Applications
- MATH 564 Mathematical Modeling in the Life Sciences
- PHYS 331 Introduction to Numerical Techniques in Physics 1

Statistics
- BIOS 511 Introduction to Statistical Computing and Data Management
- ENEC 562 Statistics for Environmental Scientists
- ENEC 563 Statistical Analysis in Ecology and Evolution
- GEOL 520 Data Analysis in the Earth Sciences
- GEOL 525 Inverse Theory: Advanced Data Analysis and Geophysical Modeling
- STOR 455 Statistical Methods I
- STOR 435 Introduction to Probability
- STOR 556 Advanced Methods of Data Analysis

Basic Science
- BIOL 201 Ecology and Evolution H
- BIOL 271 Plant Biology
- CHEM 261 Introduction to Organic Chemistry I H
- PHYS 114 General Physics I: For Students of the Life Sciences (corrected on 12/21/2017) 1
  or PHYS 118 Introductory Calculus-based Mechanics and Relativity

PHYS 115 General Physics II: For Students of the Life Sciences (corrected on 12/21/2017)
  or PHYS 119 Introductory Calculus-based Electromagnetism and Quanta

PHYS 118 Introductory Calculus-based Mechanics and Relativity 1
  or PHYS 119 Introductory Calculus-based Electromagnetism and Quanta

Modeling
- COMP 401 Foundation of Programming & COMP 410 and Data Structures H
- COMP 401 Foundation of Programming & COMP 411 and Computer Organization H
- COMP 401 Foundation of Programming & ENEC 415 and Environmental Systems Modeling H

GIS and Remote Sensing
- ANTH 419 Anthropological Application of GIS
- GEOG 370 Introduction to Geographic Information
- GEOG 391 Quantitative Methods in Geography
- GEOG 477 Introduction to Remote Sensing of the Environment
- GEOG 491 Introduction to GIS
- GEOG 577 Advanced Remote Sensing
- GEOG 591 Applied Issues in Geographic Information Systems
- GEOG 592 Geographic Information Science Programming
- GEOL/MASC 483 Geologic and Oceanographic Applications of GIS

Four courses from one of the following concentrations (12-16 courses total)

Energy Management
- ENEC 307 Energy and Material Flows in the Environment and Society
- ENEC 395 Research in Environmental Sciences and Studies for Undergraduates 1
  or ENEC 396 Directed Readings
- ENEC 482 Energy and the Environment: A Coastal Perspective
- ENEC 693H Honors Research in Environmental Sciences and Studies 1
  or ENEC 694H Honors Project in Environmental Sciences and Studies
- ENVR/ENEC 403 Environmental Chemistry Processes 1

Energy Sources
- GEOL 215 Energy Resources
- PHYS 131 Energy: Physical Principles and the Quest for Alternatives to Dwindling Oil and Gas
- PHYS 581 Renewable Electric Power Systems
- PHYS 582 Decarbonizing Fuels
- PLAN/ENEC 547 Energy, Transportation, and Land Use

Environmental Processes
- ENEC 202 Introduction to the Environmental Sciences
- ENEC 222 Estuarine and Coastal Marine Science
- ENEC 256 Mountain Biodiversity
- ENEC 395 Research in Environmental Sciences and Studies for Undergraduates 1
  or ENEC 396 Directed Readings
Environmental Science, B.S.

ENEC 489  Ecological Processes in Environmental Systems
ENEC 693H Honors Research in Environmental Sciences and Studies
or ENEC 694H Honors Project in Environmental Sciences and Studies

ENVC/ENEC 403 Environmental Chemistry Processes
MASC 432 Major World Rivers and Global Change: From Mountains to the Sea
MASC 433 Wetland Hydrology
MASC 450 Biogeochemical Processes
MASC 460 Fluid Dynamics of the Environment
GEOL 435 Groundwater
GEOL 436 Geochemistry of Natural Waters
GEOL 508 Global Hydrology
GEOL 520 Data Analysis in the Earth Sciences
GEOL 525 Inverse Theory: Advanced Data Analysis and Geophysical Modeling
GEOG 410 Modeling of Environmental Systems
GEOG 412  Synoptic Meteorology
GEOG 414 Climate Change
GEOG 416 Applied Climatology: The Impacts of Climate and Weather on Environmental and Social Systems
GEOG 441 Introduction to Watershed Systems

Smart Cities
ENEF 350 Environmental Law and Policy
ENEF 351 Coastal Law and Policy
ENEF 325 Water Resource Management and Human Rights
ENEF 380 Environmental Economics
ENEF 395 Research in Environmental Sciences and Studies for Undergraduates
or ENEF 396 Directed Readings
ENEF/PL 420 Community Design and Green Architecture
ENEF 480 Environmental Decision Making
ENEF 485 Coastal Resource Economics and Policy
ENEF 492 Social Science Research Methods
ENEF 625 Honors Research in Environmental Sciences and Studies
or ENEF 694H Honors Project in Environmental Sciences and Studies

PLAN/ENVC 547 Energy, Transportation, and Land Use
PLAN/ENVC 641 Ecology and Land Use Planning
PLAN 636 Urban Transportation Planning
PLAN 637 Public Transportation
PLAN 638 Pedestrian and Bike Transportation
PLAN 651 Urban Form and the Design of Cities

Additional Requirements
BIOI 101 Principles of Biology
& 101L and Introductory Biology Laboratory
or BIOI 110 Introduction to Programming
or BIOI 116 Introduction to Scientific Programming
or PHYS 331 Introduction to Numerical Techniques in Physics

CHEM 101 General Descriptive Chemistry I
& 101L and Quantitative Chemistry Laboratory I (PX)
or PHYS 114 General Physics I: For Students of the Life Sciences
or PHYS 118 Introductory Calculus-based Mechanics and Relativity
CHEM 102 General Descriptive Chemistry II
& 102L and Quantitative Chemistry Laboratory II (PX)
or PHYS 115 General Physics II: For Students of the Life Sciences
or PHYS 119 Introductory Calculus-based Electromagnetism and Quanta
MATH 231 Calculus of Functions of One Variable I (QR)
MATH 232 Calculus of Functions of One Variable II (QI)
MATH 233 Calculus of Functions of Several Variables (QI)

Total Hours 120

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 Following courses are listed under multiple requirements in the major but can only be used to fulfill one requirement per course: ENEC 395, ENEC 396, ENEC 693H, ENEC 694H, ENVR 403/ENVC 403, PHYS 114, PHYS 115, PHYS 118, PHYS 119, PHYS 331.
2 Recommended courses are ENEC 202 (PX), ECON 101 (SS), STOR 155 (QR) or BIOS 600, and one of the following PH courses: ENEC 325, COMM 375/ENVC 375, or PHIL 368/ENVC 368.

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. Major

Course Title Hours
First Year
BIOI 101 Principles of Biology 4
& 101L and Introductory Biology Laboratory
CHEM 101 General Descriptive Chemistry I
& 101L and Quantitative Chemistry Laboratory I
ENEC 201 Introduction to Environment and Society
MATH 231 Calculus of Functions of One Variable I
MATH 232 Calculus of Functions of One Variable II
Language level 2 (FL)
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)
Environmental Science, B.S.

Suggested Program of Study for the Quantitative Energy Systems Track

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td><strong>First Year</strong></td>
<td></td>
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</tr>
<tr>
<td>ENEC 201</td>
<td>Introduction to Environment and Society^H</td>
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<tr>
<td>BIOL 101</td>
<td>Principles of Biology and Introductory Biology Laboratory^H</td>
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<tr>
<td>CHEM 101</td>
<td>General Descriptive Chemistry I</td>
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<td>CHEM 102</td>
<td>General Descriptive Chemistry II</td>
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<td>MATH 231</td>
<td>Calculus of Functions of One Variable I</td>
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<td>MATH 232</td>
<td>Calculus of Functions of One Variable II</td>
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<tr>
<td>ENGL 105</td>
<td>English Composition and Rhetoric</td>
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^H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.

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<td>ENEC 203</td>
<td>Introduction to Environmental Science Problem Solving</td>
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<tr>
<td>MATH 233</td>
<td>Calculus of Functions of Several Variables</td>
<td>4</td>
</tr>
<tr>
<td>COMP 110 or</td>
<td>Introduction to Programming^H or Introduction to Scientific Programming</td>
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<td>116</td>
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<tr>
<td>PHYS 331</td>
<td>Introduction to Numerical Techniques in Physics</td>
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<th><strong>Junior Year</strong></th>
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<tr>
<td>ENEC 203</td>
<td>Introduction to Environmental Science Problem Solving</td>
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</tr>
<tr>
<td>MATH 233</td>
<td>Calculus of Functions of Several Variables^H</td>
<td>4</td>
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<tr>
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</table>

| Remaining environmental concentration courses | 6 |

| Total Hours | 120-121 |

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

Enough free electives to meet 120 academic hour minimum

| Hours | 30 |

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| Remaining environmental concentration courses | 6 |

| Total Hours | 120-121 |

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| Remaining environmental concentration courses | 6 |

| Total Hours | 120-121 |

^H Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.
Remaining General Education (http://catalog.unc.edu/undergraduate/general-education-curriculum-degree-requirements) courses and free electives to reach at least 120 academic credit hours

<table>
<thead>
<tr>
<th>Hours</th>
<th>Total Hours</th>
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<td>16</td>
<td>120</td>
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</table>

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

**Dual Bachelor’s–Master’s Degree Program**

Three dual bachelor’s–master’s programs are offered:

1. **Environmental and Science Communication** is a collaboration between Environment and Ecology and the School of Media and Journalism;  
2. **Environmental Informatics** is a collaboration between Environment and Ecology and the School of Information and Library Science;  
3. **Environmental Finance and Leadership** is a collaboration between Environment and Ecology and the School of Government.

Each program is designed for students to earn their bachelor’s degree and complete a master’s degree in a professional school in as few as five years. The dual degree in environmental and science communication is approached through the bachelor’s of arts degree with a major in environmental studies, and students then complete a master’s degree in journalism. The dual degree in environmental informatics is approached through the bachelor’s of science degree with a major in environmental science, and students then complete a master’s in information sciences. The dual degree in environmental finance and leadership is approached through either the bachelor’s of science or the bachelor’s of arts in environment and ecology, and students then complete a master’s in public administration.

Students may begin taking courses for the graduate degree while in the undergraduate program, and a limited number of credit hours of approved graduate coursework may be transferred into the graduate degree program in mass communication (up to nine hours), information sciences (up to 12 hours) and public administration (up to 13 hours). Courses taken as an undergraduate for graduate credit may not be counted as part of the undergraduate degree if the intent is to transfer them to the graduate program. Early advising is essential to success in navigating these dual-degree programs. Advisors are available in both units to help students prepare and select courses appropriately to get the most from their education.

Applying for one of the dual-degree programs is a two-step process. It is highly recommend that interested first- and second-year students speak to an advisor early in their college program. Students must submit a conditional application to the program no later than their junior year to ensure that they will receive preference in registering for courses. Students must formally apply to the program through The Graduate School in their senior year. The GRE is not required for applications from current UNC–Chapel Hill students for the dual degree in environmental science and communication; for other dual degrees students should check with their advisors about GRE requirements. For complete information on the application process and curriculum requirements, please go to the specific Web site listed above for the dual-degree program of interest.

**Special Opportunities in Environmental Science and Studies**

**Honors in Environmental Science or Studies**

Students in either the B.S. or B.A. degree program may participate in honors research leading to graduation with honors or highest honors. This distinction is earned by participation in honors research (ENEC 693H) and culminates in ENEC 694H, thesis writing and defense. Students should follow the guidelines established by Honors Carolina and meet with the faculty honors advisor, Dr. Geoff Bell, to ensure that appropriate requirements are fulfilled (Requirements can be found on the Honors Program Web site (http://honorscarolina.unc.edu/current-students/honors-thesis-and-undergraduate-research/honors-thesis)). Honors students can use three credit hours of ENEC 693H (research) or ENEC 694H (thesis), but not both courses, to fulfill a concentration requirement.

**Departmental Involvement**

The Carolina Environmental Student Alliance (CESA) is an interdisciplinary organization dedicated to uniting the environmental interests of students across campus. Participation is open to all students and community members with an interest in the environment. The Epsilon Eta Environmental Honors Fraternity is an organization dedicated to excellence in environmental education. Interested students are nominated for membership.

**Experiential Education**

Possibilities for experiential education include APPLES service-learning courses (ENEC 593), Coral Reef Ecology and Management (ENEC 259), Sierra Nevada Program (ENEC 208), internships (ENEC 393, ENEC 493), research (ENEC 395, ENEC 396, ENEC 698), and honors research (ENEC 693H, ENEC 694H). Additionally, a series of experiential education field sites is available in North Carolina and around the world where students may take coursework and conduct research for a semester. Fall semester field sites are offered in North Carolina at Highlands Biological Station (mountain/ecology), the Institute for Marine Sciences (marine ecology/geology), and the Coastal Studies Institute/Outer Banks (coastal policy and economics). Spring semester field sites are offered on the UNC campus (Sustainable Triangle field site), in Thailand (energy and pollution), and Ecuador (ecology or sustainable development). The Ecuador and Thailand field site experiences incorporate part of the following summer as well. Summer programs are also offered in the Galapagos via UNC’s Center for Galapagos Studies. Contact our advisors about other opportunities. Faculty members often arrange Burch Program summer educational trips to such locations as Australia (conservation, restoration, and natural resource management), Siberia, Russia (ecology and anthropology), the Sierra Nevadas (ecology and physical geography), and northern Europe (energy, sustainability, and communication).

**Internships**

Students are encouraged to apply for paid or unpaid internships in local, state, national, and international environmental organizations. Internship opportunities can be found through the environmental internships Web site (http://environmentalinternships.web.unc.edu). These internships provide valuable practical experience, and some may be conducted for academic credit. Students interested in academic credit should contact the director of undergraduate studies, Dr. Amy Cooke (amycooke@unc.edu), to obtain the required application for credit before the term begins.
Study Abroad
Exchange and other study abroad programs are available through the UNC Study Abroad Office. At some locations students may take courses for UNC credit, such as some field sites listed above. Students may take courses at other universities during study abroad and apply for transfer credit as well. We encourage students to participate in study abroad during their career at Carolina.

Undergraduate Awards
Undergraduates may be considered for the Watts and Betsy Carr Awards, Mary and Watts Hill Jr. Awards, and Robert Alonzo Winston Scholarships.

Undergraduate Research
All students are encouraged (but not required) to complete an independent or team research project. Such projects introduce students to the tools needed for graduate study. They also provide an important opportunity for working directly with the world-class environmental faculty members and graduate students at UNC–Chapel Hill, as well as in the many environmental organizations in the Research Triangle. The Triangle area contains one of the largest collections of environmental organizations and expertise in the world, providing unique opportunities for students to conduct research on an immense range of topics from fundamental scientific research to policy applications. Students interested in obtaining course credit for research should speak with either Dr. Geoff Bell (honors advisor) or Dr. Amy Cooke (director of undergraduate studies) to ensure all the requirements and appropriate paperwork has been approved within the first week of classes.