ENVIRONMENTAL HEALTH SCIENCES MAJOR, B.S.P.H.

Contact Information
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The undergraduate major in environmental health sciences is designed to develop a comprehensive understanding of the environmental factors that impact human health; the physical, chemical, and biological processes that underlie the impact of human activity on the environment and human health; methods used to assess the impact of human activity on the environment and human health; and science-based solutions for environmental problems. Students may choose to emphasize environmental chemistry, environmental health biology, or environmental physics by selecting those concentrations. Admission into the program requires satisfactory completion of coursework in basic sciences and mathematics. Recent graduates have entered graduate programs in environmental science, microbiology, marine science, applied mathematics, and environmental engineering. Students who pursued employment after completing the B.S.P.H. degree are working in environmental advocacy organizations, environmental consulting firms, industry, and investment banking firms.

Upon completion of the B.S. in environmental science and engineering, students should be able to:

- Demonstrate knowledge of the fundamental sciences
- Describe the relationship between public health and environmental sciences and engineering
- Identify major issues in environmental sciences and engineering
- Describe significant regulatory components that have shaped environmental policy
- Demonstrate written and oral communication skills related to environmental sciences and engineering issues within a public health context

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.

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

Admission (http://catalog.unc.edu/undergraduate/schools-college/public-health) to the program is required. Students apply in the spring of their sophomore year. By the end of their sophomore year successful applicants should have earned a grade of C or better from UNC–Chapel Hill in at least one course per group in three of the following groups:

Group 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 201</td>
<td>Ecology and Evolution&lt;sup&gt;H&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 202</td>
<td>Molecular Biology and Genetics&lt;sup&gt;H&lt;/sup&gt;</td>
<td>4</td>
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</tbody>
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Group 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 102</td>
<td>General Descriptive Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 261</td>
<td>Introduction to Organic Chemistry&lt;sup&gt;H&lt;/sup&gt;</td>
<td>3</td>
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</tbody>
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Group 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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<tbody>
<tr>
<td>COMP 116</td>
<td>Introduction to Scientific Programming</td>
<td>3</td>
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</tbody>
</table>

or approved alternatives:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 201H</td>
<td>Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>BIOL/MATH 553</td>
<td>Mathematical and Computational Models in Biology</td>
<td>3</td>
</tr>
<tr>
<td>GEG 597</td>
<td>Ecological Modeling</td>
<td>3</td>
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</tbody>
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Group 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<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>
<tr>
<td>MATH 232 or MATH 283</td>
<td>Calculus of Functions of One Variable II or BioCalculus II</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 233</td>
<td>Calculus of Functions of Several Variables&lt;sup&gt;H&lt;/sup&gt;</td>
<td>4</td>
</tr>
</tbody>
</table>

Group 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 114</td>
<td>General Physics I: For Students of the Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 115</td>
<td>General Physics II: For Students of the Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 118</td>
<td>Introductory Calculus-based Mechanics and Relativity</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 119</td>
<td>Introductory Calculus-based Electromagnetism and Quanta</td>
<td>4</td>
</tr>
</tbody>
</table>

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

The major in environmental health sciences includes several concentrations:

- General (p. 2)
- Environmental Chemistry (p. 2)
- Environmental Health Biology (p. 2)
- Environmental Physics (p. 3)

Requirements for All Concentrations

Core Requirements

Public Health Core Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>BIOS 600</td>
<td>Principles of Statistical Inference</td>
<td>3</td>
</tr>
<tr>
<td>EPID 600</td>
<td>Principles of Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>HBEH 600</td>
<td>Social and Behavioral Sciences in Public Health</td>
<td>3</td>
</tr>
<tr>
<td>HPM 600</td>
<td>Introduction to Health Policy and Management</td>
<td>3</td>
</tr>
</tbody>
</table>

Other Core Courses:
### General Concentration

**Environmental Health Electives**

Complete four advanced (400-level or above) courses with a substantive environmental health content.

**Additional Requirements**

- **MATH 233**  
  Calculus of Functions of Several Variables

**Environmental Chemistry Concentration**

**Environmental Health Electives**

All students must complete four advanced (400-level or above) courses selected from:

- **ENVR 403**  
  Environmental Chemistry Processes
- **ENVR 416**  
  Aerosol Physics and Chemistry
- **ENVR 419**  
  Chemical Equilibria in Natural Waters
- **ENVR 451**  
  Elements of Chemical Reactor Engineering
- **ENVR 575**  
  Global Climate Change: Science, Impacts, Solutions
- **ENVR 650**  
  Principles of Chemical Carcinogenesis
- **ENVR 675**  
  Air Pollution, Chemistry, and Physics

**Additional Requirements**

- **CHEM 481**  
  Physical Chemistry I
- **MATH 233**  
  Calculus of Functions of Several Variables
- **MATH 283**  
  First Course in Differential Equations
- **PHYS 118**  
  Introductory Calculus-based Mechanics and Relativity
- **PHYS 119**  
  Introductory Calculus-based Electromagnetism and Quanta

**Environmental Health Biology Concentration**

**Environmental Health Electives**

All students must complete four advanced (400-level or above) courses selected from:

- **ENVR 411**  
  Laboratory Techniques and Field Measurements
- **ENVR 412**  
  Ecological Microbiology
- **ENVR 421**  
  Environmental Health Microbiology
- **ENVR 423**  
  Industrial Toxicology
- **ENVR 425**  
  Introduction to Health Physics: Radiation and Radiation Protection
- **ENVR 433**  
  Health Hazards of Industrial Operation
- **ENVR 442**  
  Biochemical Toxicology
- **ENVR 468**  
  Advanced Functions of Temporal GIS
- **ENVR 610**  
  Global Perspectives on Environmental Health Inequalities
- **ENVR 630**  
  Systems Biology in Environmental Health

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1. At least two must be listed within the Department of Environmental Sciences and Engineering. This requirement is satisfied by any ENVR course (or course cross-listed with ENVR) that is at least two credit hours and numbered between 401 and 690, except for ENVR 593, ENVR 600, and ENVR 601. Other courses may be substituted with the approval of the director of undergraduate studies.

2. if placed out of MATH 231 and MATH 232

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**Honors version available. An honors course fulfills the same requirements as the nonhonors version of that course. Enrollment and GPA restrictions may apply.**
Environmental Health Sciences Major, B.S.P.H.

Environmental Physics Concentration

All students must complete four advanced (400-level or above) courses selected from the following list:

- ENVR 403 Environmental Chemistry Processes
- ENVR 416 Aerosol Physics and Chemistry
- ENVR 451 Elements of Chemical Reactor Engineering
- ENVR 452 Fluid Dynamics
- ENVR 453 Groundwater Hydrology
- ENVR 666 Numerical Methods
- ENVR 671 Environmental Physics I
- ENVR 472 Quantitative Risk Assessment in Environmental Health Microbiology
- ENVR 675 Air Pollution, Chemistry, and Physics

Additional Requirements

- MATH 233 Calculus of Functions of Several Variables\(^H\) 4
- MATH 383 First Course in Differential Equations\(^H\) 3

\(^H\) 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.

### Course Title Hours

#### First Year

**Fall Semester**

- MATH 231 or MATH 241 Calculus of Functions of One Variable I or BioCalculus I 3-4
- BIOL 101 Principles of Biology 4
- BIOL 101L and Introductory Biology Laboratory\(^H\) 4

**Spring Semester**

- CHEM 101 General Descriptive Chemistry I 4
- CHEM 101L and Quantitative Chemistry Laboratory I 4
- BIOL 201 Ecology and Evolution\(^H\) 4

#### Sophomore Year

**Fall Semester**

- CHEM 102 General Descriptive Chemistry II and Quantitative Chemistry Laboratory II\(^H\) 4
- MATH 232 Calculus of Functions of One Variable II 4

**Spring Semester**

- PHYS 118 Introductory Calculus-based Mechanics and Relativity 4
- BIOL 202 Molecular Biology and Genetics\(^H\) 4
- COMP 116 Introduction to Scientific Programming 3

#### Junior Year

**Fall Semester**

- ENVR 230 Environmental Health Issues 3
- CHEM 261 Introduction to Organic Chemistry I\(^H\) 3
- HPM 600 Introduction to Health Policy and Management 3

**Spring Semester**

- PHYS 119 Introductory Calculus-based Electromagnetism and Quanta 4
- HBEH 600 Social and Behavioral Sciences in Public Health 3
- ENVR 403 Environmental Chemistry Processes 3
- ENVR 695 Undergraduate Research 1-3

#### Senior Year

**Fall Semester**

- BIOS 600 Principles of Statistical Inference 3
- ENVR 412 Ecological Microbiology 3
- ENVR 430 Health Effects of Environmental Agents 3
- ENVR 593 Undergraduate Practicum in Environmental Health Sciences 1-3
- ENVR 691H Honors Research 3

**Spring Semester**

- EPID 600 Principles of Epidemiology 3
- ENVR 423 Industrial Toxicology 3
- ENVR 470 Environmental Risk Assessment 3
- ENVR 692H Honors Thesis 3

Total Hours 13-15

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**Special Opportunities in Environmental Health Sciences**

**Honors in Environmental Health Sciences**

Students who have a grade point average of 3.3 or higher are eligible to participate in honors research and to write an honors thesis.

**Study Abroad**

There are several opportunities for pursuing environmental study abroad, both through the department and through the UNC Study Abroad Office (http://studyabroad.unc.edu/studyabroad.cfm).

**Undergraduate Research**

Many undergraduate students participate in the research programs of the department. Students are encouraged to consult individual faculty members for more information.
members for opportunities to participate in such research. In addition, the department has information concerning fellowships and internships, some of which are combined with research opportunities in laboratories or field settings.