

# Environmental Engineering (BS)

## Environmental Engineering Degree

The Environmental Engineering curriculum is designed for students interested in environmental protection and sustainability. The curriculum provides students with a foundation in the science and mathematics required to observe, understand, model, and analyze environmental systems, as well as engineering skills to design critical components of society's infrastructure. Upon graduation, students are prepared to work in such areas as water treatment, water resources management, air pollution control, solid waste management, and sustainable energy systems. The curriculum emphasizes the interdisciplinary nature of environmental engineering with courses in engineering, earth, and life sciences, including specialized courses on energy and climate, pollution control, waste management, and water and sanitation in developing countries.

## Educational Objectives in Environmental Engineering

*Within a few years of graduation alumni of the Environmental Engineering program will:*

- Function successfully in a professional environment by utilizing and enhancing their technical, critical thinking, communication, and leadership skills.
- Continue learning through graduate or other professional education and obtaining licensure where appropriate.
- Function in team-oriented, multidisciplinary open-ended engineering activities considering the societal, economic, public health, and environmental impacts of engineering decisions, and the professional and ethical responsibilities of environmental engineers.
- Provide mentoring to those under their supervision, and provide leadership in their employment organizations, industry associations, and professional societies.

## Plan Requirements

### First Year

Fall Semester		Hours
CH 101	Chemistry - A Molecular Science <sup>1</sup>	3
CH 102	General Chemistry Laboratory <sup>1</sup>	1
E 101	Introduction to Engineering & Problem Solving <sup>2</sup>	1
E 115	Introduction to Computing Environments	1
ENG 101	Academic Writing and Research <sup>2</sup>	4
MA 141	Calculus I <sup>1</sup>	4
<b>Hours</b>		<b>14</b>

### Spring Semester

CH 201	Chemistry - A Quantitative Science <sup>2</sup>	3
Select one of the following:		3
ARE 201	Introduction to Agricultural & Resource Economics	
ARE 201A	Introduction to Agricultural & Resource Economics	

EC 201	Principles of Microeconomics	
EC 205	Fundamentals of Economics	
MA 241	Calculus II <sup>1</sup>	4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory <sup>1</sup>	4
E 102	Engineering in the 21st Century	2
<b>Hours</b>		<b>16</b>

### Second Year

#### Fall Semester

CE 214	Engineering Mechanics-Statics <sup>2</sup>	3
CE 250	Introduction to Sustainable Infrastructure <sup>2</sup>	3
CHE 205	Chemical Process Principles	4
MA 242	Calculus III	4
CSC 111	Introduction to Computing: Python	3
<b>Hours</b>		<b>17</b>

#### Spring Semester

BIO 183	Introductory Biology: Cellular and Molecular Biology	4
CE 373	Fundamentals of Environmental Engineering <sup>2</sup>	3
SSC 442	Soil and Environmental Biogeochemistry	3
MA 341	Applied Differential Equations I	3
CE 282	Hydraulics	3
<b>Hours</b>		<b>16</b>

### Third Year

#### Fall Semester

CE 378	Environmental Chemistry and Microbiology	4
TDE 220 or GIS 280	Civil Engineering Graphics or Introduction to GIS	3
PY 208	Physics for Engineers and Scientists II	3
PY 209	Physics for Engineers and Scientists II Laboratory	1
ST 370	Probability and Statistics for Engineers	3
COM 110	Public Speaking	3
<b>Hours</b>		<b>17</b>

#### Spring Semester

CE 381	Hydraulics Systems Measurements Lab	1
CE 383	Hydrology and Urban Water Systems	3
CE 339	Civil Engineering Systems	3
MAE 201	Thermal-Fluid Sciences	3
PS 320 or PS 336	U.S. Environmental Law and Politics or Global Environmental Politics	3
<b>Hours</b>		<b>13</b>

### Fourth Year

#### Fall Semester

CE 476 or CE 479	Air Pollution Control or Air Quality	3
CE 484	Water Supply and Waste Water Systems	3
CE 488	Water Resources Engineering	3
ENE Elective I (p. 2)		3
<b>Hours</b>		<b>12</b>

**Spring Semester**

CE 477	Principles of Solid Waste Engineering	3
CE 481	Environmental Engineering Project	3
ENE Elective II (p. 2)		3
ENE Elective III (p. 2)		3
<b>Hours</b>		<b>12</b>
<b>Total Hours</b>		<b>117</b>

<sup>1</sup> A grade of C or higher is required.<sup>2</sup> A grade of C- or higher is required.

<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>GEP Courses</b>		
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		2
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> )		3
GEP US Diversity, Equity, and Inclusion ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/</a> )		3
GEP Global Knowledge ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/</a> ) (verify requirement)		
World Language Proficiency ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/</a> ) (verify requirement)		
<b>Total Hours</b>		<b>11</b>

**ENE Elective I**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CE 435	Engineering Geology	3
CE 476	Air Pollution Control	3
CE 478	Energy and Climate	3
CE 479	Air Quality	3
CE 487	Introduction to Coastal and Ocean Engineering	3
CE 578	Energy and Climate	3
MEA 479	Air Quality	3

**ENE Elective II**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CE 435	Engineering Geology	3
CE 476	Air Pollution Control	3
CE 478	Energy and Climate	3
CE 479	Air Quality	3
CE 499	Undergraduate Research Thesis in Civil, Construction and Environmental Engineering	1-3
CE 487	Introduction to Coastal and Ocean Engineering	3
CE 578	Energy and Climate	3
MEA 479	Air Quality	3

**ENE Elective III**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
ARC 521	Daylighting and Passive Energy Systems for Architecture	3
ARC 522	Building Energy Efficiency & Renewable Energy	3
ARC 590	Special Topics in Architecture	1-6
CE 435	Engineering Geology	3
CE 476	Air Pollution Control	3
CE 478	Energy and Climate	3
CE 479	Air Quality	3
CE 487	Introduction to Coastal and Ocean Engineering	3
CE 578	Energy and Climate	3
MEA 479	Air Quality	3

**Semester Sequence**

This is a sample.

**First Year**

Fall Semester		Hours
CH 101	Chemistry - A Molecular Science <sup>1</sup>	3
CH 102	General Chemistry Laboratory <sup>1</sup>	1
E 101	Introduction to Engineering & Problem Solving <sup>1,2</sup>	1
E 115	Introduction to Computing Environments <sup>1,2</sup>	1
ENG 101	Academic Writing and Research <sup>1,2</sup>	4
MA 141	Calculus I <sup>1,2</sup>	4
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1

**Spring Semester**

CH 201	Chemistry - A Quantitative Science	3
EC 205	Fundamentals of Economics <sup>1</sup>	3
MA 241	Calculus II <sup>1</sup>	4
PY 205	Physics for Engineers and Scientists I <sup>1</sup>	3
PY 206	Physics for Engineers and Scientists I Laboratory <sup>1</sup>	1
E 102	Engineering in the 21st Century	2
<b>Hours</b>		<b>16</b>

**Second Year**

Fall Semester		
CE 214	Engineering Mechanics-Statics	3
CE 250	Introduction to Sustainable Infrastructure	3
CHE 205	Chemical Process Principles	4
MA 242	Calculus III	4
CSC 111	Introduction to Computing: Python	3
Hours		17

**Spring Semester**

BIO 183	Introductory Biology: Cellular and Molecular Biology	4
CE 373	Fundamentals of Environmental Engineering	3
Earth System Chemistry Elective		3

SSC 442	Soil and Environmental Biogeochemistry	
MA 341	Applied Differential Equations I	3
CE 282	Hydraulics	3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1
<b>Hours</b>		<b>17</b>
<b>Third Year</b>		
<b>Fall Semester</b>		
CE 378	Environmental Chemistry and Microbiology	4
TDE 220 or GIS 280	Civil Engineering Graphics or Introduction to GIS	3
PY 208	Physics for Engineers and Scientists II	3
ST 370	Probability and Statistics for Engineers	3
COM 110	Public Speaking	3
PY 209	Physics for Engineers and Scientists II Laboratory	1
<b>Hours</b>		<b>17</b>
<b>Spring Semester</b>		
CE 381	Hydraulics Systems Measurements Lab	1
CE 383	Hydrology and Urban Water Systems	3
CE 339	Civil Engineering Systems	3
MAE 201	Thermal-Fluid Sciences	3
PS 320 or PS 336	U.S. Environmental Law and Politics or Global Environmental Politics	3
GEP Requirement ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
<b>Hours</b>		<b>16</b>
<b>Fourth Year</b>		
<b>Fall Semester</b>		
CE 488	Water Resources Engineering	3
CE 476 or CE 479	Air Pollution Control or Air Quality	3
ENE Elective I (p. 2)		3
CE 484	Water Supply and Waste Water Systems	3
GEP Requirement ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
<b>Hours</b>		<b>15</b>
<b>Spring Semester</b>		
CE 477	Principles of Solid Waste Engineering	3
CE 481	Environmental Engineering Project	3
ENE Elective II (p. 2)		3
ENE Elective III (p. 2)		3
GEP Requirement ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
<b>Hours</b>		<b>15</b>
<b>Total Hours</b>		<b>128</b>

<sup>1</sup> A grade of C or higher is required.<sup>2</sup> A grade of C- or higher is required.

## Career Opportunities

Society will always need constructed facilities to live, work, and sustain their lives and environment, and civil, construction, and environmental engineers will always be needed to plan, design, and construct these facilities. Civil, construction, and environmental engineering comprise such diversified fields that graduates have a wide choice in types and locations of employment. Jobs range from federal, state, or municipal agencies to a variety of manufacturing and processing industries, consulting firms or construction companies. The work may be performed partially or wholly in an office or in the field and may be located in a small community, a big city, an industrial center, or even in a foreign country. Careers in either professional practice or teaching and research are common for many graduates who complete advanced degrees.

## Career Titles

- Environmental Engineer
- Air Quality Engineer
- Coastal Engineer
- Energy Engineer
- Environmental Engineer
- Industrial Safety and Health Engineer
- Municipal Engineer
- Product Safety Engineer
- Process Engineer
- Project Manager
- Solar Energy Systems Designer
- Water/Wastewater Engineer
- Engineering Professor

## Learn More About Careers

NCcareers.org (<https://nccareers.org/>)

Explore North Carolina's central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (<https://www.bls.gov/ooh/>)

Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics. You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (<https://www.careeronestop.org/>)

View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation. Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (<https://careers.dasa.ncsu.edu/explore-careers/career-assessments/>) (NC State student email address required)  
This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an account. Make an appointment with your career counselor (<https://careers.dasa.ncsu.edu/about/hours-appointments/>) to discuss the results.

Focus 2 Apply Assessment (<https://www.focus2career.com/Portal/Register.cfm?SID=1929>) (Available to prospective students)

A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your

unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.

American Academy of Environmental Engineers & Scientists (<http://www.aaees.org/>)

National Association of Environmental Professionals (<https://www.naep.org/>)

American Water Resources Association (<https://www.awra.org/>)

National Society of Professional Engineers (<https://www.nspe.org/>)

American Society of Civil Engineers (<https://www.asce.org/>)