

ENVIRONMENTAL SCIENCE MAJOR, B.S.

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. There are two tracks available. Interested students should contact Dr. Amy Cooke (amycooke@unc.edu) to discuss which track best fits their interests and career goals.

Student Learning Outcomes

Upon completion of the environmental sciences program (B.S.), students should be able to:

- Demonstrate knowledge in the connections in social and/or natural sciences through an understanding of major concepts, theoretical reasoning, and empirical findings in environmental studies
- 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. 4)



Environmental Science, B.S.

In addition to the program requirements, students must




- earn a minimum final cumulative GPA of 2.000
- complete a minimum of 45 academic credit hours earned from UNC–Chapel Hill courses
- take at least half of their major core requirements (courses and credit hours) at UNC–Chapel Hill
- earn a minimum cumulative GPA of 2.000 in the major core requirements. Some programs may require higher standards for major or specific courses.

For more information, please consult the degree requirements section of the catalog (<https://catalog.unc.edu/undergraduate/degree-requirements/>).

Code	Title	Hours
Core Requirements		
ENEC 201	 Introduction to Environment and Society ^{H, F}	4
ENEC 203	 Introduction to Environmental Science Problem Solving	3


or EMES 203	 Data Analysis for Earth, Marine, and Environmental Sciences	
or ENEC 415	Environmental Systems Modeling	
or MATH 528	Mathematical Methods for the Physical Sciences I	
or MATH 564	Mathematical Modeling in the Life Sciences	
ENEC 698	Capstone: Analysis and Solution of Environmental Problems	3
or ENEC 694H	 Honors Project in Environmental Sciences and Studies	

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






BIOL 260	Introduction to Ecology ¹	
EMES 401/ BIOL 350/ ENVR 417	Oceanography	
ENEC 202	 Introduction to the Environmental Sciences	
ENEC 222	Estuarine and Coastal Marine Science ¹	
ENEC 324 & 324L	 Water in Our World: Introduction to Hydrologic Science and Environmental Problems and  Water in Our World Laboratory ¹	
ENEC/ENVR 403	Environmental Chemistry Processes ¹	
ENEC/EMES 448	Coastal and Estuarine Ecology ¹	
ENEC 489	Ecological Processes in Environmental Systems ¹	

Two courses from one analytical skills option: 6-7

Applied Math:

MATH 233	 Calculus of Functions of Several Variables ^{H, F}	
MATH 383	First Course in Differential Equations ^H	

GIS and Remote Sensing:

ANTH 419	Anthropological Application of GIS	
EMES 483	Geologic and Oceanographic Applications of Geographical Information Systems ¹	
ENEC/ENVR 468	Temporal GIS and Space/Time Geostatistics for the Environment and Public Health	
ENEC 479	Landscape Analysis ¹	
GEOG 370	 Introduction to Geographic Information ¹	
GEOG 456	 Geovisualizing Change	
GEOG 477	 Introduction to Remote Sensing of the Environment	
GEOG/PLAN 491	Introduction to GIS	
GEOG 577	 Advanced Remote Sensing	
GEOG 591	 Applied Issues in Geographic Information Systems	

Statistics:

BIOL/ENEC 562	Statistics for Environmental Scientists ¹	
BIOS 511	Introduction to Statistical Computing and Data Management	
BIOS 650	Basic Elements of Probability and Statistical Inference I	
EMES 520	Data Analysis for Earth and Marine Sciences	

EMES 525	Modelling in Earth and Marine Sciences	
STOR 455	Methods of Data Analysis	
STOR 556	Time Series Data Analysis	
Informatics		
BUSI 410	Business Analytics	
BUSI 520	Advanced Spreadsheet Modeling for Business	
INLS 161	Tools for Information Literacy	
INLS 382	Information Systems Analysis and Design	
INLS 523	Introduction to Database Concepts and Applications	
INLS 541	Information Visualization	
STOR 215	Foundations of Decision Sciences	
STOR 305	Introduction to Decision Analytics	
Five courses chosen from one of the following concentrations		15-20
Additional Requirements		
CHEM 101 & 101L	General Descriptive Chemistry I and Quantitative Chemistry Laboratory I ^{H, F}	4
CHEM 102 & 102L	General Descriptive Chemistry II and Quantitative Chemistry Laboratory II ^{H, F}	4
COMP 110	Introduction to Programming and Data Science ^H	3
or COMP 116	Introduction to Scientific Programming	
or BIOL 222	Introduction to Programming with Biological Data	
or INLS 560	Programming for Information Science	
MATH 231	Calculus of Functions of One Variable I ^{H, F}	4
MATH 232	Calculus of Functions of One Variable II ^{H, F}	4
STOR 155	Introduction to Data Models and Inference ^F	3
or BIOS 600	Principles of Statistical Inference	
Select one of the following:		8
BIOL 101 & 101L & BIOL 104	Principles of Biology and Introductory Biology Laboratory and Biodiversity ^{H, H, F}	
PHYS 118 & PHYS 119	Introductory Calculus-based Mechanics and Relativity and Introductory Calculus-based Electromagnetism and Quanta ^{H, F}	
PHYS 114 & PHYS 115	General Physics I: For Students of the Life Sciences and General Physics II: For Students of the Life Sciences ^F	
Students are required to earn a minor in an allied science, such as biology, chemistry, computer science, geography, geographic information sciences, geology, information science, marine science, mathematics, physics, or statistics and analytics.		15
Enough free electives to accumulate minimum of 120 credit hours. ² Varies		
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.

^F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

¹ These course appear in the major core, concentrations and additional requirements, but can only be counted toward one of the three.

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

Ecology and Natural Resources Concentration




Code	Title	Hours
BIOL/ENEC 256	Mountain Biodiversity	4
BIOL 260	Introduction to Ecology ¹	3
BIOL/ENEC 272	Local Flora	3
BIOL 277 & 277L	Vertebrate Field Zoology and Vertebrate Field Zoology Laboratory	4
BIOL 402	Infectious Disease in the Developing World	3
BIOL/ENEC 461	Fundamentals of Ecology	4
BIOL 462/EMES 440	Marine Ecology	3
BIOL 463	Field Ecology	4
BIOL 464	Global Change Biology	3
BIOL 465	Global Biodiversity and Macroecology	3
BIOL 469	Behavioral Ecology	3
BIOL 471 & 471L	Evolutionary Mechanisms and Evolutionary Mechanisms Laboratory	4
BIOL 476 & 476L	Avian Biology and Avian Biology Laboratory	4
BIOL 561	Ecological Plant Geography	3
BIOL/ENEC 562	Statistics for Environmental Scientists ¹	4
BIOL/ENEC 563	Statistical Analysis in Ecology and Evolution	4
BIOL 565	Conservation Biology ^H	3
BIOL 568H	Disease Ecology and Evolution	3
BIOL 657/ENVR 520/EMES 507	Biological Oceanography	4
EMES 443	Marine Microbiology	3
ENEC 222	Estuarine and Coastal Marine Science ¹	4
ENEC/GEOG 264	Conservation of Biodiversity in Theory and Practice	3
ENEC 304	Restoration Ecology	4
ENEC 324 & 324L	Water in Our World: Introduction to Hydrologic Science and Environmental Problems and Water in Our World Laboratory ¹	4
ENEC/EMES 352	Marine Fisheries Ecology	3
ENEC 370	Agriculture and the Environment ^H	3
ENEC 395	Research in Environmental Sciences and Studies for Undergraduates	1-3
ENEC/EMES 433	Wetland Hydrology	3
ENEC/EMES 441	Marine Physiological Ecology	3

ENEC/EMES 444/ BIOL 456	Marine Phytoplankton	3
ENEC/EMES 448	Coastal and Estuarine Ecology ¹	4
ENEC/EMES 450	Biogeochemical Processes	4
ENEC 462	Ecosystem Management	3
ENEC/EMES 471	Human Impacts on Estuarine Ecosystems	4
ENEC 479	Landscape Analysis ¹	3
ENEC 485	Coastal Resource Economics and Policy	3-4
ENEC 489	Ecological Processes in Environmental Systems ¹	4
GEOG 444	Landscape Biogeography	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.

¹ These courses appear in the major core, concentrations, and additional requirements, but can only be counted toward one of the three.








Environment and Health Concentration

Code	Title	Hours
BIOL 402	Infectious Disease in the Developing World	3
BIOL 568H	Disease Ecology and Evolution	3
CHEM 261	Introduction to Organic Chemistry I ^{1, H}	3
EMES 443	Marine Microbiology	3
ENEC 222	Estuarine and Coastal Marine Science ¹	4
ENEC/EMES 324	 Water in Our World: Introduction to Hydrologic Science and Environmental Problems ¹	3
ENEC 325	 Water Resource Management and Human Rights ^H	3-4
ENEC 395	 Research in Environmental Sciences and Studies for Undergraduates	1-3
ENEC/ENVR 403	Environmental Chemistry Processes ¹	3
ENEC/EMES 444/ BIOL 456	Marine Phytoplankton	3
ENEC/ENVR 522	Environmental Change and Human Health	3
ENVR 412	Ecological Microbiology	3
ENVR 413	Limnology	3
ENVR 416	Aerosol Physics and Chemistry	4
ENVR 419	Chemical Equilibria in Natural Waters	3
ENVR 421	Environmental Health Microbiology	3
ENVR 430	Health Effects of Environmental Agents	3
ENVR 431	Techniques in Environmental Health Sciences	2
ENVR 451	Introduction to Environmental Modeling	3
ENVR 600	Environmental Health	3
EPID 600	Principles of Epidemiology for Public Health	3
PATH 128	Biology of Human Disease	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.

¹ These courses appears in the major core, concentrations, and additional requirements but can only be counted toward one of the three.

Water and Climate Concentration

Code	Title	Hours
BIOL 350/ ENVR 417/ EMES 401	Oceanography	3
EMES 306	 Earth Systems History	3
EMES 314	 Earth Systems in a Changing World	3
EMES 431	Major World Rivers and Global Change: From Mountains to the Sea	3
EMES 432	Paleoclimatology	3
EMES/ENEC 433	Wetland Hydrology	3
EMES/ENEC 435	Principles of Environmental Consulting: Mechanics of Groundwater Flow	3
EMES 436	Geochemistry of Natural Waters	3
EMES 483	Geologic and Oceanographic Applications of Geographical Information Systems	4
EMES 506	Physical Oceanography	4
EMES 508	Global Hydrology	3
ENEC 222	Estuarine and Coastal Marine Science ¹	4
ENEC/GEOG 253	Introduction to Atmospheric Processes	4
ENEC/EMES 324	 Water in Our World: Introduction to Hydrologic Science and Environmental Problems ¹	3
ENEC 395	 Research in Environmental Sciences and Studies for Undergraduates	1-3
ENEC/ENVR 403	Environmental Chemistry Processes ¹	3
ENEC/EMES 411	Oceanic Processes in Environmental Systems	4
ENEC/EMES 415	Environmental Systems Modeling	3
EMES 434	Blue Carbon and Coastal Environments	3
EMES 503	Marine Geology	4
ENEC/EMES 417	Surface Processes and Landscape Evolution	4
ENEC/EMES 450	Biogeochemical Processes	4
ENVR 413	Limnology	3
ENVR 416	Aerosol Physics and Chemistry	4
ENVR 419	Chemical Equilibria in Natural Waters	3
ENVR 453	Groundwater Hydrology	3
GEOG 370	 Introduction to Geographic Information ¹	3
GEOG 412	Synoptic Meteorology	3
GEOG 414	 Climate Change	3
GEOG 416	 Applied Climatology: The Impacts of Climate and Weather on Environmental and Social Systems	3
GEOG 440/ EMES 502	Earth Surface Processes	3

¹ These courses appear in the major core, concentrations, and additional requirements, but can only be counted toward one of the three.







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














In addition to the program requirements, students must

- earn a minimum final cumulative GPA of 2.000
- complete a minimum of 45 academic credit hours earned from UNC–Chapel Hill courses
- take at least half of their major core requirements (courses and credit hours) at UNC–Chapel Hill
- earn a minimum cumulative GPA of 2.000 in the major core requirements. Some programs may require higher standards for major or specific courses.

For more information, please consult the degree requirements section of the catalog (<https://catalog.unc.edu/undergraduate/degree-requirements/>).

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

Code	Title	Hours
Core Requirements		
ENEC 201	 Introduction to Environment and Society ^{H, F}	4
ENEC 203	 Introduction to Environmental Science Problem Solving	3
or EMES 203	 Data Analysis for Earth, Marine, and Environmental Sciences	
or ENEC 415	Environmental Systems Modeling	
or MATH 528	Mathematical Methods for the Physical Sciences I	
or MATH 564	Mathematical Modeling in the Life Sciences	
ENEC 698	Capstone: Analysis and Solution of Environmental Problems	3
or ENEC 694H	 Honors Project in Environmental Sciences and Studies	
Two courses each from two of the following quantitative skills (4 courses total)		
Informatics		
BUSI 410	Business Analytics	
BUSI 520	Advanced Spreadsheet Modeling for Business	
INLS 161	Tools for Information Literacy	
INLS 382	Information Systems Analysis and Design	
INLS 523	Introduction to Database Concepts and Applications	
INLS 541	Information Visualization	
STOR 215	 Foundations of Decision Sciences	
STOR 305	 Introduction to Decision Analytics	
Applied Mathematics		
MATH 347	Linear Algebra for Applications	
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 564	Mathematical Modeling in the Life Sciences	
PHYS 331	Numerical Techniques for the Sciences I 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	
EMES 520	Data Analysis for Earth and Marine Sciences	
EMES 525	Modelling in Earth and Marine Sciences	
STOR 455	Methods of Data Analysis	
STOR 435	Introduction to Probability	
STOR 556	Time Series Data Analysis	
Basic Science		
BIOL 260	Introduction to Ecology	
BIOL 271	 Plant Biology	
CHEM 261	Introduction to Organic Chemistry I ^H	
PHYS 114	 General Physics I: For Students of the Life Sciences ^{1, F}	
or PHYS 118	 Introductory Calculus-based Mechanics and Relativity	
PHYS 115	 General Physics II: For Students of the Life Sciences ^F	
or PHYS 119	 Introductory Calculus-based Electromagnetism and Quanta	
Modeling		
BIOL 222	 Introduction to Programming with Biological Data	
COMP 211	Systems Fundamentals	
COMP 283	 Discrete Structures ^H	
or MATH 381	Discrete Mathematics	
ENEC 415	Environmental Systems Modeling	
ENEC/ENVR/PLAN 635	Energy Modeling for Environment and Public Health	
INLS 560	Programming for Information Science	
GIS and Remote Sensing		
ANTH 419	Anthropological Application of GIS	
ENEC 479	Landscape Analysis	
GEOG 370	 Introduction to Geographic Information	
GEOG 456	 Geovisualizing Change	
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	
EMES 483	Geologic and Oceanographic Applications of Geographical Information Systems	
ENEC/ENVR 468	Temporal GIS and Space/Time Geostatistics for the Environment and Public Health	
Four courses from one of the following concentrations		12-16

Energy Management		EMES 508	Global Hydrology
ENEC 307	Energy and Material Flows in the Environment and Society	EMES 520	Data Analysis for Earth and Marine Sciences
ENEC 395	Research in Environmental Sciences and Studies for Undergraduates ¹	EMES 525	Modelling in Earth and Marine Sciences
	or ENEC 396 Directed Readings	GEOG 410	Modeling of Environmental Systems
ENEC 407	Principles of Energy Conversion	GEOG 412	Synoptic Meteorology
ENEC 432	Environmental Life Cycle Assessment	GEOG 414	Climate Change
ENEC 481	Energy Economics	GEOG 416	Applied Climatology: The Impacts of Climate and Weather on Environmental and Social Systems
ENEC 482	Energy and the Environment: A Coastal Perspective	GEOG 441	Introduction to Watershed Systems
ENEC 693H	Honors Research in Environmental Sciences and Studies ¹	Smart Cities	
	or ENEC 694H Honors Project in Environmental Sciences and Studies	ENEC 325	Water Resource Management and Human Rights ^H
ENVR/ENEC 403	Environmental Chemistry Processes ¹	ENEC 350	Environmental Law and Policy
PHYS 131	Energy: Physical Principles and the Quest for Alternatives to Dwindling Oil and Gas	ENEC 351	Coastal Law and Policy
PHYS 381	Renewable Electric Power Systems	ENEC 380	Environmental Economics
PLAN/ENEC 547	Energy, Transportation, and Land Use	ENEC 395	Research in Environmental Sciences and Studies for Undergraduates ¹
PLAN/ENEC/ENVR 548	Sustainable Energy Systems		or ENEC 396 Directed Readings
PLAN/ENEC/ENVR 635	Energy Modeling for Environment and Public Health	ENEC/PLAN 420	Community Design and Green Architecture
Environmental Processes		ENEC 485	Coastal Resource Economics and Policy
ENEC 202	Introduction to the Environmental Sciences	ENEC 492	Social Science Research Methods
ENEC 222	Estuarine and Coastal Marine Science	ENEC 693H	Honors Research in Environmental Sciences and Studies ¹
ENEC 256	Mountain Biodiversity		or ENEC 694 Honors Project in Environmental Sciences and Studies
ENEC 304	Restoration Ecology	PLAN/ENEC 547	Energy, Transportation, and Land Use
ENEC 352	Marine Fisheries Ecology	PLAN 636	Urban Transportation Planning
ENEC 370	Agriculture and the Environment ^H	PLAN 637	Public Transportation
ENEC 395	Research in Environmental Sciences and Studies for Undergraduates ¹	PLAN 638	Pedestrian and Bike Transportation
	or ENEC 396 Directed Readings	PLAN 639	Complete, Safe, Equitable Streets
ENEC 462	Ecosystem Management	PLAN/ENEC 641	Watershed Planning
ENEC 489	Ecological Processes in Environmental Systems	PLAN 651	Urban Form and the Design of Cities
ENEC 693H	Honors Research in Environmental Sciences and Studies ¹	PLAN 652	Site Planning and Urban Design
	or ENEC 694 Honors Project in Environmental Sciences and Studies	PLAN 655	Planning for Natural Hazards and Climate Risk
ENVR/ENEC 403	Environmental Chemistry Processes ¹	PLAN 672	Urban Data Analytics
EMES 431	Major World Rivers and Global Change: From Mountains to the Sea	PUBA/PLAN/ENVR 787	Applied Environmental Finance: How to Pay for Environmental Services
EMES/ENEC 433	Wetland Hydrology	Additional Requirements	
EMES/ENEC 450	Biogeochemical Processes	COMP 110	Introduction to Programming and Data Science ³⁻⁴ _{1, H}
EMES/ENEC 435	Principles of Environmental Consulting: Mechanics of Groundwater Flow	or COMP 116	Introduction to Scientific Programming
EMES 436	Geochemistry of Natural Waters	or PHYS 331	Numerical Techniques for the Sciences I
		or BIOL 222	Introduction to Programming with Biological Data
		Select from one of the following course options: ^{1,2} 7-8	
		BIOL 101	Principles of Biology
		& 101L	and Introductory Biology Laboratory
		& BIOL 104	and Biodiversity ^{H, F}

CHEM 101 & 101L & CHEM 102 & CHEM 102L	General Descriptive Chemistry I and Quantitative Chemistry Laboratory I and General Descriptive Chemistry II and Quantitative Chemistry Laboratory II ^{H, F}	
PHYS 114 & PHYS 115	General Physics I: For Students of the Life Sciences and General Physics II: For Students of the Life Sciences ^F	
PHYS 118 & PHYS 119	Introductory Calculus-based Mechanics and Relativity and Introductory Calculus-based Electromagnetism and Quanta ^{H, F}	
MATH 231	Calculus of Functions of One Variable I ^{H, F}	4
MATH 232	Calculus of Functions of One Variable II ^{H, F}	4
MATH 233	Calculus of Functions of Several Variables ^{H, F}	4
STOR 155 or BIOS 600	Introduction to Data Models and Inference ^F Principles of Statistical Inference	3
Enough General Education courses and free electives to satisfy 12051-61 credit hours.		
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.

F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

¹ The following courses are listed under multiple requirements in the major but can only be used to fulfill one requirement per course: BIOL 222 (<https://catalog.unc.edu/search/?search=BIOL+222>), ENEC 395, ENEC 415, ENEC 396, PLAN/ENEC/ENVR 635 (<https://catalog.unc.edu/search/?search=enec+635>), ENEC 693H, ENEC 694H, ENVR 403/ENEC 403, PHYS 114, PHYS 115, PHYS 118, PHYS 119, PHYS 331.

² Courses to be taken in a series; e.g., CHEM 101+L and CHEM 102+L.

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

First Year		Hours
First-Year Foundation Courses		
IDST 101	College Thriving	1
ENGL 105 or ENGL 105I	English Composition and Rhetoric or English Composition and Rhetoric (Interdisciplinary)	3
First-Year Seminar or First-Year Launch (https://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/) ^F		3
Triple-I and Data Literacy (https://catalog.unc.edu/undergraduate/ideas-in-action/triple-i/)		4
Global Language through level 3 (https://catalog.unc.edu/undergraduate/ideas-in-action/global-language/) ¹		3-4
Major Courses		
CHEM 101 & 101L	General Descriptive Chemistry I and Quantitative Chemistry Laboratory I ^{H, F}	4
ENEC 201	Introduction to Environment and Society ^{H, F}	4
MATH 231	Calculus of Functions of One Variable I ^{H, F}	4
MATH 232	Calculus of Functions of One Variable II ^{H, F}	4
STOR 155	Introduction to Data Models and Inference ^F	3
Additional Courses		
Lifetime Fitness (https://catalog.unc.edu/undergraduate/ideas-in-action/lifetime-fitness/)		1
Hours		34-35
Sophomore Year		
CHEM 102 & 102L	General Descriptive Chemistry II and Quantitative Chemistry Laboratory II ^{H, F}	4
ENEC 203 or EMES 203 or ENEC 415 or MATH 528 or MATH 564	Introduction to Environmental Science Problem Solving or Data Analysis for Earth, Marine, and Environmental Sciences or Environmental Systems Modeling or Mathematical Methods for the Physical Sciences I or Mathematical Modeling in the Life Sciences	3
One environmental concentration course		3
One earth system science core		3-4
BIOL 101 & 101L or PHYS 114 or PHYS 118	Principles of Biology ^{H, F} or General Physics I: For Students of the Life Sciences or Introductory Calculus-based Mechanics and Relativity	4
BIOL 104 or PHYS 115 or PHYS 119	Biodiversity ^F or General Physics II: For Students of the Life Sciences or Introductory Calculus-based Electromagnetism and Quanta	3-4

COMP 110 or COMP 116 or BIOL 222 or INLS 560	Introduction to Programming and Data Science ^H or Introduction to Scientific Programming or Introduction to Programming with Biological Data or Programming for Information Science	3
Electives or IDEAs in Action Requirements		6
Hours		29-31
Junior Year		
Two courses from the analytical skills core		6
Three courses from environmental concentration core		9
Two courses from a minor field		6
Electives or IDEAs in Action Requirements		9
Hours		30
Senior Year		
ENEC 698 or ENEC 694H	Capstone: Analysis and Solution of Environmental Problems or Honors Project in Environmental Sciences and Studies	3
Remaining environmental concentration core		3
Remaining minor field courses		9
Remaining Electives or IDEAs in Action Requirements to meet 120 academic hour minimum		11
Hours		26
Total Hours		119-122

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

^F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

¹ Students may wish to consider completing their GLOBE-LANG (<https://catalog.unc.edu/undergraduate/ideas-in-action/global-language/>) requirement over the summer, in the second year, or through transfer credit to allow for taking fewer hours per semester in the first year.

Suggested Program of Study for the Quantitative Energy Systems Track

First Year	Hours
ENEC 201	Introduction to Environment and Society ^{H, F} 4
STOR 155	Introduction to Data Models and Inference ^F 3
CHEM 101 & 101L	General Descriptive Chemistry I and Quantitative Chemistry Laboratory I ^{H, F} 4
CHEM 102 & 102L	General Descriptive Chemistry II and Quantitative Chemistry Laboratory II ^{H, F} 4
MATH 231	Calculus of Functions of One Variable I ^{H, F} 4
MATH 232	Calculus of Functions of One Variable II ^{H, F} 4
Language levels 2 and 3 6	

Lifetime fitness	1
ENGL 105	English Composition and Rhetoric 3
Hours	
33	

Sophomore Year		
ENEC 203 or EMES 203 or ENEC 415 or MATH 528 or MATH 564	Introduction to Environmental Science Problem Solving or Data Analysis for Earth, Marine, and Environmental Sciences or Environmental Systems Modeling or Mathematical Methods for the Physical Sciences I or Mathematical Modeling in the Life Sciences	3
MATH 233	Calculus of Functions of Several Variables ^{H, F}	4
COMP 110 or BIOL 222 or COMP 116 or PHYS 331	Introduction to Programming and Data Science ^{1, H} or Introduction to Programming with Biological Data or Introduction to Scientific Programming or Numerical Techniques for the Sciences I	3
Two courses from quantitative skills		6
Additional General Education courses and free electives		15
Hours		31
Junior Year		
COMP 110 or BIOL 222 or COMP 116 or PHYS 331	Introduction to Programming and Data Science ^{1, H} or Introduction to Programming with Biological Data or Introduction to Scientific Programming or Numerical Techniques for the Sciences I	3
Two courses from environmental concentration courses		6
Two courses from quantitative skills		6
Additional General Education courses and free electives		15
Hours		30
Senior Year		
ENEC 698 or ENEC 694H	Capstone: Analysis and Solution of Environmental Problems or Honors Project in Environmental Sciences and Studies	3
Remaining environmental concentration courses		6
Remaining General Education courses and free electives to reach at least 120 academic credit hours		17
Hours		26
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.

^F FY-Launch class sections may be available. A FY-Launch section fulfills the same requirements as a standard section of that course, but also fulfills the FY-SEMINAR/FY-LAUNCH First-Year Foundations requirement. Students can search for FY-Launch sections in ConnectCarolina using the FY-LAUNCH attribute.

Dual Bachelor's–Master's Degree Program

Four dual bachelor's–master's programs are offered:

1. *Environmental and science communication* is a collaboration between the environment, ecology and energy program (E3P) and the School of Journalism and Media;
2. *Environmental informatics* is a collaboration between E3P and the School of Information and Library Science;
3. *Environmental finance and leadership* is a collaboration between E3P and the School of Government;
4. *Environmental geography* is a collaboration between E3P and the Department of Geography.

Each program is designed for students to earn their bachelor's degree and complete a master's degree in a professional school or program in as few as five years:

- The dual degree in environmental and science communication is approached through the bachelor of arts degree with a major in environmental studies, and students then complete a master's degree in journalism with a focus on strategic communication or journalism. The Hussman School has one-year graduate degrees in both journalism and strategic communications (so-called +1 programs) but retain a "pipeline" for environmental studies and sciences students interested in obtaining both degrees.
- The dual degree in environmental informatics is approached through the bachelor of science degree with a major in environmental science, and students then complete a master's in information sciences (M.S.I.S.).
- The dual degree in environmental finance and leadership is approached through either the bachelor of science in environmental science or the bachelor of arts in environmental studies, and students then complete a master of public administration (M.P.A.).
- The dual degree in environmental geography is approached through either the bachelor of science in environmental science or the bachelor of arts in environmental studies, and students then complete a master's in geography.

Students in the last three programs may begin taking courses for the graduate degree while in the undergraduate program. In some programs, up to 12 hours of undergraduate credits can also be counted in the graduate degree. 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 recommended that interested first- and second-year students speak to an advisor early in their college program. Students must submit a conditional application to most programs 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 degrees in environmental science and communication, nor for the dual degrees in environmental geography; 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 website listed above for the dual-degree program of interest.

In addition to the four dual-degree programs specific to collaborations with E3P, there are other dual-degree undergraduate/graduate programs developed by other UNC departments and colleges. Programs of interest include the Department of City and Regional Planning for a master's in city and regional planning (M.C.R.P.) (<https://planning.unc.edu/academics/dual-degree/bachelor/>), the Department of Public Policy for a master's in public policy (M.P.P.) (<https://publicpolicy.unc.edu/mpp-unc/>), and the Gillings School of Global Public Health (<https://sph.unc.edu/envr/bachelors-to-masters-programs/>) for a range of public health-related master's programs.

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 (<https://catalog.unc.edu/undergraduate/programs-study/environmental-science-bs/gwbell@email.unc.edu>), to ensure that appropriate requirements are fulfilled. (Requirements can be found on the Honors Program website (<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 Epsilon Eta Environmental Honors Fraternity is an organization dedicated to excellence in environmental education. Interested students are nominated for membership and membership is not limited to E3P majors. E3P faculty are involved with a number of student organizations and initiatives across campus. See UNC Heel Life (<https://heelife.unc.edu/>) for more environmental clubs at Carolina.

Experiential Education

Possibilities for experiential education include APPLES service-learning courses (ENEC 593), Coral Reef Ecology and Management (ENEC 259), internships (ENEC 393, ENEC 493), research (ENEC 395, ENEC 396, ENEC 698), and honors research (ENEC 693H, ENEC 694H).

Additionally, a series of five experiential education field sites (<https://ie.unc.edu/field-education/field-sites/>) are located 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 (sustainability/urban planning) and in Thailand (energy and pollution).

Summer programs are also offered in the Galapagos via UNC's Center for Galapagos Studies. Faculty members often arrange Burch Program summer educational trips to such locations as Australia (conservation, restoration, and natural resource management) and northern Europe (energy, sustainability, and communication). Contact our advisors about other opportunities — many other study abroad programs combine well with the E3P program.

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 Ecostudio Internship Incubator website (<https://ecostudio.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), or the Ecostudio, to obtain the required application for credit before the term begins. Students may also find their own internship and petition the Ecostudio to gain academic credit.

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.

Department Programs

Majors

- Environmental Studies Major, B.A. (<https://catalog.unc.edu/undergraduate/programs-study/environmental-studies-major-ba/>)
- Environmental Science Major, B.S. (p. 1)
- Dual Bachelor's-Master's Degree Programs (<https://catalog.unc.edu/undergraduate/programs-study/environmental-studies-major-ba/#dualdegreertext>)

Minors

- Environmental Science and Studies Minor (<https://catalog.unc.edu/undergraduate/programs-study/environmental-science-studies-minor/>)
- Food Studies Minor (<https://catalog.unc.edu/undergraduate/programs-study/food-studies-minor/>)
- Sustainability Studies Minor (<https://catalog.unc.edu/undergraduate/programs-study/sustainability-studies-minor/>)

Graduate Programs

- Doctor of Philosophy (<https://catalog.unc.edu/graduate/schools-departments/environment-ecology/#programstext>)
- Master of Science (<https://catalog.unc.edu/graduate/schools-departments/environment-ecology/#programstext>)
- Master of Arts (<https://catalog.unc.edu/graduate/schools-departments/environment-ecology/#programstext>)

Contact Information

Environment, Ecology, and Energy Program

Visit Program Website (<https://e3p.unc.edu/>)

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