

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 (<http://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 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 103	 How Cells Function ^{1, F}	
or BIOL 104	 Biodiversity	
or BIOL 201	Ecology and Evolution	
ENEC 202	 Introduction to the Environmental Sciences	
ENEC 222	Estuarine and Coastal Marine Science ¹	
ENEC 489	Ecological Processes in Environmental Systems ¹	
ENEC/MASC 448	Coastal and Estuarine Ecology ¹	
ENEC/ENVR 403	Environmental Chemistry Processes ¹	
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	
GEOL 315	Energy Resources	
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	
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 491	Introduction to GIS	
GEOG 577	 Advanced Remote Sensing	
GEOG 591	 Applied Issues in Geographic Information Systems	
GEOL/MASC 483	Geologic and Oceanographic Applications of Geographical Information Systems ¹	
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	
GEOL 520	Data Analysis in the Earth Sciences	
GEOL 525	Inverse Theory: Advanced Data Analysis and Geophysical Modeling	

STOR 455	Methods of Data Analysis	
STOR 556	Time Series Data Analysis	
Basic Science:		
BIOL 202	Molecular Biology and Genetics ^{H, F}	
CHEM 261	Introduction to Organic Chemistry I ^{1, H}	
Informatics		
INLS 161	Tools for Information Literacy	
INLS 201	Foundations of Information Science	
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 ^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	
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 201	Principles of Biology and Introductory Biology Laboratory and Ecology and Evolution ^{H, H, F}	
PHYS 118 & PHYS 119	Introductory Calculus-based Mechanics and Relativity and Introductory Calculus-based Electromagnetism and Quanta ^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 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 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 201	Ecology and Evolution ^{1, H}	4
BIOL/ENEC 272	Local Flora	4
BIOL 277 & 277L	Vertebrate Field Zoology and Vertebrate Field Zoology Laboratory	4
BIOL 402	Infectious Disease in the Developing World	3
BIOL 463	Field Ecology	4
BIOL 464	Global Change Ecology	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 565	Conservation Biology ^H	3
BIOL 568	Disease Ecology and Evolution	3
BIOL/ENEC 256	Mountain Biodiversity	4
BIOL/ENEC 461	Fundamentals of Ecology	4
BIOL/ENEC 562	Statistics for Environmental Scientists ¹	4
BIOL/ENEC 563	Statistical Analysis in Ecology and Evolution	4
BIOL 657/ENVR 520/MASC 504	Biological Oceanography	4
BIOL 462/MASC 440	Marine Ecology	3
ENEC 222	Estuarine and Coastal Marine Science ¹	4
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 370	Agriculture and the Environment ^H	3
ENEC 462	Ecosystem Management	3
ENEC 479	Landscape Analysis ¹	3
ENEC 485	Coastal Resource Economics and Policy	3-4
ENEC 489	Ecological Processes in Environmental Systems ¹	4
ENEC/GEOG 264	Conservation of Biodiversity in Theory and Practice	3

ENEC/GEOL/ MASC 450	Biogeochemical Processes	4
ENEC/MASC 352	Marine Fisheries Ecology	3
ENEC/MASC 433	Wetland Hydrology	3
ENEC/MASC 441	Marine Physiological Ecology	3
ENEC/MASC 444	Marine Phytoplankton	3
ENEC/MASC 448	Coastal and Estuarine Ecology ¹	4
ENEC/MASC 471	Human Impacts on Estuarine Ecosystems	4
GEOG 444	Landscape Biogeography	3
MASC 443	Marine Microbiology	3
MASC 445	Marine Invertebrate Biology	4

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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.







Environment and Health Concentration

Code	Title	Hours
BIOL 402	Infectious Disease in the Developing World	3
BIOL 568	Disease Ecology and Evolution	3
CHEM 261	Introduction to Organic Chemistry I ^{1, H}	3
ENEC 222	Estuarine and Coastal Marine Science ¹	4
ENEC/ENVR 403	Environmental Chemistry Processes ¹	3
ENEC/ENVR 522	Environmental Change and Human Health	3
ENEC/GEOL 324	 Water in Our World: Introduction to Hydrologic Science and Environmental Problems ¹	3
ENEC/MASC 444	Marine Phytoplankton	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 442	Biochemical Toxicology	3
ENVR 451	Introduction to Environmental Modeling	3
ENVR 600	Environmental Health	3
EPID 600	Principles of Epidemiology for Public Health	3
MASC 443	Marine Microbiology	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 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 Concentration

Code	Title	Hours
BIOL 350/ ENVR 417/ GEOL 403/ MASC 401	Oceanography	3
ENEC 222	Estuarine and Coastal Marine Science ¹	4
ENEC/ENVR 403	Environmental Chemistry Processes ¹	3
ENEC/GEOG 253	Introduction to Atmospheric Processes	4
ENEC/GEOL 324	 Water in Our World: Introduction to Hydrologic Science and Environmental Problems ¹	3
ENEC/GEOL 417	Surface Processes and Landscape Evolution	3
ENEC/GEOL/ MASC 411	Oceanic Processes in Environmental Systems	4
ENEC/GEOL/ MASC 415	Environmental Systems Modeling	3
ENEC/GEOL/ MASC 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/ GEOL 502	Earth Surface Processes	3
GEOL 202	 Earth Systems History	3
GEOL 432	Paleoclimatology	3
GEOL 435	Groundwater	3
GEOL 436	Geochemistry of Natural Waters	3
GEOL/MASC 483	Geologic and Oceanographic Applications of Geographical Information Systems ¹	4
GEOL/MASC 503	Marine Geology	4
GEOL/MASC 506	Physical Oceanography	4
GEOL 508	Global Hydrology	3
MASC 312	From the Equator to the Poles: Case Studies in Global Environmental Change	3
MASC 314	 Earth Systems in a Changing World	3
MASC 432	Major World Rivers and Global Change: From Mountains to the Sea	3
MASC 433	Wetland Hydrology	3
MASC 460	Fluid Dynamics of the Environment	3

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

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 (<http://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 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		
INLS 161	Tools for Information Literacy	
INLS 201	Foundations of Information Science	
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	
GEOL 520	Data Analysis in the Earth Sciences	
GEOL 525	Inverse Theory: Advanced Data Analysis and Geophysical Modeling	
STOR 455	Methods of Data Analysis	
STOR 435	Introduction to Probability	
STOR 556	Time Series Data Analysis	
Basic Science		
BIOL 101	^{1, H}	
BIOL 201	Ecology and Evolution ^{1, H, H}	
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		
ENEC 415	Environmental Systems Modeling	
MATH 381	Discrete Mathematics ^H	
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	
GEOL/MASC 483	Geologic and Oceanographic Applications of Geographical Information Systems	
Four courses from one of the following concentrations		12-16
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 407	Principles of Energy Conversion	
ENEC 432	Environmental Life Cycle Assessment	
ENEC 481	Energy Economics	

ENEC 482	Energy and the Environment: A Coastal Perspective		
ENEC 693H	Honors Research in Environmental Sciences and Studies ¹		
or ENEC 694	Honors Project in Environmental Sciences and Studies		
ENVR/ENEC 403	Environmental Chemistry Processes ¹		
GEOL 315	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		
ENEC 462	Ecosystem Management		
ENEC 489	Ecological Processes in Environmental Systems		
ENEC 693H	Honors Research in Environmental Sciences and Studies ¹		
or ENEC 694	Honors Project in Environmental Sciences and Studies		
ENVR/ENEC 403	Environmental Chemistry Processes ¹		
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			
ENEC 350	Environmental Law and Policy		
ENEC 351	Coastal Law and Policy		
ENEC 325	Water Resource Management and Human Rights ^H		
ENEC 380	Environmental Economics		
ENEC 395	Research in Environmental Sciences and Studies for Undergraduates ¹		
or ENEC 396	Directed Readings		
ENEC/PLAN 420	Community Design and Green Architecture		
ENEC 480	Environmental Decision Making		
ENEC 485	Coastal Resource Economics and Policy		
ENEC 492	Social Science Research Methods		
ENEC 693H	Honors Research in Environmental Sciences and Studies ¹		
or ENEC 694	Honors Project in Environmental Sciences and Studies		
PLAN/ENEC 547	Energy, Transportation, and Land Use		
PLAN 652	Site Planning and Urban Design		
PLAN 672	Urban Data Analytics		
PUBA 787	Applied Environmental Finance: How to Pay for Environmental Services		
PLAN/ENEC 641	Watershed 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			
COMP 110	Introduction to Programming and Data Science ^{1, H}		3
or COMP 116	Introduction to Scientific Programming		
or PHYS 331	Numerical Techniques for the Sciences I		
CHEM 101 & 101L	General Descriptive Chemistry I and Quantitative Chemistry Laboratory I (PX) ^{1, F}		4
or PHYS 114	General Physics I: For Students of the Life Sciences		
or PHYS 118	Introductory Calculus-based Mechanics and Relativity		
or BIOL 101 & 101L	Principles of Biology and Introductory Biology Laboratory		
CHEM 102 & 102L	General Descriptive Chemistry II and Quantitative Chemistry Laboratory II (PX) ^{1, H, F}		4
or PHYS 115	General Physics II: For Students of the Life Sciences		
or PHYS 119	Introductory Calculus-based Electromagnetism and Quanta		
or BIOL 201	Ecology and Evolution		
MATH 231	Calculus of Functions of One Variable I (QR) ^{H, F}		4
MATH 232	Calculus of Functions of One Variable II (QI) ^{H, F}		4
MATH 233	Calculus of Functions of Several Variables (QI) ^{H, F}		4
STOR 155	Introduction to Data Models and Inference ^F		3
or BIOS 600	Principles of Statistical Inference		

Enough General Education courses and free electives to satisfy 12048-59 credit hours.²

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 Following courses are listed under multiple requirements in the major but can only be used to fulfill one requirement per course: ENEC 395, ENEC 415, ENEC 396, ENEC 693H, ENEC 694H, ENVR 403/ENEC 403, PHYS 114, PHYS 115, PHYS 118, PHYS 119, PHYS 331.

² Recommended courses are ENEC 202 (PX), ECON 101 (SS), and one of the following PH courses: ENEC 325, COMM 375/ENEC 375, or PHIL 368/ENEC 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





	Hours
First Year	
First-Year Foundation Courses	
IDST 101  College Thriving	1
ENGL 105  English Composition and Rhetoric	3
or ENGL 105I  English Composition and Rhetoric (Interdisciplinary)	
First-Year Seminar or First-Year Launch (http://catalog.unc.edu/undergraduate/ideas-in-action/first-year-seminars-launches/) ^F	3
Triple-I and Data Literacy (http://catalog.unc.edu/undergraduate/ideas-in-action/triple-i/)	4
Global Language through level 3 (http://catalog.unc.edu/undergraduate/ideas-in-action/global-language/) ¹	3-4
Major Courses	
CHEM 101  General Descriptive Chemistry I and  Quantitative Chemistry Laboratory I ^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 (<http://catalog.unc.edu/undergraduate/ideas-in-action/lifetime-fitness/>) 1

Hours **34-35**




Sophomore Year




CHEM 102  General Descriptive Chemistry II and Quantitative Chemistry Laboratory II^{H, F} 4



ENEC 203  Introduction to Environmental Science Problem Solving 3
 or ENEC 415  or Environmental Systems Modeling
 or MATH 528  or Mathematical Methods for the Physical Sciences I
 or MATH 564  or Mathematical Modeling in the Life Sciences

One environmental concentration course 3

One earth system science core 3-4

PHYS 114  General Physics I: For Students of the Life Sciences^F 4
 or PHYS 118  or  Introductory Calculus-based Mechanics and Relativity

PHYS 115  General Physics II: For Students of the Life Sciences^F 4
 or PHYS 119  or  Introductory Calculus-based Electromagnetism and Quanta

COMP 110  Introduction to Programming and Data Science^H 3
 or COMP 116  or Introduction to Scientific Programming

Electives or IDEAs in Action Requirements 6

Hours **30-31**

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  Capstone: Analysis and Solution of Environmental Problems 3
 or ENEC 694H  or  Honors Project in Environmental Sciences and Studies

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 **120-122**




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 (<http://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 ^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  Introduction to Environmental Science Problem Solving or ENEC 415  or Environmental Systems Modeling or MATH 528  or Mathematical Methods for the Physical Sciences I or MATH 564  or Mathematical Modeling in the Life Sciences	3
MATH 233  Calculus of Functions of Several Variables ^{H, F}	4
COMP 110  Introduction to Programming and Data Science ^H or COMP 116  or Introduction to Scientific Programming or PHYS 331  or Numerical Techniques for the Sciences I	3
Two courses from quantitative skills	6
Approaches and Connections (4 courses)	12
Free elective course	3
Hours	31
Junior Year	
COMP 110  Introduction to Programming and Data Science ^H or COMP 116  or Introduction to Scientific Programming or PHYS 331  or Numerical Techniques for the Sciences I	3
Two courses from environmental concentration courses	6
Two courses from quantitative skills	6
Approaches and Connections (3 courses)	9

Free elective courses	6
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 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. 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 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 (<https://planning.unc.edu/academics/dual-degree/bachelor/>) (M.C.R.P.), 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, 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 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.

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) and in Thailand (energy

and pollution). The Thailand field site experience incorporates 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 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.

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

Minors

- Environmental Science and Studies Minor (<http://catalog.unc.edu/undergraduate/programs-study/environmental-science-studies-minor/>)
- Food Studies Minor (<http://catalog.unc.edu/undergraduate/programs-study/food-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/#programstext>)
- Master of Science (<http://catalog.unc.edu/graduate/schools-departments/environment-ecology/#programstext>)
- Master of Arts (<http://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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