

Science Education (BS): Earth Science Concentration

The Science Education: Earth & Environmental Science concentration (BS) degree is one of five undergraduate degree options in the Science Education program in the Department of STEM Education.

This degree program prepares teacher-leaders to have a deep understanding of the pedagogical strategies to teach high school Earth and Environmental Science. Students complete courses focused on Earth and Environmental Sciences and Science education, obtain relevant pedagogical experiences while immersed in rich field experiences in science classrooms, and emphasize teaching science with technology. Upon successful completion of the program, students are recommended for an initial North Carolina teaching license in grades 9-12. They will be able to seek employment opportunities in education and make a positive difference in their communities.

The goals and objectives of the BS degree in Science Education are:

- To enable and ensure that each prospective teacher enriches his/her life through a comprehensive university education
- To develop the professional qualities and academic background needed to teach science to all student levels in the grade for which the teacher is certified
- To develop a general knowledge foundation upon which specialized professional knowledge is built, and upon which a well-rounded university education is the base

Coursework for the degree is divided into four types of knowledge:

- General pedagogical knowledge — the nature of learners and general principles of instruction
- Content-area knowledge — knowledge of the natural sciences
- Pedagogical content knowledge — principles of curriculum, instruction and assessment directly related to the natural sciences
- Context knowledge — understanding the culture of the school, community and society in which educational institutions exist and function

Students in this program also have the opportunity to participate in:

- Undergraduate research
- The student chapter of the NC Science Teachers Association (NCSTA), and other high impact experiences such as Passport to Success, SAY Village, and study abroad
- Outreach and tutoring in local schools

For more information about this program, visit our website (<https://ced.ncsu.edu/programs/science-education-middle-school-or-secondary-bachelor/>).

Contact

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Plan Requirements

Code	Title	Hours
Orientation		
ED 100	Intro to Education ¹	2
	or ED 150/151 Students Advocating for Youth I	
Communication/Advanced Writing		
Choose from:		3
COM 110	Public Speaking	
COM 112	Interpersonal Communication	
COM 211	Argumentation and Advocacy	
COM 289	Science Communication and Public Engagement	
ENG 232	Literature and Medicine	
ENG 425	Analysis of Scientific and Technical Writing	
Mathematics		
Choose from:		3-4
MA 121	Elements of Calculus	
MA 131	Calculus for Life and Management Sciences A	
MA 141	Calculus I	
Note: MA 131 or MA 141 are recommended, but not required, as they are prerequisites for many 300/400 Level Earth and Environmental Science courses.		
Choose from:		3-4
MA 231	Calculus for Life and Management Sciences B	
MA 241	Calculus II	
ST 311	Introduction to Statistics	
Sciences		
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity ²	4
BIO 183	Introductory Biology: Cellular and Molecular Biology ²	4
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory ²	4
PY 131	Conceptual Physics ²	4
	or PY 211 College Physics I	

MEA 101 & MEA 110	Geology I: Physical and Geology I Laboratory ²	4
MEA 130	Introduction to Weather and Climate ²	3
MEA 200	Introduction to Oceanography ²	3
MEA 202	Geology II: Historical ²	3
PY 123 or PY 124 or MEA 240	Stellar and Galactic Astronomy ² Solar System Astronomy The Planets of Our Solar System	3
Earth and Environmental Science Electives (p. 2) ²		3
Earth and Environmental Science 300/400 Level Electives (p. 2)		7
Earth Science Lab Electives (Choose Two) (p. 3) ²		2
Advised Science Electives (p. 3) ²		6

Science Education

EMS 205	Introduction to Teaching Science ³	2
EMS 373	Instructional Materials in Science ¹	3
EMS 375	Methods of Teaching Science I ³	3
EMS 475	Methods of Teaching Science II ³	3
EMS 476	Student Teaching in Science ^{3, 4}	10
EMS 495	Senior Seminar in Mathematics and Science Education ^{1, 4}	2

General Education and Psychology

ED 204	Introduction to Teaching in Today's Schools ¹	2
ED 311 & ED 312	Classroom Assessment Principles and Practices and Classroom Assessment Principles and Practices Professional Learning Lab ¹	3
EDP 304	Educational Psychology ¹	3
ELP 344	School and Society ¹	3
ECI 416	Teaching Students with Disabilities in Inclusive Classrooms ¹	3

History & Philosophy of Science Education Elective (p. 4)**Free Elective** 3-7**GEP Courses**

ENG 101	Academic Writing and Research ²	4
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/) (verify requirement)		0-6
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/) (verify requirement)		0-3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)		
GEP Foundations of American Democracy (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/) (verify requirement)		
World Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/) (verify requirement)		

Total Hours 120² A grade of C or higher is required for science content courses, up to two courses with a grade below a C is permitted³ A grade of B- or higher is required.⁴ Admission to the Professional Semester is required.**Earth and Environmental Science Electives**

Code	Title	Hours
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Any ES or MEA course, including additional lab courses.

ES 100	Introduction to Environmental Sciences	
ES 111	Applications of Environmental Sciences	
ES 113	Earth from Space	
ES 150	Water and the Environment	
ES 200	Climate Change and Sustainability	
ES 215	Organizing Field Work	
ES 295	Special Topics in Environmental Science	
MEA 100	Earth System Science: Exploring the Connections	
MEA 135	Introduction to Weather and Climate Laboratory	
MEA 150	Environmental Issues in Water Resources	
MEA 210	Oceanography Lab	
MEA 211	Geology II Laboratory	
MEA 215	Introduction to Atmospheric Sciences	
MEA 217	Introduction to Computing in the Geosciences	
MEA 220	Marine Biology	
MEA 240	The Planets of Our Solar System	
MEA 241	Air Pollution and Society	
MEA 250	Introduction to Coastal Environments	
MEA 251	Introduction to Coastal Environments Laboratory	
MEA 252	Biology of Marine Mammals	
MEA 260	Human Dimensions of Climate Change	
CNR 250	Diversity and Environmental Justice	3
FOR 252	Introduction to Forest Science	3
FOR 260	Forest Ecology	4
FOR 261	Forest Communities	2
FOR 264	Forest Wildlife	1
FW 221	Conservation of Natural Resources	3
SSC 185	Land and Life	3
SSC 200	Soil Science	3
SSC 201	Soil Science Laboratory	1
SSC 455	Soils, Environmental Quality and Global Challenges	3

Any Earth and Environmental Science 300/400 Level Elective (p.)

Earth and Environmental Science Electives 300/400 Level

Code	Title	Hours
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Any ES or MEA 3**/4** Level Course

ES 300	Energy and Environment	
ES 400	Analysis of Environmental Issues	
ES 449	Human Dimensions of Natural Resources in Australia/New Zealand	
ES 450	Sustaining Natural Resources in Australia/New Zealand	

¹ A grade of C or higher is required.

ES 495	Special Topics in Environmental Science
MEA 300	Environmental Geology
MEA 312	Atmospheric Thermodynamics
MEA 315	Mathematics Methods in Atmospheric Sciences
MEA 320	Fundamentals of Air Pollution
MEA 321	Fundamentals of Air Quality and Climate Change
MEA 323	Geochemistry of Natural Waters
MEA 350	Marine Conservation Biology
MEA 369	Life on Earth: Principles of Paleontology
MEA 409	Watershed Forensics
MEA 410	Introduction to Mineralogy
MEA 411	Marine Sediment Transport
MEA 412	Atmospheric Physics
MEA 415	Climate Dynamics
MEA 421	Atmospheric Dynamics I
MEA 422	Atmospheric Dynamics II
MEA 425	Introduction to Atmospheric Chemistry
MEA 440	Igneous and Metamorphic Petrology
MEA 443	Synoptic Weather Analysis and Forecasting
MEA 444	Mesoscale Analysis and Forecasting
MEA 449	Principles of Biological Oceanography
MEA 450	Introductory Sedimentology and Stratigraphy
MEA 451	Structural Geology
MEA 454	Marine Physical-Biological Interactions
MEA 455	Micrometeorology
MEA 459	Field Investigation of Coastal Processes
MEA 460	Principles of Physical Oceanography
MEA 462	Observational Methods and Data Analysis in Marine Physics
MEA 463	Fluid Physics
MEA 464	Ocean Circulation Systems
MEA 465	Geologic Field Camp
MEA 466	Preparatory Course for Field Camp
MEA 467	Marine Meteorology
MEA 468	Aquatic Microbiology
MEA 469	Ecology of Coastal Resources
MEA 470	Introduction to Geophysics
MEA 471	Exploration and Engineering Geophysics
MEA 473	Principles of Chemical Oceanography
MEA 476	Worldwide River and Delta Systems: Their Evolution and Human Impacts
MEA 479	Air Quality
MEA 481	Geomorphology: Earth's Dynamic Surface
MEA 485	Introduction to Hydrogeology
MEA 488	Meteorology for Media
MEA 493	Special Topics in MEAS
Up to 4 credit hours may be selected from the following list:	
AEC 360	Ecology
or PB 360	Ecology
AEC 380	Water Resources: Global Issues in Ecology, Policy, Management, and Advocacy
AEC 390	Community Ecology
AEC 400	Applied Ecology

AEC 419	Freshwater Ecology
AEC 460	Field Ecology and Methods
AEC 470	Urban Ecology
BIO 325	Paleontological Field Methods
FW 314	Coastal Ecology and Management
FW 333	Conservation Biology in Practice
FW 353	Wildlife Management
FW 403	Urban Wildlife Management
FW 404	Wildlife Habitat Management
FW 405	Tropical Wildlife Ecology
FW 453	Principles of Wildlife Science
FW 460	International Wildlife Management and Conservation
FW 465	African Ecology and Conservation
NR 303	Humans and the Environment

Earth Science Lab Electives

Code	Title	Hours
MEA 135	Introduction to Weather and Climate Laboratory	1
MEA 210	Oceanography Lab	1
MEA 211	Geology II Laboratory	1
PY 125	Astronomy Laboratory	1

Advised Science Electives

Code	Title	Hours
ANY 200+ Level AEC, BIO, BCH, BSC, CH, ENT, ES, MB, MEA, PB, PY, ZO		
ANY GEP Natural Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-natural-sciences/) course (except BIO 105/106, CH 111)		
ANS 150	Introduction to Animal Science	3
ANS 205	Physiology of Domestic Animals	3
ANS 206	Anatomy of Domestic Animals Lab	1
ANS 220	Reproductive Physiology	3
ANS 221	Reproductive Physiology Lab	1
BIO 165		
CS 211	Plant Genetics	3
ES 100	Introduction to Environmental Sciences	3
ES 111	Applications of Environmental Sciences	1
ES 150	Water and the Environment	3
FOR 252	Introduction to Forest Science	3
FOR 260	Forest Ecology	4
FOR 261	Forest Communities	2
FOR 264	Forest Wildlife	1
FOR 339		
FW 353	Wildlife Management	3
FW 404	Wildlife Habitat Management	3
FW 405	Tropical Wildlife Ecology	3
FW 444	Mammalogy	3
FW 453	Principles of Wildlife Science	4
FW 460	International Wildlife Management and Conservation	3

NR 303	Humans and the Environment	3
NR 406	Conservation of Biological Diversity	3

History & Philosophy of Science Education Elective

Code	Title	Hours
Choose from:		
ECI 305	Equity and Education	3
HI 321	Scientific Revolution and European Society, 1500-1800	3
HI 322	Rise of Modern Science	3
HI 323	Science, American Style	3
HI 341	Technology in History	3
HI 481	History of the Life Sciences	3
HI 482	Darwinism in Science and Society	3
HI 483	Science and Religion in European History	3
HI 484	Science in European Culture	3
HI 485	History of American Technology	3
PHI 340	Philosophy of Science	3
PHI 440	The Scientific Method	3
STS 210	Women and Gender in Science and Technology	3
STS 214	Introduction to Science, Technology, and Society	3
STS 301	Science and Civilization	3
STS 302	Contemporary Science, Technology and Human Values	3
STS 471	Darwinism and Christianity	3
STS 490	Issues in Science, Technology, and Society	3

Semester Sequence

This is a sample.

First Year

Fall Semester	Hours
ED 100 Intro to Education	2
MEA 101 Geology I: Physical ²	3
MEA 110 Geology I Laboratory ²	1
BIO 181 Introductory Biology: Ecology, Evolution, and Biodiversity ²	4
MA 131 Calculus for Life and Management Sciences A or MA 141 or Calculus I or MA 121 or Elements of Calculus	3-4
ENG 101 Academic Writing and Research	4
Hours	17

Spring Semester

MEA 202 Geology II: Historical ²	3
MEA 211 Geology II Laboratory ²	1
BIO 183 Introductory Biology: Cellular and Molecular Biology ²	4
MA 231 Calculus for Life and Management Sciences B or MA 241 or Calculus II or ST 311 or Introduction to Statistics	3-4

GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	1
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Communication/Advanced Writing Requirement	3
Choose from:	

COM 110 Public Speaking	
COM 112 Interpersonal Communication	
COM 211 Argumentation and Advocacy	
COM 289 Science Communication and Public Engagement	
ENG 232 Literature and Medicine	

Hours	15
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Second Year

Fall Semester

MEA 130 Introduction to Weather and Climate ²	3
MEA 135 Introduction to Weather and Climate Laboratory ²	1
CH 101 Chemistry - A Molecular Science & CH 102 and General Chemistry Laboratory ²	4
Advised Science Elective (p. 3)	3

GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	1
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Free Elective	4
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Hours	16
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Spring Semester

ED 204 Introduction to Teaching in Today's Schools ¹	2
EMS 205 Introduction to Teaching Science ³	2
EDP 304 Educational Psychology ¹	3
PY 131 Conceptual Physics ² or PY 211 or College Physics I	4

GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3
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Hours	14
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Third Year

Fall Semester

EMS 373 Instructional Materials in Science ¹	3
ELP 344 School and Society ¹	3
MEA 200 Introduction to Oceanography ²	3
History and Philosophy of Science Education Elective (p. 4)	3
Earth and Environmental Science Electives (p. 2) ²	3

Hours	15
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Spring Semester

ED 311 Classroom Assessment Principles and Practices & ED 312 and Classroom Assessment Principles and Practices Professional Learning Lab ¹	3
EMS 375 Methods of Teaching Science I ³	3
PY 124 Solar System Astronomy ² or PY 125 or Astronomy Laboratory or MEA 240 or The Planets of Our Solar System	3
Earth & Environmental Science Electives 300/400 Level (p.) ²	4

Free Elective		3
Hours		16
Fourth Year		
Fall Semester		
EMS 475	Methods of Teaching Science II ³	3
ECI 416	Teaching Students with Disabilities in Inclusive Classrooms ¹	3
Earth & Environmental Science Electives 300/400 Level (p.) ²		3
Advised Science Elective (p. 3) ²		3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
Hours		15
Spring Semester		
EMS 476	Student Teaching in Science ^{3, 4}	10
EMS 495	Senior Seminar in Mathematics and Science Education ^{1, 4}	2
Hours		12
Total Hours		120

¹ A grade of C or higher is required.

² A grade of C or higher is required for science content courses, up to two courses with a grade below a C is permitted

³ A grade of B- or higher is required.

⁴ Prior admission to the Professional Semester is required.

Career Opportunities

Career Titles

- Atmospheric, Earth, Marine, and Space Sciences Teachers, Postsecondary
- Biology Professor
- Chemistry Professor
- Elementary School Teacher
- Environmental Science Professor
- High School Teacher
- Middle School Teacher
- Physics 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.