

# Science Education (BS): Biology Concentration

The Science Education: Biology 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 Biology and other Life Science courses. Students complete courses focused on Biology 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
<b>Orientation</b>		
ED 100	Intro to Education <sup>1</sup>	2
or ED 150/151 Students Advocating for Youth I		
<b>Communication/Advanced Writing</b>		
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 331	Communication for Engineering and Technology	
ENG 333	Communication for Science and Research	
ENG 425	Analysis of Scientific and Technical Writing	
(Biology BA double major choose ENG 331 or ENG 333)		
<b>Mathematics</b>		
Choose from:		3-4
MA 121	Elements of Calculus	
MA 131	Calculus for Life and Management Sciences A	
MA 141	Calculus I	
Choose from:		3-4
MA 231	Calculus for Life and Management Sciences B	
MA 241	Calculus II	
ST 311	Introduction to Statistics	
(Biology BA double major choose ST 311)		
<b>Sciences</b>		
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity <sup>2</sup>	4
BIO 183	Introductory Biology: Cellular and Molecular Biology <sup>2</sup>	4
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory <sup>2</sup>	4
Choose from:		4
CH 221 & CH 222	Organic Chemistry I and Organic Chemistry I Lab <sup>2</sup>	
CH 220 & CH 222	Introductory Organic Chemistry and Organic Chemistry I Lab <sup>2</sup>	
PY 131	Conceptual Physics <sup>2</sup>	4
or PY 211		
College Physics I		

Earth and Environmental Science Electives (p. 2) <sup>2</sup>		7
PB 360	Ecology <sup>2</sup>	4
or AEC 360	Ecology	
GN 311	Principles of Genetics <sup>2</sup>	3-4
or GN 301	Genetics in Human Affairs	
Life Science Electives 200+ Level (p. ) <sup>2</sup>		3
Life Science Electives 300/400 Level (p. 2) <sup>2</sup>		7
(MB 351/MB 352 recommended but not required)		
Advised Science Electives (p. 2) <sup>2</sup>		6
<b>Science Education</b>		
EMS 205	Introduction to Teaching Science <sup>3</sup>	2
EMS 373	Instructional Materials in Science <sup>1</sup>	3
EMS 375	Methods of Teaching Science I <sup>3</sup>	3
EMS 475	Methods of Teaching Science II <sup>3</sup>	3
EMS 476	Student Teaching in Science <sup>1, 4</sup>	10
EMS 495	Senior Seminar in Mathematics and Science Education <sup>1, 4</sup>	2
<b>General Education and Psychology</b>		
ED 204	Introduction to Teaching in Today's Schools <sup>1</sup>	2
ELP 344	School and Society <sup>1</sup>	3
ED 311	Classroom Assessment Principles and Practices	3
& ED 312	and Classroom Assessment Principles and Practices Professional Learning Lab <sup>1</sup>	
ECI 416	Teaching Students with Disabilities in Inclusive Classrooms <sup>1</sup>	3
EDP 304	Educational Psychology <sup>1</sup>	3
<b>History &amp; Philosophy of Science Education Elective (p. 3)</b>		<b>3</b>
<b>Free Electives</b>		<b>0-7</b>
<b>GEP Courses</b>		
ENG 101	Academic Writing and Research	4
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> ) (verify requirement)		0-6
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> ) (verify requirement)		0-3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		2
GEP Elective ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> ) (verify requirement)		
GEP Global Knowledge ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/</a> ) (verify requirement)		
GEP Foundations of American Democracy ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/</a> ) (verify requirement)		
World Language Proficiency ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/</a> ) (verify requirement)		
<b>Total Hours</b>		<b>120</b>

<sup>1</sup> A grade of C or higher is required.<sup>2</sup> A grade of C or higher is required for science content courses, up to two courses with a grade below a C is permitted<sup>3</sup> A grade of B- or higher is required.<sup>4</sup> Admission to the Professional Semester is required.

## Earth and Environmental Science Electives

### Life Science Electives 200+ Level

Code	Title	Hours
Any 200+ Level BIO, BCH, BSC, ENT, MB, PB, or ZO course		
Any course from the list below:		
ANS 205	Physiology of Domestic Animals	
ANS 220	Reproductive Physiology	
ANS 221	Reproductive Physiology Lab	
CS 211	Plant Genetics	
FOR 252	Introduction to Forest Science	
FOR 260	Forest Ecology	
FOR 261	Forest Communities	
FOR 264	Forest Wildlife	
FW 221	Conservation of Natural Resources	
MEA 220	Marine Biology	
MEA 252	Biology of Marine Mammals	
PP 222	Kingdom of Fungi	
Life Science Electives 300/400 Level (p. 2)		

### Life Science Electives 300/400 Level

Code	Title	Hours
ANY 300+ Level AEC, BIO, BCH, BSC, ENT, GN, MB, PB, or ZO course		
Any course from the list below:		
FOR 339		
FW 353	Wildlife Management	
FW 444	Mammalogy	
MEA 350	Marine Conservation Biology	
MEA 369	Life on Earth: Principles of Paleontology	
MEA 469	Ecology of Coastal Resources	
NR 406	Conservation of Biological Diversity	

## 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 ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-natural-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-natural-sciences/</a> ) 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	
HI 321	Scientific Revolution and European Society, 1500-1800	
HI 322	Rise of Modern Science	
HI 323	Science, American Style	
HI 341	Technology in History	
HI 481	History of the Life Sciences	
HI 482	Darwinism in Science and Society	
HI 483	Science and Religion in European History	
HI 484	Science in European Culture	
HI 485	History of American Technology	
PHI 340	Philosophy of Science	
PHI 440	The Scientific Method	
STS 210	Women and Gender in Science and Technology	
STS 214	Introduction to Science, Technology, and Society	
STS 301	Science and Civilization	
STS 302	Contemporary Science, Technology and Human Values	
STS 471	Darwinism and Christianity	
STS 490	Issues in Science, Technology, and Society	

## Semester Sequence

This is a sample.

First Year		
Fall Semester		Hours
ED 100	Intro to Education <sup>1</sup>	2
	or ED 150/151	or Students Advocating for Youth I
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity <sup>2</sup>	4
CH 101	Chemistry - A Molecular Science <sup>2</sup>	3
CH 102	General Chemistry Laboratory <sup>2</sup>	1

MA 121	Elements of Calculus	3
or MA 131	or Calculus for Life and Management Sciences A	
ENG 101	Academic Writing and Research	4
<b>Hours</b>		<b>17</b>

### Spring Semester

BIO 183	Introductory Biology: Cellular and Molecular Biology <sup>2</sup>	4
CH 221	Organic Chemistry I <sup>2</sup>	4
& CH 222	or Introductory Organic Chemistry	
or CH 220		
MA 231	Calculus for Life and Management Sciences B	3
or ST 311	or Introduction to Statistics	
Communication/Advanced Writing Req.		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	
ENG 331	Communication for Engineering and Technology	
ENG 333	Communication for Science and Research	
ENG 425	Analysis of Scientific and Technical Writing	
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1

**Hours** **15**

### Second Year

#### Fall Semester

AEC 360	Ecology <sup>2</sup>	4
or PB 360	or Ecology	
PY 131	Conceptual Physics <sup>2</sup>	4
or PY 211	or College Physics I	
Earth and Environmental Science Elective w/ Lab (p. ) <sup>2</sup>		4
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1

**Hours** **16**

#### Spring Semester

ED 204	Introduction to Teaching in Today's Schools <sup>1</sup>	2
EMS 205	Introduction to Teaching Science <sup>3</sup>	2
EDP 304	Educational Psychology <sup>1</sup>	3
GEP Elective ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
Earth and Environmental Science Elective (p. ) <sup>2</sup>		3
Advised Science Elective (p. 2) <sup>2</sup>		3
<b>Hours</b>		<b>16</b>

**Third Year****Fall Semester**

EMS 373	Instructional Materials in Science <sup>1</sup>	3
ELP 344	School and Society <sup>1</sup>	3
GN 311 or GN 301	Principles of Genetics <sup>2</sup> or Genetics in Human Affairs	3-4
History & Philosophy of Science Education Elective (p. 3) <sup>2</sup>		3
Life Science 200+ Level Elective (p. ) <sup>2</sup>		3
<b>Hours</b>		<b>16</b>

**Spring Semester**

EMS 375	Methods of Teaching Science I <sup>3</sup>	3
ED 311 & ED 312	Classroom Assessment Principles and Practices and Classroom Assessment Principles and Practices Professional Learning Lab <sup>1</sup>	3
Life Science Electives 300/400 Level (p. 2) <sup>2</sup>		4
Free Elective		3
<b>Hours</b>		<b>13</b>

**Fourth Year****Fall Semester**

EMS 475	Methods of Teaching Science II <sup>3</sup>	3
ECI 416	Teaching Students with Disabilities in Inclusive Classrooms <sup>1</sup>	3
Life Science Electives 300/400 Level (p. 2) <sup>2</sup>		3
Advised Science Elective (p. 2) <sup>2</sup>		3
Free Elective		3
<b>Hours</b>		<b>15</b>

**Spring Semester**

EMS 476	Student Teaching in Science <sup>3, 4</sup>	10
EMS 495	Senior Seminar in Mathematics and Science Education <sup>1, 4</sup>	2
<b>Hours</b>		<b>12</b>
<b>Total Hours</b>		<b>120</b>

<sup>1</sup> A grade of C or higher is required.<sup>2</sup> A grade of C or higher is required for science content courses, up to two courses with a grade below a C is permitted<sup>3</sup> A grade of B- or higher is required.<sup>4</sup> Prior admission to the Professional Semester is required.**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.

**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