

# 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	Counts towards
<b>Orientation</b>			
ED 100	Intro to Education 1	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. 3) <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. 4) <sup>2</sup>		7
(MB 351/MB 352 recommended but not required)		
Advised Science Electives (p. 4) <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 & ED 312	Classroom Assessment Principles and Practices and Classroom Assessment Principles and Practices Professional Learning Lab <sup>1</sup>	3
ECI 416	Teaching Exceptional Students in the Mainstreamed Classroom <sup>1</sup>	3
EDP 304	Educational Psychology <sup>1</sup>	3
<b>History &amp; Philosophy of Science Education Elective (p. 4)</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 Additional Breadth ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> ) (Humanities/Social Sciences/Visual and Performing Arts)	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 U.S. Diversity ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/</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)	
Foreign Language Proficiency ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-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

Code	Title	Hours	Counts towards
Choose from:			
ES 100	Introduction to Environmental Sciences		
ES 113	Earth from Space		
ES 150	Water and the Environment		
ES 200	Climate Change and Sustainability		
ES 300	Energy and Environment		
MEA 100	Earth System Science: Exploring the Connections		
MEA 101	Geology I: Physical		
MEA 110	Geology I Laboratory		

MEA 130	Introduction to Weather and Climate
MEA 135	Introduction to Weather and Climate Laboratory
MEA 150	Environmental Issues in Water Resources
MEA 200	Introduction to Oceanography
MEA 202	Geology II: Historical
MEA 210	Oceanography Lab
MEA 211	Geology II Laboratory
MEA 215	Introduction to Atmospheric Sciences
MEA 250	Introduction to Coastal Environments
MEA 251	Introduction to Coastal Environments Laboratory
MEA 260	Human Dimensions of Climate Change
MEA 300	Environmental Geology
MEA 320	Fundamentals of Air Pollution
MEA 321	Fundamentals of Air Quality and Climate Change

### Life Science Electives 200+ Level

Code	Title	Hours	Counts towards
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. 4)	

## Life Science Electives 300/400 Level

**Code Title Hours Counts towards**

ANY 300+ Level AEC, BIO, BCH, BSC, ENT, GN, MB, PB, or ZO course

Any course from the list below:

FOR 339	Dendrology
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 Counts towards**

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
ANS 205	Physiology of Domestic Animals
ANS 206	Anatomy of Domestic Animals Lab
ANS 220	Reproductive Physiology
ANS 221	Reproductive Physiology Lab

BIO 165	Introduction to Environmental Research
CS 211	Plant Genetics
ES 100	Introduction to Environmental Sciences
ES 111	Applications of Environmental Sciences
ES 150	Water and the Environment
FOR 252	Introduction to Forest Science
FOR 260	Forest Ecology
FOR 261	Forest Communities
FOR 264	Forest Wildlife
FOR 339	Dendrology
FW 353	Wildlife Management
FW 404	Wildlife Habitat Management
FW 405	Tropical Wildlife Ecology
FW 444	Mammalogy
FW 453	Principles of Wildlife Science
FW 460	International Wildlife Management and Conservation
NR 303	Humans and the Environment
NR 406	Conservation of Biological Diversity

## History & Philosophy of Science Education Elective

**Code Title Hours Counts towards**

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> or ED 150/151 or Students Advocating for Youth I	2
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 or MA 131 or Calculus for Life and Management Sciences A	3
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
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CH 221 Organic Chemistry I <sup>2</sup> & CH 222 or Introductory Organic Chemistry or CH 220	4
MA 231 Calculus for Life and Management Sciences B or ST 311 or Introduction to Statistics	3
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> or PB 360 or Ecology	4
PY 131 Conceptual Physics <sup>2</sup> or PY 211 or College Physics I	4
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 Additional Breadth ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> ) (Humanities/Social Sciences/Visual and Performing Arts)	3
Earth and Environmental Science Elective (p. ) <sup>2</sup>	3
Advised Science Elective (p. 4) <sup>2</sup>	3

**Hours 16**

### 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 Principles of Genetics <sup>2</sup> or GN 301 or Genetics in Human Affairs	3-4
History & Philosophy of Science Education Elective (p. 4) <sup>2</sup>	3
Life Science 200+ Level Elective (p. ) <sup>2</sup>	3

**Hours 16**

**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. 4) <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 Exceptional Students in the Mainstreamed Classroom <sup>1</sup>	3
Life Science Electives 300/400 Level (p. 4) <sup>2</sup>		3
Advised Science Elective (p. 4) <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.