Science Education (BS): Physics Concentration

The Science Education: Physics 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 Physics. Students complete courses focused on Physics 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 (NSTA), 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
Orientation			
ED 100	Intro to Education [1]	2	
or ED 150/151	Students Advocating for Youth I		
Communication/Advanced Writing		**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		
(Physics BA double major choose ENG 331 or ENG 333)			
Mathematics			
MA 141	Calculus I	4	
MA 241	Calculus II	4	
MA 242	Calculus III	4	
MA 341	Applied Differential Equations I	3	
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
Earth and Environmental Science Electives (p. 3) [2]		6
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory [2]	4
or PY 201	University Physics I	
(Physics BA double major choose PY 201)		
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory [2]	4
or PY 202	University Physics II	
(Physics BA double major choose PY 202)		
Physics Electives 100/200 Level (p. 3) [2]		3
(Physics BA double major choose PY 203)		
Physics Electives 300/400 Level (p. 3) [2]		9
(Physics BA double major choose PY 401, PY 411, PY 413, and PY 414)		
Advised Science Electives (p. 4) [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
EDP 304	Educational Psychology [1]	3
ED 311 & ED 312	Classroom Assessment Principles and Practices and Classroom Assessment Principles and Practices Professional Learning Lab [1]	3
ELP 344	School and Society [1]	3
ECI 416	Teaching Exceptional Students in the Mainstreamed Classroom [1]	3
History and Philosophy of Science Education Elective (p.)		**3**
Free Electives		**0-4**
GEP Courses		
ENG 101	Academic Writing and Research	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)		0-6
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/) (Humanities/Social Sciences/Visual and Performing Arts)		3
GEP U.S. Diversity (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/) (verify requirement)		

GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)	
Foreign Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/) (verify requirement)	
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 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		

Physics Electives 100/200 Level

Code	Title	Hours	Counts towards
Choose from:			
PY 123	Stellar and Galactic Astronomy	3	
PY 124	Solar System Astronomy	3	
PY 125	Astronomy Laboratory	1	
PY 203	University Physics III	4	
PY 251	Introduction to Scientific Computing	3	
PY 252	Instrumental and Data Analysis for Physics	2	
PY 299	Special Problems in Physics	1-3	
Physics Electives 300/400 Level (p. 3)			

Physics Electives 300/400 Level

Code	Title	Hours	Counts towards
Choose from:			
PY 301	Introduction to Quantum Mechanics	3	
PY 328	Stellar and Galactic Astrophysics	3	
PY 341	Relativity, Gravitation and Cosmology	3	

PY 401	Quantum Physics I	3
PY 402	Quantum Physics II	3
PY 407	Introduction to Modern Physics	3
PY 411	Mechanics I	3
PY 412	Mechanics II	3
PY 413	Thermal Physics	3
PY 414	Electromagnetism I	3
PY 415	Electromagnetism II	3
PY 452	Advanced Physics Laboratory	3
PY 456	Senior Design Project in Physics	3
PY 489	Solid State Solar and Thermal Energy Harvesting	3
PY 495	Special Topics in Physics	1-4
PY 499	Independent Research in Physics	1-6

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		

Semester Sequence

This is a sample.

First Year		
Fall Semester		**Hours**
ED 100	Intro to Education [1]	2
PY 205 & PY 206 or PY 201	Physics for Engineers and Scientists I [2] or University Physics I	4
MA 141	Calculus I	4
ENG 101	Academic Writing and Research	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
	Hours	**15**
Spring Semester		
PY 208 & PY 209 or PY 202	Physics for Engineers and Scientists II [2] or University Physics II	4
MA 241	Calculus II	4
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1

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	
	Hours	**16**
Second Year		
Fall Semester		
Physics Elective 100/200 Level (p.) [2]		3
MA 242	Calculus III	4
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity [2]	4
Earth and Environmental Science Elective (p. 3) [2]		3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
	Hours	**17**
Spring Semester		
EMS 205	Introduction to Teaching Science [3]	2
ED 204	Introduction to Teaching in Today's Schools [1]	2
EDP 304	Educational Psychology [1]	3
MA 341	Applied Differential Equations I	3
BIO 183	Introductory Biology: Cellular and Molecular Biology [2]	4
	Hours	**14**
Third Year		
Fall Semester		
EMS 373	Instructional Materials in Science [1]	3
ELP 344	School and Society [1]	3
History and Philosophy of Science Education Elective (p.)		3
Physics Elective 300/400 Level (p. 3)		3
Free Elective		4
	Hours	**16**
Spring Semester		
EMS 375	Methods of Teaching Science I [3]	3
ED 311 & ED 312	Classroom Assessment Principles and Practices and Classroom Assessment Principles and Practices Professional Learning Lab [1]	3
Physics Elective 300/400 Level (p. 3) [2]		3
Earth and Environmental Science Elective (p. 3) [2]		3
Advised Science Elective (p. 4) [2]		3
	Hours	**15**
Fourth Year		
Fall Semester		
EMS 475	Methods of Teaching Science II [3]	3
ECI 416	Teaching Exceptional Students in the Mainstreamed Classroom [1]	3
Physics Elective 300/400 Level (p. 3) [2]		3
Advised Science Elective (p. 4) [2]		3
GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/) (Humanities/Social Sciences/Visual and Performing Arts)		3
	Hours	**15**
Spring Semester		
EMS 476	Student Teaching in Science [1]	10
EMS 495	Senior Seminar in Mathematics and Science Education [1]	2
	Hours	**12**
	Total Hours	**120**

1. A grade of C or better is required.
2. A grade of C or better is required, up to two courses with a grade below a C is permitted.
3. A grade of B- or better is required.