Science Education (BS): Chemistry Concentration

The Science Education: Chemistry 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 Chemistry. Students complete courses focused on Chemistry 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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ced.ncsu.edu (http://ced.ncsu.edu/)

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	3
Choose from:		
COM 110	Public Speaking	
COM 112	Interpersonal Communication	
COM 211	Argumentation and Advocacy	
COM 289	Science Communication and Public Engagement	nt
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	
(Chemistry BA do	uble major choose ENG 331 or ENG 333)	
Mathematics		
Choose from:		3-4
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	
(Chemistry BA and ST 311)	double major must take both (MA 231 or MA 241)
Sciences		
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity ²	4
BIO 183	Introductory Biology: Cellular and Molecular Biology ²	4
PY 131	Conceptual Physics ²	4
or PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Labo	ratory
or PY 211	College Physics I	

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(Chemistry BA double major choose PY 211 or PY 205 and PY 206) Earth and Environmental Science Electives (p. 2)² 7 Chemistry - A Molecular Science CH 101 4 and General Chemistry Laboratory² & CH 102 or CH 103 General Chemistry I for Students in Chemical & CH 104 Sciences and General Chemistry Laboratory I for Students in **Chemical Sciences** (Chemistry BA double major choose CH 103 & CH 104) CH 201 Chemistry - A Quantitative Science 4 and Quantitative Chemistry Laboratory² & CH 202 or CH 203 General Chemistry II for Students in Chemical & CH 204 Sciences and General Chemistry Laboratory II for Students in **Chemical Sciences** (Chemistry BA double major choose CH 203 & CH 204) CH 221 Organic Chemistry I 4 and Organic Chemistry I Lab² & CH 222 or CH 225 Organic Chemistry I for Students in Chemical Sciences & CH 226 and Organic Chemistry Laboratory I for Students in **Chemical Sciences** (Chemistry BA double major choose CH 225 & CH 226) CH 223 Organic Chemistry II 4 and Organic Chemistry II Lab² & CH 224 or CH 227 Organic Chemistry II for Students in Chemical & CH 228 Sciences and Organic Chemistry Laboratory II for Students in Chemical Sciences (Chemistry BA double major choose CH 227 & CH 228) Chemistry Electives 300/400 Level (p. 2) 9 (Chemistry BA double major choose CH 315/CH 316, CH 331, and CH 401) Advised Science Electives (p. 3) 6 (Chemistry BA double major choose (PY 212 or PY 208/209) and (BCH 351 or BCH 451)) Science Education Introduction to Teaching Science ³ 2 EMS 205 EMS 373 Instructional Materials in Science ¹ 3 Methods of Teaching Science I³ EMS 375 3 Methods of Teaching Science II ³ EMS 475 3 Student Teaching in Science 3, 4 10 EMS 476 2 EMS 495 Senior Seminar in Mathematics and Science Education 1, 4 **General Education and Psychology** Introduction to Teaching in Today's Schools¹ ED 204 2 ELP 344 School and Society¹ 3 3 FD 311 **Classroom Assessment Principles and Practices** & ED 312 and Classroom Assessment Principles and Practices Professional Learning Lab¹ Teaching Students with Disabilities in Inclusive ECI 416 3 Classrooms¹ EDP 304 Educational Psychology¹ 3 History and Philosophy of Science Education Elective (p. 3) 3

Free Electives

GEP Courses ENG 101 Academic Writing and Research 4 GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-0-6 category-requirements/gep-humanities/) (verify requirement) GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-0-3category-requirements/gep-social-sciences/) (verify requirement) GEP Health and Exercise Studies (http://catalog.ncsu.edu/ 2 undergraduate/gep-category-requirements/gep-health-exercisestudies/) GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-3 requirements/) GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gepcategory-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** 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 Chemistry Electives 300/400 Level Title Code Hours Choose from: CH 315 **Quantitative Analysis** & CH 316 and Quantitative Analysis Laboratory CH 331 Introductory Physical Chemistry CH 335 Principles of Green Chemistry CH 345 Chemistry and War CH 401 Systematic Inorganic Chemistry I CH 403 Systematic Inorganic Chemistry II CH 415 Analytical Chemistry II CH 431 Physical Chemistry I CH 433 Physical Chemistry II CH 435 Introduction to Quantum Chemistry CH 437 Physical Chemistry for Engineers CH 441 Forensic Chemistry CH 442 Advanced Synthetic Techniques CH 444 Advanced Synthetic Techniques II

Advanced Measurement Techniques I

Advanced Measurement Techniques II

Undergraduate Research in Chemistry

Molecular Origins of Life

Special Topics in Chemistry

CH 452

CH 454

CH 463

CH 495

CH 499

0-7

Advised Science Electives Title

Code

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 Societ	y 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.

Hours

First Year		
Fall Semester		Hours
ED 100	Intro to Education ¹	2
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory ²	4
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity ²	4
MA 131 or MA 141	Calculus for Life and Management Sciences A or Calculus I	3-4
ENG 101	Academic Writing and Research	4
	Hours	17
Spring Semester		
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory ²	4
BIO 183	Introductory Biology: Cellular and Molecular Biology	4
MA 231 or MA 241	Calculus for Life and Management Sciences B or Calculus II	3-4
GEP Health and Exe undergraduate/gep-c studies/)	rcise Studies (http://catalog.ncsu.edu/ ategory-requirements/gep-health-exercise-	1
Communication/Adva	anced 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	
ENG 331	Communication for Engineering and Technology	
ENG 333	Communication for Science and Research	
ENG 425	Analysis of Scientific and Technical Writing	
	Hours	15
Second Year		
Fall Semester		
CH 221 & CH 222	and Organic Chemistry I Lab ²	4
PY 131 or PY 205 and PY 206 or PY 211	Conceptual Physics ² or Physics for Engineers and Scientists I <i>and</i> Physics for Engineers and Scientists I Laboratory or College Physics I	4
Earth and Environme	ental Science Elective w/ Lab (p. 2) ²	4

	Total Hours	120
	Hours	12
EMS 495	Senior Seminar in Mathematics and Science Education ^{1, 4}	2
EMS 476	Student Teaching in Science ^{3, 4}	10
Spring Semester		
	Hours	15
Free Elective		3
Advised Science Ele	ective (p. 3) ²	3
Chemistry Elective 3	300/400 Level (p. 2) ²	3
	Inclusive Classrooms ¹	0
ECI 416	Teaching Students with Disabilities in	3
EMS 475	Methods of Teaching Science II ³	3
Fall Semester		
Fourth Year		
	Hours	15
Advised Science Ele	ective (p. 3) ²	3
category-requirement	nts/)	0
GEP Elective (http://	/catalog.ncsu.edu/undergraduate/gen-	3
Chemistry Elective	$300/400 \text{ Level (p. 2)}^2$	3
EMS 375	Methods of Teaching Science 1 ³	3
& ED 312	Practices and Classroom Assessment Principles and Practices Professional Learning Lab ¹	
ED 311	Classroom Assessment Principles and	3
Spring Semester		
	Hours	16
Free Elective ¹		4
Chemistry Elective 3	300/400 Level (p. 2) ²	3
History and Philosor	by of Science Education Flective (p. 3) 2	3
EIII P 344	School and Society ¹	3
FMS 373	Instructional Materials in Science ¹	3
Fall Semester		
Third Voor	nours	14
Earth and Environm	ental Science Elective (p. 2)	3
& CH 224	and Organic Chemistry II Lab	0
CH 223	Organic Chemistry II	4
EDP 304	Educational Psychology ¹	3
EMS 205	Introduction to Teaching Science ³	2
ED 204	Introduction to Teaching in Today's Schools ¹	2
Spring Semester		
	Hours	16
studies/)	category-requirements/gep-neatti-exercise-	
GEP Health and Exe	ercise Studies (http://catalog.ncsu.edu/	1
category-requirement	nts/gep-humanities/)	
GEP Humanities (ht	tp://catalog.ncsu.edu/undergraduate/gep-	3

¹ A grade of C or higher is required.

² A grade of C (2.0) or better is required for core content courses. Up to two courses with a grade below a "C" is permitted

³ B- or better is required

⁴ 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/explorecareers/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.