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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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		
(Chemistry BA double 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 double major must take both (MA 231 or MA 241) and ST 311)		
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 Laboratory	
or PY 211	College Physics I	
(Chemistry BA double major choose PY 211 or PY 205 and PY 206)		
Earth and Environmental Science Electives (p. 3) [2]		7
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory [2]	4
or CH 103 & CH 104	General Chemistry I for Students in Chemical Sciences and General Chemistry Laboratory I for Students in Chemical Sciences	
(Chemistry BA double major choose CH 103 & CH 104)		
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory [2]	4
or CH 203 & CH 204	General Chemistry II for Students in Chemical Sciences and General Chemistry Laboratory II for Students in Chemical Sciences	
(Chemistry BA double major choose CH 203 & CH 204)		
CH 221 & CH 222	Organic Chemistry I and Organic Chemistry I Lab [2]	4
or CH 225 & CH 226	Organic Chemistry I for Students in Chemical Sciences and Organic Chemistry Laboratory I for Students in Chemical Sciences	
(Chemistry BA double major choose CH 225 & CH 226)		
CH 223 & CH 224	Organic Chemistry II and Organic Chemistry II Lab [2]	4
or CH 227 & CH 228	Organic Chemistry II for Students in Chemical 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. 4)		9
(Chemistry BA double major choose CH 315/CH 316, CH 331, and CH 401)		
Advised Science Electives (p. 4)		6
(Chemistry BA double major choose (PY 212 or PY 208/209) and (BCH 351 or BCH 451))		
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
ELP 344	School and Society [1]	3

ED 311 & ED 312	Classroom Assessment Principles and Practices and Classroom Assessment Principles and Practices Professional Learning Lab [1]	3
ECI 416	Teaching Students with Disabilities in Inclusive Classrooms [1]	3
EDP 304	Educational Psychology [1]	3
History and Philosophy of Science Education Elective (p. 5)		**3**
Free Electives		**0-7**
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)		0-3
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)		
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

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		

Chemistry Electives 300/400 Level

Code	Title	Hours	Counts towards
Choose from:			
CH 315 & CH 316	Quantitative Analysis 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		
CH 452	Advanced Measurement Techniques I		
CH 454	Advanced Measurement Techniques II		
CH 463	Molecular Origins of Life		
CH 495	Special Topics in Chemistry		
CH 499	Undergraduate Research in Chemistry		

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	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	Counts towards
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 [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 Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
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	
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	Organic Chemistry I 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 ***and*** Physics for Engineers and Scientists I Laboratory or College Physics I	4
Earth and Environmental Science Elective w/ Lab (p. 3) [2]		4
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3

GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
	Hours	**16**
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
CH 223 & CH 224	Organic Chemistry II and Organic Chemistry II Lab [2]	4
Earth and Environmental Science Elective (p. 3) [2]		3
	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. 5) [2]		3
Chemistry Elective 300/400 Level (p. 4) [2]		3
Free Elective [1]		4
	Hours	**16**
Spring Semester		
ED 311 & ED 312	Classroom Assessment Principles and Practices and Classroom Assessment Principles and Practices Professional Learning Lab [1]	3
EMS 375	Methods of Teaching Science I [3]	3
Chemistry Elective 300/400 Level (p. 4) [2]		3
GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		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 Students with Disabilities in Inclusive Classrooms [1]	3
Chemistry Elective 300/400 Level (p. 4) [2]		3
Advised Science Elective (p. 4) [2]		3
Free Elective		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 (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/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.