

Chemistry (BA)

To see more about what you will learn in this program, visit the Learning Outcomes website (<https://apps.oirp.ncsu.edu/pgas/>)!

Chemistry is a diverse and growing field that is full of academic and career opportunities for undergraduate students. Our two degree programs offer flexibility in choosing the appropriate academic path to fulfill your interest and career goals.

The **Bachelor of Arts (B.A.) in Chemistry** is built around the core sub-disciplines of chemistry with the addition of elective coursework in a chosen field. This program is designed to train you for a career outside of traditional laboratory work.

The **Bachelor of Science (B.S.) in Chemistry** program is certified by the American Chemical Society and trains you for entry in the chemical workforce or graduate school in the chemical sciences.

The Chemistry Honors Program offers students a challenging program of advanced study where they can develop independence, collaborative skills and a deeper understanding of chemistry required for careers in both industry and graduate school.

Outside of the classroom, students in Chemistry actively share their passion for chemistry with others, including the next generation of scientists. Opportunities in this area are possible through participation in our student groups:

- **Alpha Chi Sigma** – professional co-ed chemistry fraternity; benefits students not only by helping with their studies but also by providing projects and activities that teach the roles of leadership and management
- **American Chemical Society** – the student chapter of the ACS takes part in activities including tours of local research facilities, trips to national and regional conferences, and presentations by guest speakers
- **Cosmetic Chemistry Club** - open to all students interested in learning about cosmetics and the industry behind them; connects students to the cosmetic industry through guest speakers, company visits, and other activities

Undergraduate research can be one of the most rewarding aspects of your academic experience at NC State. Research offers opportunities to make pioneering discoveries at the forefront of science, using instrumentation and techniques far more sophisticated than those you would encounter in standard laboratory courses. Students often **co-author publications** in peer-reviewed journals and **present their research** at conferences. For more information on getting involved, please contact our Undergraduate Research Coordinator.

For more information about this program, visit our website (<https://chemistry.sciences.ncsu.edu/undergraduate/programs/>).

Contact

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Plan Requirements

Code	Title	Hours	Counts towards
Orientation			
COS 100	Science of Change ²	2	
Writing and Speaking			
ENG 101	Academic Writing and Research ¹	4	
	Advanced Writing (p. 3)	3	
Communications			
	Communications Requirement (p. 4) ³	3	
Basic Math & Sciences¹			
	Select one of the following Physics I courses:	4	
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory		
PY 211	College Physics I		
	Select one of the following Physics II courses:	4	
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory		
PY 212	College Physics II		
MA 131	Calculus for Life and Management Sciences A	3-4	
	or MA 141	Calculus I	
MA 231	Calculus for Life and Management Sciences B	3-4	
	or MA 241	Calculus II	
	Statistics (p. 4) ⁵	3	
Chemistry Core Courses¹			

CH 103	General Chemistry I for Students in Chemical Sciences	3
CH 104	General Chemistry Laboratory I for Students in Chemical Sciences	1
CH 203	General Chemistry II for Students in Chemical Sciences	3
CH 204	General Chemistry Laboratory II for Students in Chemical Sciences	1
CH 225	Organic Chemistry I for Students in Chemical Sciences	3
CH 226	Organic Chemistry Laboratory I for Students in Chemical Sciences	1
CH 227	Organic Chemistry II for Students in Chemical Sciences	3
CH 228	Organic Chemistry Laboratory II for Students in Chemical Sciences	1
CH 315	Quantitative Analysis	3
CH 316	Quantitative Analysis Laboratory	1
CH 331	Introductory Physical Chemistry	4
CH 401	Systematic Inorganic Chemistry I	3
Chemistry Advanced Elective (p. 3) ⁹		6
Advised Electives		
Advised Electives ⁴		24

Advised Electives are designed to allow students to concentrate in areas related to their professional goals. Advised Electives will be planned by the student in consultation with their academic advisor. At least 15 credit hours must be at the 300 level or higher with remaining credit hours being fulfilled by courses at the 200 level or above (exceptions to the 200 level course restriction include BIO 181, BIO 183, and FL* 1** courses that are not in your language of proficiency). Courses used to meet GEP requirements cannot also be used to meet Advised Electives requirements.

GEP Courses

GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	6
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)	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 Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)	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)	
Free Electives	
Free Electives (12 Hr S/U Lmt) ⁶	14

Free Elective courses can NOT be CH 100, C 111, MA 100, MA 101, MA 103, MA 107, MA 108, MA 111, MA 121, MA 131, MA 231, PY 131, PY 211, PY 212, ENG 100. 100-level Foreign Language Courses (FL*, LAT, GRK, PER) can be used if not satisfying the language proficiency requirement.

Total Hours **120**

Chemistry Advanced Electives

Code	Title	Hours	Counts towards
CH 335	Principles of Green Chemistry	4	
CH 403	Systematic Inorganic Chemistry II	3	
CH 415	Analytical Chemistry II	3	
CH 435	Introduction to Quantum Chemistry	3	
CH 441	Forensic Chemistry	3	
CH 495	Special Topics in Chemistry	3	
CH 572	Proteomics	3	
CH 701	Advanced Inorganic Chemistry I: Structure and Bonding	3	
CH 703	Advanced Inorganic Chemistry II: Applications of Group Theory to Bonding and Spectroscopy	3	
CH 705	Organometallic and Inorganic Reaction Mechanism	3	
CH 721	Advanced Organic Chemistry I	3	
CH 723	Advanced Organic Chemistry II	3	
CH 725	Physical Methods in Organic Chemistry	3	
CH 727	Biological Mass Spectrometry	3	

CH 730	Advanced Physical Chemistry	3
CH 732	Advanced Physical Chemistry in Biological Applications	3
CH 734	Spectroscopic Methods in Chemical Biology	3
CH 735	Magnetic Resonance in Chemistry	3
CH 737	Quantum Chemistry	3
CH 743	Electrochemistry	3
CH 745	Chemical Separation	3
CH 755	Organic Reaction Mechanisms	3
CH 765	Chemistry of Materials	3
CH 770	Bioinorganic Chemistry	3
CH 772	Solid State Chemistry	3
CH 795	Special Topics in Chemistry	3

Advanced Writing

Code	Title	Hours	Counts towards
ENG 214	Introduction to Editing	3	
ENG 281	Introduction to Creative Nonfiction	3	
ENG 287	Explorations in Creative Writing	3	
ENG 288	Fiction Writing	3	
ENG 289	Poetry Writing	3	
ENG 316	Introduction to News and Article Writing	3	
ENG 323	Writing in the Rhetorical Tradition	3	
ENG 331	Communication for Engineering and Technology	3	
ENG 332	Communication for Business and Management	3	
ENG 333	Communication for Science and Research	3	

ENG 425	Analysis of Scientific and Technical Writing	3
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Statistics

Code	Title	Hours	Counts towards
ST 311	Introduction to Statistics	3	
ST/BUS 350	Economics and Business Statistics	3	
ST 370	Probability and Statistics for Engineers	3	

Communications

Code	Title	Hours	Counts towards
COM 110	Public Speaking	3	
COM 112	Interpersonal Communication	3	
COM 201	Introduction to Persuasion Theory	3	
COM 202	Small Group Communication	3	
COM 211	Argumentation and Advocacy	3	
COM 289	Science Communication and Public Engagement	3	

¹ No grades below a C- are permitted.

² For students that did not enroll in COS 100 during their first semester, a GEP-Interdisciplinary Perspectives course may substitute for COS 100.

³ Communications requirement must be selected from COM 110, 112, 201, 202, 211, 289. The Communications requirement may not be used to satisfy the GEP requirements; it is taken in addition to the GEP.

⁴ Advised Electives are designed to allow students to concentrate in areas related to their professional goals. Advised Electives will be planned by the student in consultation with their academic advisor. At least 15 credit hours must be at the 300 level or higher with remaining credit hours being fulfilled by courses at the 200 level or above (exceptions to the 200 level course restriction include BIO 181, BIO 183, and FL* 1** courses that are not in your language of proficiency). Courses used to meet GEP requirements cannot also be used to meet Cross Discipline Electives requirements.

⁵ Statistics requirement must be selected from ST 311, 350 (or BUS 350), 370.

⁶ Free Elective courses can NOT be CH 100, C 111, MA 100, MA 101, MA 103, MA 107, MA 108, MA 111, MA 121, MA 131, MA 231, PY 131, PY 211, PY 212, ENG 100. 100-level Foreign Language Courses (FL*, LAT, GRK, PER) can be used if not satisfying the language proficiency requirement.

⁷ The two course sequence: CH 431 plus CH 433 can substitute for CH 331.

⁸ Advanced Writing course must be selected from ENG 214, 281, 287, 288, 289, 316, 323, 331, 332, 333, 425. The Advanced Writing course may not be used to satisfy the GEP requirements; it is taken in addition to the GEP.

⁹ Choose from among the following: CH 335/PSE 335, CH 403, CH 415, CH 435, CH 441, CH 495, CH 5xx or CH 7xx.

Semester Sequence

This is a sample.

First Year

Fall Semester		Hours
CH 103	General Chemistry I for Students in Chemical Sciences ¹	3
CH 104	General Chemistry Laboratory I for Students in Chemical Sciences ¹	1
MA 131 or MA 141	Calculus for Life and Management Sciences A ¹ or Calculus I	3-4
ENG 101	Academic Writing and Research ¹	4
COS 100	Science of Change	2
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
Hours		14

Spring Semester

CH 203	General Chemistry II for Students in Chemical Sciences ¹	3
CH 204	General Chemistry Laboratory II for Students in Chemical Sciences ¹	1
MA 231 or MA 241	Calculus for Life and Management Sciences B ¹ or Calculus II	3-4
Communications Requirement (p. 4) ³		3
Advised Elective ⁴		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		16

Second Year

Fall Semester

CH 225	Organic Chemistry I for Students in Chemical Sciences ¹	3
CH 226	Organic Chemistry Laboratory I for Students in Chemical Sciences ¹	1
PY 205 & PY 206 or PY 211	Physics for Engineers and Scientists I ¹ or College Physics I	4
Statistics (p. 4) ^{1,5}		3
Advised Elective ⁴		3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
Hours		15

Spring Semester

CH 227	Organic Chemistry II for Students in Chemical Sciences ¹	3
CH 228	Organic Chemistry Laboratory II for Students in Chemical Sciences ¹	1
CH 315	Quantitative Analysis ¹	3
CH 316	Quantitative Analysis Laboratory ¹	1
PY 208 & PY 209 or PY 212	Physics for Engineers and Scientists II ¹ or College Physics II	4
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Third Year**Fall Semester**

CH 331	Introductory Physical Chemistry ^{1,7}	4
Advanced Writing (p. 3) ⁸		3
Advised Elective ⁴		3
Free Elective ⁶		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		16

Spring Semester

CH 401	Systematic Inorganic Chemistry I ¹	3
Advised Elective ⁴		3
Advised Elective ⁴		3
Free Elective ⁶		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Fourth Year**Fall Semester**

Chemistry Advanced Elective (p. 3) ^{1,9}		3
Advised Elective ⁴		3
Advised Elective ⁴		3
Free Elective ⁶		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		3
Hours		15

Spring Semester

Chemistry Advanced Elective (p. 3) ^{1,9}		3
Advised Elective ⁴		3
Free Elective ⁶		3
Free Elective ⁶		2
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		14

Total Hours **120**