

# Chemistry (BS)

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
<b>Orientation</b>			
COS 100	Science of Change	2	
<b>Writing and Speaking</b>			
ENG 101	Academic Writing and Research <sup>1</sup>	4	
	Advanced Writing (p. 3)	3	
<b>Basic Math &amp; Sciences</b>			
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory <sup>1</sup>	4	
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory <sup>1</sup>	4	
MA 141	Calculus I <sup>1</sup>	4	
MA 241	Calculus II <sup>1</sup>	4	
MA 242	Calculus III <sup>1</sup>	4	
MA 341	Applied Differential Equations I <sup>1</sup>	3	
BCH 451	Principles of Biochemistry <sup>1</sup>	4	
<b>Chemistry</b>			

CH 103 & CH 104	General Chemistry I for Students in Chemical Sciences and General Chemistry Laboratory I for Students in Chemical Sciences <sup>1</sup>	4
CH 203 & CH 204	General Chemistry II for Students in Chemical Sciences and General Chemistry Laboratory II for Students in Chemical Sciences <sup>1</sup>	4
CH 225 & CH 226	Organic Chemistry I for Students in Chemical Sciences and Organic Chemistry Laboratory I for Students in Chemical Sciences <sup>1</sup>	4
CH 227 & CH 228	Organic Chemistry II for Students in Chemical Sciences and Organic Chemistry Laboratory II for Students in Chemical Sciences <sup>1</sup>	4
CH 315 & CH 316	Quantitative Analysis and Quantitative Analysis Laboratory <sup>1</sup>	4
CH 401	Systematic Inorganic Chemistry I <sup>1</sup>	3
CH 415	Analytical Chemistry II <sup>1</sup>	3
CH 431	Physical Chemistry I <sup>1</sup>	3
CH 433	Physical Chemistry II <sup>1</sup>	3

CH 442	Advanced Synthetic Techniques <sup>1</sup>	4
CH 452	Advanced Measurement Techniques I <sup>1</sup>	4
CH 444 or CH 454	Advanced Synthetic Techniques II <sup>1</sup> Advanced Measurement Techniques II	4
Chemistry Elective (p. 3) <sup>1</sup>		6
<b>Advised Electives <sup>2</sup></b>		<b>12</b>

Advised electives are designed to allow students to concentrate in areas related to their academic goals. Courses used to fulfill this requirement are selected by students after consultation and approval by their advisors or the Coordinator of Advising.

<b>GEP Courses</b>		
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> )		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> )		6
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 Elective ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		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> )		3
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)		
World Language Proficiency ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/</a> ) (verify requirement)		
<b>Free Electives</b>		<b>2</b>

Free electives courses cannot be CH 100, CH 111, MA 100, MA 101, MA 107, MA 108, MA 111, MA 121, MA 131, MA 231, PY 131, PY 211, PY 212, ENG 100. 100-level World Language Courses (WL\*) can be used if not satisfying the language proficiency requirement.

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**Total Hours** **120**

<sup>1</sup> No grades below a C- are permitted.

<sup>2</sup> Consult with your advisor regarding this requirement.

## 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 Rhetorical Traditions	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	

## Chemistry Electives

Code	Title	Hours	Counts towards
BIO 572	Proteomics	3	
BIO 727	Biological Mass Spectrometry	3	
BIT 572	Proteomics	3	
CH 335	Principles of Green Chemistry	4	
CH 403	Systematic Inorganic Chemistry II	3	
CH 415	Analytical Chemistry II	3	
CH 441	Forensic Chemistry	3	

CH 463	Molecular Origins of Life	3	
CH 563	Molecular Origins of Life	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 711	Advanced Analytical Chemistry I	3	
CH 713		2	
CH 714		1	
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 736	Chemical Spectroscopy	3	
CH 737	Quantum Chemistry	3	
CH 743	Electrochemistry	3	
CH 745	Chemical Separation	3	
CH 755	Organic Reaction Mechanisms	3	
CH 757		3	
CH 759		3	
CH 772	Solid State Chemistry	3	
CH 795	Special Topics in Chemistry	1-6	
PSE 335	Principles of Green Chemistry	4	

## Semester Sequence

This is a sample.

### First Year

Fall Semester		Hours
CH 103	General Chemistry I for Students in Chemical Sciences <sup>1</sup>	3
CH 104	General Chemistry Laboratory I for Students in Chemical Sciences <sup>1</sup>	1
MA 141	Calculus I <sup>1</sup>	4
ENG 101	Academic Writing and Research <sup>1</sup>	4
COS 100	Science of Change	2
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
<b>Hours</b>		<b>15</b>

### Spring Semester

CH 203	General Chemistry II for Students in Chemical Sciences <sup>1</sup>	3
CH 204	General Chemistry Laboratory II for Students in Chemical Sciences <sup>1</sup>	1
MA 241	Calculus II <sup>1</sup>	4
PY 205	Physics for Engineers and Scientists I <sup>1</sup>	3
PY 206	Physics for Engineers and Scientists I Laboratory	1
GEP Requirement ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
<b>Hours</b>		<b>15</b>

### Second Year

#### Fall Semester

CH 225	Organic Chemistry I for Students in Chemical Sciences <sup>1</sup>	3
CH 226	Organic Chemistry Laboratory I for Students in Chemical Sciences <sup>1</sup>	1
PY 208	Physics for Engineers and Scientists II <sup>1</sup>	3
PY 209	Physics for Engineers and Scientists II Laboratory <sup>1</sup>	1
MA 242	Calculus III <sup>1</sup>	4
GEP Requirement ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
<b>Hours</b>		<b>15</b>

#### Spring Semester

CH 227	Organic Chemistry II for Students in Chemical Sciences <sup>1</sup>	3
CH 228	Organic Chemistry Laboratory II for Students in Chemical Sciences <sup>1</sup>	1
CH 315	Quantitative Analysis <sup>1</sup>	3
CH 316	Quantitative Analysis Laboratory <sup>1</sup>	1
MA 341	Applied Differential Equations I <sup>1</sup>	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
GEP Requirement ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
<b>Hours</b>		<b>15</b>

### Third Year

#### Fall Semester

CH 431	Physical Chemistry I <sup>1</sup>	3
CH 401	Systematic Inorganic Chemistry I <sup>1</sup>	3
CH 442	Advanced Synthetic Techniques <sup>1</sup>	4
Advanced Writing Elective (p. 3) <sup>1</sup>		3
Advised Elective (p. 1)		3
<b>Hours</b>		<b>16</b>

#### Spring Semester

CH 433	Physical Chemistry II <sup>1</sup>	3
CH 415	Analytical Chemistry II <sup>1</sup>	3
BCH 451	Principles of Biochemistry <sup>1</sup>	4
GEP Elective ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
Advised Elective (p. 1)		3
<b>Hours</b>		<b>16</b>

### Fourth Year

#### Fall Semester

Chemistry Advanced Elective (p. 3) <sup>1</sup>		3
CH 452	Advanced Measurement Techniques I <sup>1</sup>	4
GEP Requirement ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
Advised Elective (p. 1)		2
Free Elective		3
<b>Hours</b>		<b>15</b>

#### Spring Semester

CH 444	Advanced Synthetic Techniques II <sup>1</sup>	4
Chemistry Advanced Elective (p. 3) <sup>1</sup>		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> )		3
Advised Elective (p. 1)		3
<b>Hours</b>		<b>13</b>
<b>Total Hours</b>		<b>120</b>

<sup>1</sup> A grade of C- or higher is required.

## Career Opportunities

### Career Titles

- Agricultural Technician
- Agronomist
- Anesthesiologist (MD)
- Biochemist
- Biophysicist
- Cardiologist (MD)
- Chemical Engineer
- Chemical Technicians
- Chemist
- Chemistry Professor
- Conservation Scientist
- Criminalist
- Dairy Technologist

- Dental Laboratory Technician
- Dentist (DDS)
- Environmental Engineer
- Environmental Technician
- Fire Prevention Engineer
- Food & Drug Inspector
- Food Science Technicians
- Food Technologist
- Forensic Science Technicians
- Forest and Conservation Technician
- Fuel Cell Engineers
- General Internists (MD)
- Geneticist
- Geologist
- High School Teacher
- Horticulturist
- Hydrographer
- Hydrologist
- Industrial Air Pollution Analyst
- Industrial Waste Inspector
- Laboratory Tester
- Landfill Inspectors
- Materials Scientist
- Medical and Health Services Managers
- Microbiologist
- Middle School Teacher
- Neurologists
- Nuclear Engineer
- Nuclear Fuels Research Engineer
- Nuclear Medicine Technologist
- Occupational Health and Safety Technicians
- Occupational Safety & Health Inspector
- Pathologist (MD)
- Perfumer
- Petroleum Engineer
- Pharmacist
- Pharmacologist
- Plant Breeder
- Radiation Protection Engineer
- Safety Inspector
- Sales Representative (Chemicals & Drugs)
- Sanitary Engineer
- Soil Scientist
- Surgeons (MD)
- Sustainability Specialists
- Technical & Scientific Publications Editor
- Technical Publications Writer
- Toxicologist
- Veterinarian (VMD)

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.

American Chemical Society (<http://www.acs.org/content/acs/en/careers.html>)

## Learn More About Careers

NCcareers.org (<https://nccareers.org/>)