

CHEMISTRY (BS)

CIP: 40.0501

Program Description

Chemistry is the study of molecules, how they are created from atoms, how their structures affect their chemical and physical properties, and how they unite or assemble to form the matter that makes up the physical and natural world. Knowledge of chemistry is fundamental to an in-depth understanding of all materials in the natural world and the structural properties and biochemical reactions that define living systems. Chemistry interfaces with biology, physics, mathematics, computer science, and engineering.

Modern chemistry's range of applications is broad, spanning many aspects of human activities such as the improvement of agriculture, the utility of alternative and renewable energies, the discovery of new drugs and medical diagnostics, and the creation of new materials by learning how molecules are assembled and how they recognize one another. Chemistry is at the heart of sustainability—meeting the needs of the present without compromising the ability of the earth to provide for future generations. It also drives the exciting interdisciplinary fields of nanotechnology, materials science, biotechnology, polymers, environmental science, forensics, and chemical biology to name several examples.

The Chemistry major builds on the Foundations of Science program and offers students the opportunity to pursue their interests in the traditional sub-disciplines of chemistry: organic chemistry, inorganic chemistry, physical chemistry, and analytical chemistry. The major offers elective courses that explore the interdisciplinary areas of biochemistry, computational chemistry, chemical biology, and materials science. A degree in Chemistry prepares students for graduate work and rewarding careers in all sectors of scientific life, from basic research to commercial product development. It also enables the pursuit of exciting careers in education, law, medicine, business, and government.

The study away pathway for the Chemistry major can be found on the NYUAD Student Portal at students.nyuad.nyu.edu/pathways (<http://students.nyuad.nyu.edu/pathways/>). Students with questions should contact the Office of Global Education.

The program strongly recommends that not more than one chemistry elective be taken while studying away.

Students majoring in chemistry will achieve a factual and theoretical understanding of the physical world and the atoms and molecules that comprise it; they will understand the important role of chemistry as the central science and the integration of chemistry with the other disciplines; will conduct laboratory experiments effectively and safely; will solve problems through a rigorous scientific approach; will be able to search and use the peer-reviewed scientific literature effectively; demonstrate effective communication in oral and written form; will learn how to work effectively in a multidisciplinary team; they will practice ethics and conduct themselves responsibly with an awareness of the role of chemistry in society.

Specialization in Biophysics for Natural Science Majors

The Biology, Chemistry, and Physics majors offer a specialization in Biophysics which emphasizes the crosstalk between these three disciplines in understanding biological function.

Everything obeys the laws of physics, and biological systems are no exception. The complexity of biological systems, however, is compounded by the fact that they span a broad range of interacting spatial scales from a few atoms to global ecosystems, and that life inherently functions far from the equilibrium. This complexity poses problems for physicists, chemists, and biologists that are at once interesting and challenging. Biophysics addresses these problems through an interdisciplinary approach that builds on strengths in physics, chemistry, and biology.

Chemistry majors who elect to complete the Biophysics specialization must complete all courses required for the Chemistry majors, three required Biophysics courses, and one elective selected from the list below. No more than two of these courses can be used to satisfy the elective requirement for the Chemistry major. The other two would be in addition to the minimum elective requirements for the major.

Admissions

New York University's Office of Undergraduate Admissions supports the application process for all undergraduate programs at NYU. For additional information about undergraduate admissions, including application requirements, see How to Apply (<https://www.nyu.edu/admissions/undergraduate-admissions/how-to-apply.html>).

Program Requirements

Course	Title	Credits
General Education Requirements		
Colloquia		8
First-Year Seminar		4
Arts, Design, and Technology		4
Cultural Exploration Analysis		4
Data and Discovery		4
Structures of Thought and Society		4
January Term Courses (3 courses)		12
Foundations of Science		
Complete 6.5 courses from SCIEN-UH 1101EQ–1603 Foundations of Science 1-6		26
Required Courses		
MATH-UH 1012Q	Calculus with Applications to Science and Engineering	4
MATH-UH 1020	Multivariable Calculus with Applications to Science and Engineering	4
CHEM-UH 2010	Organic Chemistry 1	5
CHEM-UH 3010	Organic Chemistry 2	5
CHEM-UH 3011 & CHEM-UH 3012	Physical Chemistry: Thermodynamics and Kinetics and Physical Chemistry Laboratory: Thermodynamics and Kinetics	6
CHEM-UH 3013 & CHEM-UH 3014	Physical Chemistry: Quantum Mechanics and Spectroscopy and Physical Chemistry Laboratory: Quantum Mechanics and Spectroscopy	6
CHEM-UH 3015	Inorganic Chemistry	4
CHEM-UH 3016	Analytical Chemistry	4
CHEM-UH 3020	Biochemistry: Macromolecular Structure and Function	4
or CHEM-UH 3021	Biochemistry: Metabolism	

Elective

Select one Chemistry elective	4
-------------------------------	---

Research Seminar

CHEM-UH 3090 Research Seminar in Chemistry (half course)	2
--	---

Capstone

CHEM-UH 4001 Capstone Project in Chemistry 1	4
--	---

CHEM-UH 4002 Capstone Project in Chemistry 2	4
--	---

Other Elective Credits	18
------------------------	----

Total Credits	140
----------------------	------------

Requirements for Specialization in Biophysics for Natural Science Majors

Course	Title	Credits
--------	-------	---------

Required Courses

BIOL-UH 3130	Biophysics	4
--------------	------------	---

PHYS-UH 3219	Biological Physics: From single molecules to the cell	4
--------------	---	---

CHEM-UH 3130	Computational Biology & Biophysics (course can be used towards major elective)	4
--------------	--	---

Electives

Select one of the following:	4
------------------------------	---

PHYS-UH 3014	Statistical Mechanics and Thermodynamics
--------------	--

BIOL-UH 2010	Human Physiology
--------------	------------------

BIOL-UH 2114	Genetics
--------------	----------

BIOL-UH 3115	Genome Biology
--------------	----------------

BIOL-UH 3116	Immunology
--------------	------------

BIOL-UH 3218	Synthetic Biology
--------------	-------------------

BIOL-UH 3220	Experimental Systems Biology
--------------	------------------------------

Total Credits	16
----------------------	-----------

Sample Plan of Study

Learning Outcomes

Students who complete the major in chemistry are expected to achieve an understanding of the basic principles of chemistry and master problem-solving skills, chemical literature skills, laboratory safety skills, communication skills, team skills, and ethics. These program learning outcomes are in line with the guidelines for bachelor's degree programs in chemistry set forth by the American Chemical Society.

Students are expected to be able to do the following:

1. Demonstrate factual and theoretical knowledge of our present understanding of the physical world and the atoms and molecules that comprise it, including an understanding of the fundamental concepts underpinning organic, inorganic, physical, analytical, and biochemistry;
2. Understand the important role of chemistry as the central science and the integration of chemistry with the physical sciences, the life sciences, mathematics, and engineering;
3. Conduct laboratory experiments effectively and safely by understanding and applying the concepts of safe laboratory practices, including responsible disposal techniques, use of material safety data sheets (MSDS), recognizing and minimizing potential hazards, and handling emergencies effectively;

4. Solve problems through defining a problem clearly, forming testable hypotheses, designing and executing experiments, analyzing data, and drawing appropriate conclusions;
5. Search and use the peer-reviewed scientific literature effectively and evaluate papers and other media critically;
6. Demonstrate effective communication in oral and written form and be able to present information in a clear and organized manner, write concise reports, and use technology, such as presentation, word processing, and structure-drawing software;
7. Work effectively in a multidisciplinary team to solve scientific problems; and
8. Practice ethics and conduct themselves responsibly with an awareness of the role of chemistry in contemporary social and global issues.

Policies

NYU Policies

University-wide policies can be found on the New York University Policy pages (<https://bulletins.nyu.edu/nyu/policies/>).

NYU Abu Dhabi Policies

A full list of relevant policies can be found on NYU Abu Dhabi's undergraduate academic policies page (<https://bulletins.nyu.edu/undergraduate/abu-dhabi/academic-policies/>).