

BIOCHEMISTRY (BA)

Department Website (<http://as.nyu.edu/chemistry/>)

NYSED: 78102 HEGIS: 0414.00 CIP: 26.0202

Program Description

The Department of Chemistry has a long tradition in the College of Arts and Science, dating back well before the founding of the American Chemical Society at New York University in 1876. Professor John W. Draper, the first president of the society and chair of the department, was a remarkable polymath: chemist, physician, philosopher, historian, and pioneering photographer.

The department has undertaken a major development plan, strengthening its faculty, instructional laboratories, course offerings, and research facilities in the areas of physical, biophysical, bioorganic, and biomedical chemistry, as well as in chemical biology, nanoscience, and materials sciences. Qualified undergraduates are strongly encouraged to participate in research as early as their sophomore year of study. The department houses state-of-the-art laboratory facilities for its undergraduate chemistry courses.

The department offers majors in Chemistry, Biochemistry, and Global Public Health/Science with a concentration in Chemistry. Students have the opportunity to earn either a BA or BS in the Chemistry major. A selection of elective advanced courses, undergraduate and graduate, can be combined (in consultation with the director of undergraduate studies) to provide a broad, varied program of study in chemistry or an undergraduate specialization in organic, biochemical, physical, or theoretical chemistry. The opportunity to participate in scientific research as an undergraduate is one of the most exciting features of a Chemistry major. Research allows you to work alongside graduate students, postdoctoral fellows and faculty to develop new ideas to solve real-world problems and make new discoveries. Many of our students produce results that lead to publications and research is also a great preparation for graduate school and a wide range of chemistry careers.

The programs of study in Chemistry and Biochemistry prepare students for graduate study leading to careers in research, development, and teaching and/or for further study in areas such as medicine, dentistry, basic medical sciences, and allied health fields (including forensic science). In addition, the Chemistry and Biochemistry majors both prepare students for alternative careers, especially when paired with a minor in Economics, Data Science, or Business Studies: for example, patent law, technology investment, or management in the chemical industry.

Honors Program

Students seeking entry into the honors program must obtain the approval of the director of undergraduate studies prior to the end of their junior year. Candidates for a degree with honors in Chemistry must have an overall GPA of 3.65 and a GPA of 3.65 in all required courses for the Chemistry or Biochemistry major. The main requirement for earning an honors degree is the completion of an honors thesis based upon independent experimental or theoretical research. Students interested in research and an honors degree must enroll in CHEM-UA 995 Senior Honors in Chem and CHEM-UA 996 Senior Honors Chemistry (4-8 credits total). The prerequisite for these courses is one semester (or summer) of either CHEM-UA 997 Adv Independent Study & Research or CHEM-UA 998 Adv Independent Study & Research (2-4 credits). A senior thesis based on

the work completed in these courses must be prepared, approved by the adviser, and presented in a seminar format during the spring term of the student's senior year. Please contact the department at fas-chemistry-office@nyu.edu for more detailed information.

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

The major in Biochemistry requires six CHEM-UA core courses (28 credits), four mathematics and physics courses (18 credits), four biochemistry courses (16 credits), and one advanced chemistry elective (4 credits), all completed with a grade of C or better even if they are in other departments. Courses graded Pass/Fail do not count toward the major.

Note: *Biology is not required for any major or minor offered by the Department of Chemistry, but only for the prehealth program.*

Course	Title	Credits
General Education Requirements		
First-Year Seminar		4
EXPOS-UA 1	Writing as Inquiry	4
Foreign Language ¹		16
Texts and Ideas		4
Cultures and Contexts		4
Societies and the Social Sciences		4
Expressive Culture		4
Major Requirements		
<i>General Chemistry Sequence</i> ²		
CHEM-UA 125	General Chemistry I & Laboratory	5
CHEM-UA 126	General Chemistry II & Laboratory	5
<i>Organic Chemistry Sequence</i>		
CHEM-UA 225 or CHEM-UA 227	Organic Chemistry I & Laboratory Majors Organic Chemistry I & Laboratory	5
CHEM-UA 226 or CHEM-UA 228	Organic Chemistry II & Laboratory Majors Organic Chemistry II & Laboratory	5
<i>Physical Chemistry Courses</i> ³		
CHEM-UA 651	Quantum Mechanics & Spectroscopy	4
CHEM-UA 652	Thermodynamics & Kinetics	4
<i>Mathematics & Physics Courses</i>		
MATH-UA 121	Calculus I ⁴	4
MATH-UA 122	Calculus II ⁵	4
PHYS-UA 11	General Physics I ⁶	5
PHYS-UA 12	General Physics II ⁷	5
<i>Additional Biochemistry Courses</i>		
CHEM-UA 881	Biochemistry I	4
CHEM-UA 882	Biochemistry II	4
CHEM-UA 885	Experimental Biochem & Laboratory	4
CHEM-UA 890	Advanced Biochemistry	4

Electives

Advanced Chemistry Elective ⁸	4
Other Elective Credits	22
Total Credits	128

- ¹ The foreign language requirement is satisfied upon successful completion through the Intermediate level of a language. This may be accomplished in fewer than 16 credits, but those credits must then be completed as elective credit.
- ² When offered, the one-semester CHEM-UA 129 Accelerated General Chemistry course may substitute for the CHEM-UA 125 General Chemistry I & Laboratory and CHEM-UA 126 General Chemistry II & Laboratory sequence.
- ³ Students may take CHEM-UA 860 Special Topics in Physical Chemistry instead of both CHEM-UA 651 Quantum Mechanics & Spectroscopy and CHEM-UA 652 Thermodynamics & Kinetics. Students who choose to take Special Topics in Physical Chemistry must enroll in an additional Advanced Chemistry Elective.
- ⁴ Or Advanced Placement (or equivalent international exam) credit.
- ⁵ Advanced Placement credit for MATH-UA 122 Calculus II (a score of 5 on BC Calculus) is not accepted for this major requirement. Students with this AP credit must either (1) take Calculus II at NYU and forfeit 4 of the 8 AP credits, or (2) register for one of the following: CHEM-UA 140 Mathematics of Chemistry, MATH-UA 123 Calculus III, or MATH-UA 140 Linear Algebra, using the BC credits as a prerequisite.
- ⁶ Credit for AP Physics C: Mechanics with a score of 4 or 5 is accepted, but only for students who are not prehealth. No other AP or equivalent international credit is accepted. *Because of medical, dental, etc. school admissions requirements, students on the prehealth track cannot use AP Physics C credit to place out of either or both semesters of General Physics.*
- ⁷ Credit for AP Physics C: Electricity and Magnetism with a score of 4 or 5 is accepted, but only for students who are not prehealth. No other AP or equivalent international credit is accepted. *Because of medical, dental, etc. school admissions requirements, students on the prehealth track cannot use AP Physics C credit to place out of either or both semesters of General Physics.*
- ⁸ CHEM-UA 997 Adv Independent Study & Research, CHEM-UA 998 Adv Independent Study & Research, CHEM-UA 995 Senior Honors in Chem, CHEM-UA 996 Senior Honors Chemistry, and CHEM-UA 140 Mathematics of Chemistry *do not count* as advanced electives for the major.

Program Notes

CHEM-UA 140 Mathematics of Chemistry is strongly recommended as preparation for both Physical Chemistry: Quantum Mechanics and Spectroscopy (CHEM-UA 651) and Physical Chemistry: Thermodynamics and Kinetics (CHEM-UA 652), as well as for students interested in pursuing chemistry on the graduate level or who have an interest in theoretical chemistry or physical chemistry. Students may choose instead to take Calculus III (MATH-UA 123) and/or Linear Algebra (MATH-UA 140).

Students are required to complete the courses in general chemistry, physics, and calculus prior to entry into CHEM-UA 651, 652 (the physical chemistry sequence), which is usually taken in junior year. It is strongly advised that advanced-level chemistry course enrollment begin no later than the fifth semester of study. This allows at least three more semesters to complete all major requirements.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
CHEM-UA 125	General Chemistry I & Laboratory	5
MATH-UA 121	Calculus I	4
First-Year Seminar		4
Texts and Ideas		4
	Credits	17
2nd Semester/Term		
CHEM-UA 126	General Chemistry II & Laboratory	5
MATH-UA 122	Calculus II	4
EXPOS-UA 1	Writing as Inquiry	4
Cultures and Contexts		4
	Credits	17
3rd Semester/Term		
CHEM-UA 225 or CHEM-UA 227	Organic Chemistry I & Laboratory or Majors Organic Chemistry I & Laboratory	5
CHEM-UA 140	Mathematics of Chemistry ¹	4
BIOL-UA 11	Principles of Biology I ²	4
Foreign Language		4
	Credits	17
4th Semester/Term		
CHEM-UA 226 or CHEM-UA 228	Organic Chemistry II & Laboratory or Majors Organic Chemistry II & Laboratory	5
Elective		4
Elective		2
Foreign Language		4
	Credits	15
5th Semester/Term		
CHEM-UA 881	Biochemistry I	4
PHYS-UA 11	General Physics I	5
Foreign Language		4
Expressive Culture		4
	Credits	17
6th Semester/Term		
CHEM-UA 882	Biochemistry II	4
PHYS-UA 12	General Physics II	5
Foreign Language		4
Societies and the Social Sciences		4
	Credits	17
7th Semester/Term		
CHEM-UA 652	Thermodynamics & Kinetics ³	4
CHEM-UA 885	Experimental Biochem & Laboratory	4
Advanced Chemistry Elective		4
Elective		4
	Credits	16
8th Semester/Term		
CHEM-UA 651	Quantum Mechanics & Spectroscopy	4
CHEM-UA 890	Advanced Biochemistry	4
Elective		4
	Credits	12
	Total Credits	128

¹ CHEM-UA 140 Mathematics of Chemistry is recommended, but not required. Does not count toward any major requirements. May be substituted with an elective course.

² Principles of Biology is recommended, but not required. Does not count toward any major requirements. Some Biochemistry majors may need to choose to pursue additional coursework in biology.

³ Students may take CHEM-UA 860 Special Topics in Physical Chemistry instead of both CHEM-UA 651 Quantum Mechanics & Spectroscopy

and CHEM-UA 652 Thermodynamics & Kinetics. Students who choose to take Special Topics in Physical Chemistry must enroll in additional Advanced Chemistry Elective.

Learning Outcomes

Upon completion of program requirements, students are expected to have acquired:

1. A fundamental command of biochemistry, as well as of the subdisciplines of organic, inorganic, and physical chemistry.
2. Facility (via elective offerings) in analytical chemistry and/or mathematical and machine computational methods.
3. Mastery of laboratory skills in biochemistry and also in organic and physical chemistry.
4. Familiarity with contemporary problems in chemistry and the ability to articulate these problems and to propose well-considered solutions.

Policies

Program Policies

Grading and GPA Policy

All courses for the major must be completed with a grade of C or better even if they are in other departments (such as mathematics or physics). Courses graded Pass/Fail do not count toward the major. Students who do not have an average of 2.0 (C) or better in courses required by the department by the time they have completed 64 credits in all courses will be asked to change their major.

Prerequisite Policy

The Department of Chemistry strictly enforces all prerequisites and de-enrolls students from courses for which they do not meet the prerequisites. Prerequisite courses must be completed with a grade of C (not C minus) or better.

Advanced Standing Credit by Exam

AP, IB, and A Level credit by examination in Chemistry is not accepted toward any departmental majors or minors.

Laboratory Policy

Due to the potential hazard of any chemical experimentation, safety goggles, laboratory coats, and other protective gear must be worn at all times in the laboratories (but cannot be worn outside the laboratory). Laboratory equipment loaned to students must be replaced if damaged or broken. Students who do not return borrowed laboratory equipment at the end of a course are charged an additional fee, and their grade may be recorded as incomplete and not released until "checkout" is completed.

School of Engineering courses

No CAS student (whether majoring or minoring in this department or not) is allowed to take Tandon substitute courses for CHEM-UA 125, 126, 127, 128, 129 (General Chemistry); 225, 226, 227, 228 (Organic Chemistry); 651, 652, 661 (Physical Chemistry); 711 (Inorganic Chemistry); or 881, 882, 885, 890 (Biochemistry). However, students pursuing a major in the Department of Chemistry may seek prior permission of the director of undergraduate studies to take advanced electives in the School of Engineering and apply them to the major. This is reviewed on a case-by-case basis. These courses count against each student's 16-credit allowance in the other divisions of NYU and cannot be applied to the 64-credit UA residency requirement.

NYU Policies

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

College of Arts and Science Policies

A full list of relevant academic policies can be found on the CAS Academic Policies page (<https://bulletins.nyu.edu/undergraduate/arts-science/academic-policies/>).