

CHEMISTRY MAJOR

Requirements

Requirements for the Chemistry major are as follows:

Course	Title	Credits
First Year		
CHEM 1321 & CHEM 1311	General Chemistry I and General Chemistry I Recitation	4
CHEM 1331	General Chemistry Lab I	2
CHEM 1322 & CHEM 1312	General Chemistry II and General Chemistry II Recitation	4
CHEM 1332	General Chemistry Lab II	2
MATH 1206	Calculus I ¹	4
MATH 1207	Calculus II	4
BISC 1403 & BISC 1413	Introductory Biology I and Introductory Biology Lab I ²	5
BISC 1404 & BISC 1414	Introductory Biology II and Introductory Biology Lab II ²	5
Sophomore Year		
CHEM 2521 & CHEM 2511	Organic Chemistry I and Organic Chemistry I Recitation	4
CHEM 2531 or CHEM 2541	Organic Chemistry Lab I for Chem Majors or Organic Chemistry Lab I	2
CHEM 2522 & CHEM 2512	Organic Chemistry II and Organic Chemistry II Recitation	4
CHEM 2532 or CHEM 2542	Organic Chemistry Lab II for Chem Majors or Organic Chemistry Lab II	2
PHYS 1701 & PHYS 1511	Physics I and Physics I Lab	4
PHYS 1702 & PHYS 1512	Physics II and Physics II Lab	4
Junior Year		
CHEM 3621 & CHEM 3631	Physical Chemistry I and Physical Chemistry Lab I	6
CHEM 3622 & CHEM 3632	Physical Chemistry II and Physical Chemistry Lab II	6
CHEM 3721	Quantitative Analysis	4
CHEM 3722	Instrumental Analysis	4
CHEM 4030	Chemistry Seminar ³	0
Senior Year		
CHEM 4221	Biochemistry I ⁴	3
CHEM 4422	Inorganic Chemistry ⁴	3
Chemistry Elective ⁵		3 to 4
CHEM 4030	Chemistry Seminar ³	0

¹ MATH 12AB Transfer Calculus AB or MATH 12BC Transfer Calculus BC (transfer credit from AP Calculus) also fulfills the Calculus I requirement. Students pursuing the ACS Certified Degree and/or interested in graduate study are also strongly encouraged, but not required, to take MATH 2004 Multivariable Calculus I.

² **OPTIONAL:** Students in Pre-Health or interested in the Biochemistry minor should take BISC 1403 Introductory Biology I and BISC 1404 Introductory Biology II, along with labs. Students not pursuing these tracks are not required to take these courses.

³ Four semesters of CHEM 4030 Chemistry Seminar are required, generally taken during each semester of the junior and senior years. Additional elective research courses may be taken throughout the four-year curriculum. Contact the Associate Chair for details.

⁴ **ACS-Certified degree** candidates should also take the corresponding laboratory courses CHEM 4231 Biochemistry Lab I and CHEM 4432 Inorganic Chemistry Lab

⁵ Courses with the subject code CHEM, numbered 4222-4989, may count as electives. A rotating selection of courses satisfying the chemistry elective requirement are offered, including CHEM 4222 Biochemistry II, CHEM 4241 Biomimetic Chemistry, CHEM 4340 Environmental Chemistry, CHEM 4621 Bionanotechnology and Introduction to Nanomedicine, and CHEM 4625 Computational Chemistry. Students may take additional electives if their schedule permits.

General Advice

Majors meet with their academic adviser within the department to have their course schedules approved each semester.

For all CHEM foundation courses (i.e. General Chemistry through Organic Chemistry, including labs), a minimum grade of C- (in both lecture and lab) is required, both in order to enroll in the next course in the sequence, and for the course to apply towards the major.

Students are encouraged to pursue research projects with faculty members in the department for academic credit. These courses do not count toward major or minor requirements. Enrollment in research courses requires approval by the faculty supervisor. First-year students can enroll in CHEM 1990 Introduction to Research. Sophomores, juniors, and seniors can enroll in CHEM 3990 Directed Research. Juniors and seniors pursuing independent research can enroll in CHEM 4990 Independent Research.

Students are required to consult with the department before registering for CHEM 4030 Chemistry Seminar. Detailed instructions can be found on the department's website.

It is recommended that all chemistry majors take CHEM 3141 Methods of Biochemical Research in the years that it is offered.

Students planning to pursue graduate study in physical chemistry or chemical engineering are encouraged to take additional coursework in computer programming and mathematics and should speak with their adviser.

American Chemical Society (ACS) Certification

As an ACS-approved program in chemistry, Fordham offers the option of an ACS-certified chemistry major. This is generally recommended for students interested in pursuing careers or further study in chemistry and requires additional laboratory experience. In addition to the coursework listed above, students must complete CHEM 4432 Inorganic Chemistry Lab and CHEM 4231 Biochemistry Lab I. Students in pursuing this option are also encouraged (but not required) to take additional mathematics coursework, such as MATH 2004 Multivariable Calculus I

Biochemistry Minor

Requirements for the biochemistry minor can be found in the academic bulletin. In addition to the courses listed above, chemistry majors interested in the biochemistry minor typically take:

- **First year:** BISC 1403 Introductory Biology I, BISC 1413 Introductory Biology Lab I, BISC 1404 Introductory Biology II, and BISC 1414 Introductory Biology Lab II
- **Sophomore year:** General Genetics with Lab (BISC 2539 General Genetics/BISC 2549 General Genetics Lab or NSCI 3133 Genetics Lecture/NSCI 3833 Genetics Lab)
- **Junior year:** CHEM 4221 Biochemistry I, CHEM 4231 Biochemistry Lab I, CHEM 4222 Biochemistry II (Physical Chemistry can be postponed to senior year)
- **Senior year:** Two elective courses outside the chemistry major

Pre-Health Track

Students interested in pre-health should consult the recommended pre-health professions curriculum guidelines posted online.

In general, many chemistry majors who are pre-health take BISC 1403 Introductory Biology I, BISC 1413 Introductory Biology Lab I, BISC 1404 Introductory Biology II, and BISC 1414 Introductory Biology Lab II, in their first year. However, this coursework is not strictly required for the chemistry major. In addition, many students find taking the biochemistry sequence (CHEM 4221 Biochemistry I and CHEM 4222 Biochemistry II) to be useful preparation for taking such professional school examinations as the MCAT, DAT, and VCAT.

3-2 Engineering Track

Interested students should consult with the director of the 3-2 engineering program for information regarding major courses to be completed in their sophomore and junior years. In general, these programs often require taking coursework in the sophomore year, such as CISC 1600 Computer Science I, MATH 2004 Multivariable Calculus I, and MATH 2005 Multivariable Calculus II. Your 3-2 engineering program adviser will be able to provide additional guidance.

Learning Goals

Our American Chemical Society certified curriculum provides students with the necessary skill-sets, and prepares them for a range of STEM-related careers. The breadth and depth of courses, and research opportunities offered will prepare students for their applications to top-tier professional schools, including medical schools, graduate school programs, or to entry-level industrial positions. Students will learn how to apply their acquired knowledge in chemistry to a wide range of areas in a variety of chemistry related fields.

This preparation takes the form of the following learning goals:

1. **Students will gain knowledge and proficiency in the core concepts of Chemistry.** Students will understand the fundamental basis for the structure and reactivity of atoms, molecules and non-molecular solids. Our curriculum will introduce students to all the branches of chemistry: Organic, Inorganic, Physical, Analytical and Biochemistry.
2. **Students will acquire problem-solving and critical-thinking skills that will prepare them to work independently on research questions by drawing upon experimental, theoretical, and computational evidence.** Students will apply research methods, for design, data analysis, and interpretation. This is achieved through pedagogically engaging, discovery-based laboratory courses as well as research courses (offered in all 4 years of study) in which the students work directly with individual faculty.
3. **Students will learn to utilize chemical knowledge learned in their course work to real world applications in pharmacology, medicine and the environment.**

4. **Students will receive hands-on training with operating and interpreting data from high-tech analytical instrumentation.** The opportunities for hands-on experience on the department's bevy of modern instrumentation, either via independent research or within the framework of laboratory courses, will prepare students for scientific future careers.
5. **Students will gain experience in the computational methods of chemistry, ranging from ab initio calculations of electronic structure to molecular dynamics simulations, and learn how these complement experimental data.** Our curriculum will initiate students to "computational thinking," including chemical and materials informatics, applications of data science to chemistry, and first-principles simulation methods.
6. **Students will acquire scientific literacy skills, particularly reading, writing, and presenting scientific communications.** Through classwork and presentations at regional and national conferences, students will be prepared to communicate research findings to chemist and non-chemist audiences. Students will learn to utilize library resources and critically read scientific literature. Students will also have the opportunity to hone their writing skills through research grant applications and writing initial drafts of peer-reviewed publications.
7. **Students will be able to work safely in a laboratory setting and have hands-on experience with common laboratory equipment and glassware in organic, analytical, biochemistry, inorganic, and physical chemistry laboratories.** As a graduate of the chemistry department, students will be ready to safely work in industrial and academic research settings.

Availability

The chemistry major is available at Fordham College at Rose Hill. Students in Fordham's School of Professional and Continuing Studies may major in chemistry only if they receive the approval of their advising dean and/or department, and if their schedules are sufficiently flexible to permit them to take day courses at the Rose Hill campus.

Fordham College at Rose Hill students: The requirements above are in addition to those of the Core Curriculum.

Professional and Continuing Studies students: The requirements above are in addition to those of the PCS Core Curriculum and any additional electives that may be required to earn a minimum of 124 credits.

CIP Code

40.0501 - Chemistry, General.

You can use the CIP code to learn more about career paths associated with this field of study and, for international students, possible post-graduation visa extensions. Learn more about CIP codes and other information resources.