CHEMISTRY MAJOR

The major is recommended for students planning careers in chemistry. It is suitable preparation for graduate study in chemistry or medical school and for work as a professional chemist. The curriculum includes related courses in mathematics and physics as well as core courses and a concentration in chemistry.

Students must also complete the Undergraduate Registration Requirement (https://catalogs.northwestern.edu/undergraduate/requirements-policies/undergraduate-registration-requirement/) and the degree requirements of their home school.

NOTE: This Catalog describes Weinberg College BA requirements that pertain to students who matriculated at Northwestern after spring quarter 2023. Refer to the Archives (https://catalogs.northwestern.edu/archives/) if you are following BA requirements described in the 2018-2019 through 2022-2023 editions.

Course	Title
Department Courses (16.7–18.04 units)	
14.7–16.04 core units providing a solid basis in chemistry	
CHEM 110-0	Quantitative Problem Solving in Chemistry
& CHEM 131-0	and Fundamentals of Chemistry I
& CHEM 141-0	and Fundamentals of Chemistry Laboratory I
& CHEM 132-0	and Fundamentals of Chemistry II
& CHEM 142-0	and Fundamentals of Chemistry Laboratory II
or CHEM 151-0	General Chemistry I
& CHEM 161-0	and General Chemistry Laboratory I
& CHEM 152-0	and General Chemistry II
& CHEM 162-0	and General Chemistry Laboratory II
or CHEM 171-0	Advanced General Inorganic Chemistry
& CHEM 181-0	and Advanced General Inorganic Chemistry Laboratory
& CHEM 172-0	and Advanced General Physical Chemistry
& CHEM 182-0	and Advanced General Physical Chemistry Laboratory
CHEM 220-0	Introductory Instrumental Analysis
CHEM 217-1	Accelerated Organic Chemistry I
& CHEM 237-1	and Accelerated Organic Chemistry Laboratory I
& CHEM 217-2	and Accelerated Organic Chemistry II
& CHEM 237-2	and Accelerated Organic Chemistry Laboratory II
& CHEM 217-3	and Accelerated Organic Chemistry III
& CHEM 235-3	and Organic Chemistry Lab III
Students who complete the non-majors organic sequence CHEM 215-1, CHEM 215-2, and CHEM 215-3 with associated labs, and decide later to major in chemistry, are permitted to use these courses in place of CHEM 217-1, CHEM 217-2, and CHEM 217-3 and associated labs.	
CHEM 333-0	Inorganic Chemistry
CHEM 342-1	Thermodynamics
& CHEM 342-2	and Quantum Mechanics and Spectroscopy
& CHEM 342-3	and Kinetics and Statistical Thermodynamics
CHEM 350-1	Advanced Laboratory 1
& CHEM 350-2	and Advanced Laboratory 2
& CHEM 350-3	and Advanced Laboratory 3
2 courses from one of these concentration areas:	
Biochemistry (p. 1)	
Environmental Chemistry (p. 1)	
Inorganic Chemistry (p. 2)	
Organic Chemistry (p. 2)	
Physical Chemistry (p. 2)	
Materials/Nanotechnology (p. 2)	
Self-designed Concentration (p. 2)	
Related Courses (Units depend on mathematics courses taken.)	
BIOL_SCI 301-0	Principles of Biochemistry
or BIOL_SCI 241-0	Biochemistry, Molecular and Cell Biology for ISP - 2
MATH 220-1	Single-Variable Differential Calculus
& MATH 220-2	and Single-Variable Integral Calculus
or MATH 218-1	Single-Variable Calculus with Precalculus
& MATH 218-2	and Single-Variable Calculus with Precalculus
& MATH 218-3	and Single-Variable Calculus with Precalculus
MATH 230-1	Multivariable Differential Calculus
& MATH 230-2	and Multivariable Integral Calculus
or MATH 281-1	Accelerated Mathematics for ISP. First Year
& MATH 281-2	and Accelerated Mathematics for ISP. First Year
or MATH 285-2	Accelerated Mathematics for MMSS
& MATH 285-3	and Accelerated Mathematics for MMSS
or MATH 290-2	MENU: Linear Algebra and Multivariable Calculus
& MATH 290-3	and MENU: Linear Algebra and Multivariable Calculus
or MATH 291-2	MENU: Intensive Linear Algebra and Multivariable Calculus
& MATH 291-3	and MENU: Intensive Linear Algebra and Multivariable Calculus
PHYSICS 125-1	General Physics ISP
& PHYSICS 125-2	and General Physics for ISP
& PHYSICS 125-3	and General Physics for ISP
& PHYSICS 126-1	and Physics Laboratory for ISP
& PHYSICS 126-2	and Physics Laboratory for ISP
& PHYSICS 126-3	and Physics Laboratory for ISP
or PHYSICS 135-1	General Physics
& PHYSICS 135-2	and General Physics
& PHYSICS 135-3	and General Physics
& PHYSICS 136-1	and General Physics Laboratory
& PHYSICS 136-2	and General Physics Laboratory
& PHYSICS 136-3	and General Physics Laboratory
or PHYSICS 140-1	Fundamentals of Physics
& PHYSICS 140-2	and Fundamentals of Physics
& PHYSICS 140-3	and Fundamentals of Physics
& PHYSICS 136-1	and General Physics Laboratory
& PHYSICS 136-2	and General Physics Laboratory
& PHYSICS 136-3	and General Physics Laboratory

Concentration Courses

- Areas of concentration draw upon courses within the department as well as in other departments.
- Concentration courses are typically taken during the final year of undergraduate study.
- The concentration areas, along with eligible courses, are:

Biochemistry

Course	Title
CHEM 305-0	Chemistry of Life Processes
CHEM 314-0	Principles of Chemical Biology
CHEM 316-0	Medicinal Chemistry: the Organic Chemistry of Drug Design and Action
CHEM 432-0	X-Ray Crystallography
BIOL_SCI 361-0	Protein Structure and Function

Environmental Chemistry

Course	Title
CHEM 306-0	Environmental Chemistry
CHEM 393-0	Green Chemistry
CHEM 445-0	Advanced Physical & Analytical Chemistry [1]

CIV_ENV 260-0	Environmental Systems and Processes
CIV_ENV 314-0	Organic Geochemistry
CIV_ENV 365-0	Environmental Laboratory
CIV_ENV 367-0	Chemical Processes in Aquatic Systems

[1] Only applicable when class topic is "The Chemistry and Materials of Alternative Energy"

Inorganic Chemistry

Course	Title
CHEM 302-0	Principles of Inorganic Chemistry
CHEM 411-0	Organic Spectroscopy
CHEM 432-0	X-Ray Crystallography
CHEM 433-0	Structural Inorganic Chemistry
CHEM 434-0	Inorganic Chemistry
CHEM 435-0	Advanced Inorganic Chemistry

Organic Chemistry

Course	Title
CHEM 309-0	Polymer Chemistry
CHEM 310-1	Physical Organic Chemistry I
CHEM 310-2	Physical Organic Chemistry II
CHEM 313-0	Advanced Organic Chemistry 1. Advanced concepts of organic reactivity and selectivity in synthesis.
CHEM 314-0	Principles of Chemical Biology
CHEM 316-0	Medicinal Chemistry: the Organic Chemistry of Drug Design and Action
CHEM 319-0	Advanced Organic Synthesis - Concepts and Applications
CHEM 410-0	Physical Organic Chemistry
CHEM 411-0	Organic Spectroscopy
CHEM 412-0	Organometallic Reaction Mechanisms
CHEM 415-0	Advanced Organic Chemistry

Physical Chemistry

Course	Title
CHEM 442-1	Quantum Chemistry
CHEM 442-2	Quantum Chemistry
CHEM 443-0	Kinetics and Spectroscopy
CHEM 444-0	Elementary Statistical Mechanics
CHEM 445-0	Advanced Physical & Analytical Chemistry
CHEM 448-0	Computational Chemistry

Materials/Nanotechnology

Course	Title
CHEM 307-0	Supramolecular Design of Materials and Nanostructures [1]
or MAT_SCI 336-0	Synthetic Design of New Materials
CHEM 308-0	Design, Synthesis, and Applications of Nanomaterials
CHEM 309-0	Polymer Chemistry
MAT_SCI 201-0	Introduction to Materials Science and Engineering Principles
MAT_SCI 301-0	Introduction to Materials Science and Engineering Principles
MAT_SCI 331-0	Soft Materials
MAT_SCI 376-0	Nanomaterials

[1] Students may not count both CHEM 307-0 and MAT_SCI 336-0 toward their Chemistry major.

Self-designed Concentration

If the concentrations above do not meet their interests, students may design a concentration with approval of the Director of Undergraduate Studies in Chemistry. A concentration may consist of 2 courses from the areas above or with a common theme.

Honors in Chemistry

Majors who have done outstanding work in the classroom and research laboratory may be eligible for graduation with honors in chemistry. Students who intend to submit a senior thesis should send an e-mail message (including the name of the research adviser) to the director of undergraduate studies by fall of senior year. To be eligible for honors, a student must meet minimum GPA requirements, engage in original research during at least two quarters of CHEM 399-0 Independent Study, and write a senior thesis on this research. The CHEM 399-0 credits are not required for and do not count toward the chemistry major.

Students whose theses and grades meet department criteria are recommended to the college for graduation with honors. For more information consult the Director of Undergraduate Studies in Chemistry and see Honors in the Major (https://catalogs.northwestern.edu/undergraduate/arts-sciences/#academicoptionstext).