CHEMISTRY (CHEM)

CHEM 1001 - Chemical Concepts-Prefresh (5 Credits)
This course makes extensive use of group-formatted sessions to develop problem-solving skills, and is intended for students interested in taking CHEM 2070 or similar introductory chemistry courses at Cornell in the fall semester. There is a lab, CHEM 1002, that accompanies CHEM 1001.
Enrollment Information: Enrollment limited to: students in the pre first-year Summer Program.
Last Four Terms Offered: Summer 2021, Summer 2019, Summer 2018, Summer 2017
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1002 - Chemical Concepts Lab-Prefresh (1 Credit)
CHEM 1002 is an analytical problem-solving lab that accompanies CHEM 1001. Students will develop the mathematical problem solving skills needed for success in chemistry classes.
Enrollment Information: Enrollment limited to: students in the pre first-year Summer Program.
Last Four Terms Offered: Summer 2020, Summer 2019, Summer 2018, Summer 2017
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1007 - Academic Support for CHEM 2070 (1 Credit)
CHEM 1007 reviews material presented in CHEM 2070 lectures and also provides problem-solving strategies and practice during the discussion sections.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1008 - Academic Support for CHEM 2080 (1 Credit)
CHEM 1008 reviews material presented in CHEM 2080 lectures and also provides problem-solving strategies and practice.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1057 - Academic Support for CHEM 3570 (1 Credit)
Reviews material presented in CHEM 3570 lectures and offers practice with CHEM 3570 material. Weekly reviews and problem solving sessions focus on the most important topics covered in lecture, and office hours held throughout the week by Learning Strategies Center tutors to help improve performance in CHEM 3570.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1058 - Academic Support for CHEM 3580 (1 Credit)
Reviews material presented in CHEM 3580 lectures and offers practice with CHEM 3580 material. Weekly review sessions focus on the most important topics covered in lecture and office hours held throughout the week are designed to help improve performance in CHEM 3580.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1080 - Introduction to Critical Thinking for the Sciences (1 Credit)
This course centers on the critical reasoning skills required to solve first-year chemistry problems. Our Spring first-year chemistry class (CHEM 2080) presupposes an understanding of the basic quantitative reasoning skills required to solve chemistry problems and focus their limited lecture time instead on the teaching of chemistry knowledge. This course compensates for the fast pace of CHEM 2080.
Last Four Terms Offered: Spring 2023, Spring 2022, Spring 2019, Spring 2018
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1090 - Foundation Chemistry I (0 Credits)
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1091 - Foundation Chemistry II (0 Credits)
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1150 - The Language of Chemistry (3 Credits)
Fundamentals of chemistry will be introduced and applied to real world situations. Critical aspects of 21st century life depend on an informed voting public that can assiduously address scientific issues. The role of chemistry, the good and the bad, will be an increasingly important component of everyday life. The course seeks to prepare you to be an informed voter.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS), (SCT-IL)
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1350 - Modeling and Simulation of Real-World Scientific Problems (3 Credits)
Crosslisted with ENGRI 1510, MAE 1510, CHEME 1510
Last Four Terms Offered: Spring 2022, Spring 2020, Spring 2019, Spring 2018
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1560 - Introduction to General Chemistry (3 Credits)
CHEM 1560 is the lecture component of a one-semester introduction to fundamental topics in general chemistry, both qualitative and quantitative. Co-enrollment in CHEM 1561 (lab) is required. CHEM 1560 (lecture) and CHEM 1561 (lab) together provide a complete one-semester introduction to general chemistry and serve as preparation for CHEM 1570. CHEM 1560 is not recommended for premedical or pre-veterinary students. Students planning to take CHEM 2080 should be enrolled in CHEM 2070 rather than CHEM 1560.
Corequisites: CHEM 1561.
Forbidden Overlaps: CHEM 1560, CHEM 2070, CHEM 2090
Course Fee: Course Fee, $20. Lab fee (non-refundable) covers cost of safety goggles, lab apron, and breakage.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS), (SCT-IL)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1561 - Introduction to General Chemistry Laboratory (1 Credit)
CHEM 1561 is the laboratory component of a one-semester introduction to fundamental topics in general chemistry, both qualitative and quantitative. Co-enrollment in CHEM 1560 (lecture) is required.
CHEM 1560 (lecture) and CHEM 1561 (lab) together provide a complete one-semester introduction to general chemistry and serve as preparation for CHEM 1570. CHEM 1560 and CHEM 1561 are not recommended for premedical or pre-veterinary students. Students planning to take CHEM 2080 and CHEM 2081 should be enrolled in CHEM 2070 and CHEM 2071 rather than CHEM 1560 and CHEM 1561.
Corequisites: CHEM 1560.
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1570 - Introduction to Organic and Biological Chemistry (3 Credits)
Introduction to organic chemistry concepts with emphasis on structure, reactivity, and mechanisms of carbon compounds relevant to the life sciences.
Prerequisites: CHEM 1560 or CHEM 2070.
Forbidden Overlaps: CHEM 1570, CHEM 3530, CHEM 3570, CHEM 3590
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS), (SCT-IL)
Last Four Terms Offered: Summer 2025, Spring 2025, Summer 2024, Spring 2024
Schedule of Classes (https://classes.cornell.edu/)

CHEM 1729 - Solve It! (3 Credits)
Solve It! will teach the skill of solving cognitively challenging general chemistry questions, such as students receive in CHEM 2070. Students will explore Polya's method of problem solving while solving problems on unit conversions, combustion analysis, limiting reactants, isotopes, the Bohr model, periodic trends, 3-D Lewis structures, atomic orbitals, molecular orbitals, ideal gases, and the kinetic theory of gases. In addition, students will learn fundametal arithmetic and mathematical skills.
Distribution Requirements: (OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2070 - General Chemistry I (3 Credits)
CHEM 2070 is the lecture component of General Chemistry I. Covers fundamental chemical principles, with considerable attention given to the quantitative aspects and techniques important for further work in chemistry. Main topics include chemical transformations and equations, periodic trends of the elements, electronic structure of atoms, chemical bonding, and the collective behavior of molecules.
Corequisites: CHEM 2071.
Forbidden Overlaps: CHEM 1560, CHEM 2070, CHEM 2090
Course Fee: Course Fee, $20. Lab fee (non-refundable) covers cost of safety goggles, lab apron, and breakage.
Distribution Requirements: (CHPH-AG, OPHLS-AG, PSC-AG), (PHS-AS), (SCT-IL)
Last Four Terms Offered: Summer 2025, Spring 2025, Fall 2024, Summer 2024
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2071 - General Chemistry I Laboratory (1 Credit)
This is the laboratory component of CHEM 2070 General Chemistry I. Covers fundamental chemical principles, with considerable attention given to the quantitative aspects and techniques important for further work in chemistry. Main topics include chemical transformations and equations, periodic trends of the elements, electronic structure of atoms, chemical bonding, and the collective behavior of molecules.
Corequisites: CHEM 2070.
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2080 - General Chemistry II (3 Credits)
CHEM 2080 is the lecture component of General Chemistry II.
Covers fundamental chemical principles, including reaction kinetics, thermodynamics, and equilibrium. These principles are presented quantitatively and explored in the laboratory. Considerable attention is given to the quantitative calculations and techniques important for further work in chemistry.
Prerequisites: CHEM 2070 or CHEM 2090.
Corequisites: CHEM 2081.
Forbidden Overlaps: CHEM 2080, CHEM 2150
Course Fee: Course Fee, $20. Lab fee (non-refundable) for safety goggles, lab apron, and breakage. Only students without a prior chemistry lab course (CHEM 2070 or CHEM 2090) will be charged.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS), (SCT-IL)
Last Four Terms Offered: Summer 2025, Spring 2025, Fall 2024, Summer 2024
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2081 - General Chemistry II Laboratory (1 Credit)
CHEM 2081 is the laboratory component of General Chemistry II.
Covers fundamental chemical principles, including reaction kinetics, thermodynamics, and equilibrium. These principles are presented quantitatively and explored in the laboratory. Considerable attention is given to the quantitative calculations and techniques important for further work in chemistry.
Corequisites: CHEM 2080.
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2090 - Engineering General Chemistry (3 Credits)
CHEM 2090 is the lecture component of Engineering General Chemistry. Covers basic chemical concepts, such as reactivity and bonding of molecules, introductory quantum mechanics, and intermolecular forces in liquids and solids and gases. Attention will be focused on aspects and applications of chemistry most pertinent to engineering.
Prerequisites: high school chemistry or permission of instructor.
Corequisites: CHEM 2091.
Forbidden Overlaps: CHEM 1560, CHEM 2070, CHEM 2090
Enrollment Information: Enrollment limited to: Engineering students or written permission from the College of Engineering.
Course Fee: Course Fee, $20. Lab fee (non-refundable) covers cost of safety goggles, lab apron, and breakage.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (SCT-IL)
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2091 - Engineering General Chemistry Laboratory (1 Credit)
CHEM 2091 is the laboratory component of CHEM 2090 Engineering General Chemistry. Covers basic chemical concepts, such as reactivity and bonding of molecules, introductory quantum mechanics, and intermolecular forces in liquids and solids and gases. Attention will be focused on aspects and applications of chemistry most pertinent to engineering.
Corequisites: CHEM 2090.
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2150 - Honors General and Inorganic Chemistry (4 Credits)
Intensive systematic study of the laws and concepts of chemistry, with considerable emphasis on quantitative aspects. CHEM 2150 covers electronic structure of atoms, chemical bonding, thermodynamics, kinetics, and equilibrium. This course serves as an accelerated entry into organic chemistry in the Spring semester for students with a strong background in chemistry. Laboratory work covers qualitative and quantitative analysis, thermodynamics, kinetics transition metal chemistry, and spectroscopic techniques.
Corequisites: calculus course at level of MATH 1110, or MATH 1910 for students who have not taken high school calculus, or permission of the instructor.
Forbidden Overlaps: CHEM 2080, CHEM 2150
Course Fee: Course Fee, $20. Lab fee (non-refundable) covers cost of safety goggles, lab apron, and breakage.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS), (SCT-IL)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2510 - Introduction to Experimental Organic Chemistry (2 Credits)
Introduction to the synthesis, separation, characterization, and handling of materials, including chromatography, extraction, crystallization, infrared spectroscopy, and others. An experiment is performed the first week of lab. Students need to enroll in the course Canvas site and complete the appropriate pre-lab assignments outlined on that site before coming to the first lab.
Corequisites: at least one of the following courses: CHEM 1570, CHEM 3530, CHEM 3570, or CHEM 3590.
Distribution Requirements: (CHPH-AG, OPHLS-AG)
Last Four Terms Offered: Summer 2025, Spring 2025, Fall 2024, Summer 2024
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2770 - Methods in Chemical Education I (1-2 Credits)
CHEM 2770 is the first teaching methods companion class to CHEM 2070 and CHEM 2080. CHEM 2770 students will co-lead weekly 2-hour review sessions; meet in 2-hour group meetings to develop and refine teaching materials; attend a 1-hour discussion class on a current STEM pedagogical theory; and assess teaching progress for 1-hour (all activities on a weekly basis).
Prerequisites: CHEM 2070 and CHEM 2080.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2780 - Methods in Chemical Education II (1-2 Credits)
CHEM 2780 is the second teaching methods companion class to CHEM 2070 and CHEM 2080. CHEM 2780 students will co-lead weekly 2-hour review sessions; meet in 2-hour group meetings to develop and refine teaching materials; attend a 1-hour discussion class on a current STEM pedagogical theory; and assess teaching progress for 1-hour (all activities on a weekly basis).
Prerequisites: CHEM 2070 and CHEM 2080.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 2900 - Introductory Physical Chemistry Laboratory (2 Credits)
Survey of the methods basic to the experimental study of physical chemistry, with a focus on the areas of chemical equilibrium, kinetics, thermodynamics, and molecular spectroscopy.
Distribution Requirements: (CHPH-AG, OPHLS-AG)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3010 - Honors Experimental Chemistry I (5 Credits)
Introduction to the techniques of synthetic organic chemistry. A representative selection of the most important classes of organic reactions is explored in the first half of the semester, augmented by lectures on the reaction chemistry and the theory of separation and characterization techniques.
Prerequisites: CHEM 2510 and either CHEM 3570 or CHEM 3590.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3020 - Honors Experimental Chemistry II (5 Credits)
Chemical and instrumental methods of analysis, including fluorescence spectroscopy, electrochemistry, UV-vis absorption spectroscopy, infrared spectroscopy, and gas chromatography. Error analysis, experiment design, and data analysis using Jupyter notebooks.
Enrollment Information: Priority given to: Chemistry majors.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS, SDS-AS)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3030 - Honors Experimental Chemistry III (5 Credits)
Introduction to experimental physical chemistry, including topics in spectroscopy and kinetics. The analysis and numerical simulation of experimental data is stressed.
Prerequisites: CHEM 3020, CHEM 3890 and CHEM 3900.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS, SDS-AS)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3530 - Principles of Organic Chemistry (4 Credits)
Forbidden Overlaps: CHEM 1570, CHEM 3530, CHEM 3570, CHEM 3590
Last Four Terms Offered: Fall 2022, Fall 2021, Fall 2020, Fall 2019
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3570 - Organic Chemistry for the Life Sciences (3 Credits)
Study of the important classes of carbon compounds-including those encountered in the biological sciences. The course emphasizes their three-dimensional structures, mechanisms of their characteristic reactions, their synthesis, methods of identifying them, and their role in modern science and technology.
Prerequisites: CHEM 2080 or advanced placement, or permission of instructor.
Forbidden Overlaps: CHEM 1570, CHEM 3530, CHEM 3570, CHEM 3590
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Summer 2025, Spring 2025, Fall 2024, Summer 2024
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3580 - Organic Chemistry for the Life Sciences (3 Credits)
The course emphasizes the important classes of organic compounds, with particular emphasis on their three-dimensional structures, mechanisms of their characteristic reactions, their synthesis, methods for their identification, and their applications in modern technology and medicine.
Prerequisites: CHEM 3570 or permission of instructor.
Forbidden Overlaps: CHEM 3580, CHEM 3600
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Summer 2025, Spring 2025, Fall 2024, Summer 2024
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3590 - Honors Organic Chemistry I (3 Credits)
The course provides an intensive introduction to organic chemistry as a solid foundation for subsequent study in the fields of chemical, biological, materials and physical sciences. Students will learn a set of important tools and concepts that will enable appreciation and powerful application of modern organic chemistry.
Prerequisites: CHEM 2080 or CHEM 2150.
Forbidden Overlaps: CHEM 1570, CHEM 3530, CHEM 3570, CHEM 3590
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3600 - Honors Organic Chemistry II (3 Credits)
Rigorous and systematic study of organic chemistry with a focus on molecules that have biological applications. The course emphasizes a mechanistic understanding of organic reactions and applies this knowledge toward complex systems such as amino acids and carbohydrates.
Prerequisites: CHEM 3590 or permission of instructor.
Forbidden Overlaps: CHEM 3580, CHEM 3600
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3870 - Principles of Physical Chemistry (3 Credits)
Survey of the fundamental principles of physical chemistry, The course covers thermodynamics, chemical kinetics, enzyme kinetics, and the electronic structure of atoms and molecules. CHEM 3870 satisfies the minimum requirement for physical chemistry for the chemistry major.
Prerequisites: CHEM 2080, MATH 1110 and MATH 1120, and PHYS 2208, or permission of instructor.
Distribution Requirements: (OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3880 - Basics of Biophysical Chemistry (3 Credits)
This course builds on principles of physical chemistry as can be applied to molecular biochemistry and cell biology. Topics include thermodynamics of solutions, equilibrium binding and kinetics of biomolecular processes, oxidation-reduction reactions and electrochemical potential of membranes, and spectroscopy to examine structures and dynamics.
Prerequisites: Prerequisite or corequisite: CHEM 3870, CHEM 3890, or permission of instructor.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2022, Spring 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3890 - Honors Physical Chemistry I (4 Credits)
CHEM 3890-CHEM 3900 is a year-long sequence covering key topics in physical chemistry. CHEM 3890 introduces the use of mathematics and physics to investigate chemical systems. The fundamental principles of quantum mechanics are introduced and applied to understanding the structure and spectra of atoms and molecules. Specific topics include exact and approximate solutions to the Schrodinger equation, angular momentum, bonding and molecules, and spectroscopy. CHEM 3900 follows with an introduction to the behavior of ensembles of quantum particles (statistical mechanics), the laws of thermodynamics, and kinetic theory.
Prerequisites: CHEM 2080 and PHYS 2208, and CHEM 3890, and MATH 1920, MATH 2220 or MATH 2310, or permission of instructor.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 3900 - Honors Physical Chemistry II (4 Credits)
CHEM 3900 is a continuation of CHEM 3890 and discusses the thermodynamic behavior of macroscopic systems in the context of quantum and statistical mechanics. After an introduction to the behavior of ensembles of quantum mechanical particles, the laws of thermodynamics, concepts of equilibrium, and chemical kinetics are covered in detail.
Prerequisites: CHEM 2080 and PHYS 2208, and CHEM 3890, and MATH 1920, MATH 2220 or MATH 2310, or permission of instructor.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4040 - Entrepreneurship in Chemical Enterprise (1 Credit)
This course will introduce STEM students to the challenges of planning, financing, launching, and managing a new scientifically oriented business venture. The course focusses on case studies together with presentations by entrepreneurs in the chemical, pharmaceutical, and life sciences industries. Topics include new technology evaluation, IP assessment and management, business formation, resource allocation, personnel development, as well as manufacturing and sales issues
Last Four Terms Offered: Spring 2023, Spring 2022, Spring 2012
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4100 - Inorganic Chemistry (3 Credits)
Discussion of chemical bonding and reactivity with an emphasis on the transition metals. A ground up approach will be taken, building bonding models from atomic electronic structure to molecular orbital theory. Course will also introduce concepts germane to solid state chemistry, bioinorganic chemistry, and organometallic catalysis.
Prerequisites: CHEM 2070 and CHEM 2080 or CHEM 2150.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4210 - Introduction to Inorganic Chemistry Research (2-4 Credits)
Research in inorganic chemistry involving both laboratory and library work, planned in consultation with a faculty member.
Prerequisites: CHEM 3030 and CHEM 3890-CHEM 3900 or CHEM 3870-CHEM 3880 and CHEM 2900 with average of B- or better, or permission of instructor.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4330 - Introduction to Analytical Chemistry Research (1-4 Credits)
Research in analytical chemistry involving both laboratory and library work, planned in consultation with a faculty member.
Prerequisites: CHEM 3030 and CHEM 3900 with average of B- or better or permission of instructor.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4430 - Introduction to Chemical Biology Research (1-4 Credits)
Research in chemical biology involving both laboratory and library work, planned in consultation with a faculty member.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4500 - Principles of Chemical Biology (3 Credits)
This course provides an introduction to both the fundamental biochemistry of living systems, including the structure and synthesis of biological macromolecules, and modern approaches that combine organic chemistry with emerging techniques from the chemical and life sciences to interrogate biological systems.
Prerequisites: CHEM 3570-CHEM 3580, or CHEM 3590-CHEM 3600 or equivalent.
Distribution Requirements: (BIO-AS, PHS-AS), (CHPH-AG, OPHLS-AG)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4610 - Introduction to Organic Chemistry Research (2-4 Credits)
Research in organic chemistry involving both laboratory and library work, planned in consultation with a faculty member.
Prerequisites: CHEM 3020 and CHEM 3580 or CHEM 3600 with grade of B- or better or permission of instructor.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4770 - Introduction to Physical Chemistry Research (1-4 Credits)
Research in physical chemistry involving both laboratory and library work, planned in consultation with a faculty member.
Prerequisites: CHEM 3900 with average of B- or better or permission of instructor.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4810 - Computational Methods in Chemistry (4 Credits)
This course provides a broad overview of modern computational methods in Chemistry. Topics covered will include investigating the statistical mechanics of condensed phase chemical systems using Monte Carlo and Molecular Dynamics, quantum mechanical characterization of molecular energetics and structure using Electronic Structure Theory (Hartree Fock, Perturbation Theory, and Density Functional Theory), and time-dependent approaches to investigate chemical reaction dynamics and kinetics.Lab work will be an integral component of this course and will involve introductory scientific programming, and the use of commercially available scientific software. The midterms will be an in-class presentation and a half-semester long computational project will determine final grades in the course.
Prerequisites: one year of undergraduate physical chemistry, MATH 2310 or MATH 2220; PHYS 2208; CHEM 2080 or permission of instructor.
Distribution Requirements: (CHPH-AG, OPHLS-AG), (PHS-AS)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 4980 - Honors Seminar (0 Credits)
In the Chemistry Honors Seminar students will present their research in written and oral form. The course will also include a broader discussion of professional issues and life skills in the world of chemistry.
Prerequisites: Prerequisite or corequisite: outstanding performance in two coherent 4-credit units of research in course (ex. CHEM 4210, CHEM 4330, CHEM 4610, CHEM 4770), or equivalent amount of research in another context.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 5040 - Entrepreneurship in Chemical Enterprise (1 Credit)
Last Four Terms Offered: Spring 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 5110 - Chemical Facilities Boot Camp (1 Credit)
Discussion of and demonstration of facilities relevant to modern chemical research.
Enrollment Information: Enrollment preference given to: graduate students.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 5120 - Capstone Research Project (1-5 Credits)
Supervision of Capstone Research Project.
Prerequisites: CHEM 5110.
Enrollment Information: Enrollment preference given to: graduate students.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

CHEM 5810 - Computational Methods in Chemistry (4 Credits)
This course provides a broad overview of modern computational methods in Chemistry. Topics covered will include investigating the statistical mechanics of condensed phase chemical systems using Monte Carlo and Molecular Dynamics, quantum mechanical characterization of molecular energetics and structure using Electronic Structure Theory (Hartree Fock, Perturbation Theory, and Density Functional Theory), and time-dependent approaches to investigate chemical reaction dynamics and kinetics.
Prerequisites: one year of undergraduate physical chemistry, MATH 2310 or MATH 2220, PHYS 2208, CHEM 2080 or permission of instructor.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6050 - Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity (3 Credits)
A group theoretical analysis of bonding in main group compounds will be followed by a survey of modern coordination chemistry, including rudimentary spectroscopy and magnetism, and inorganic reaction mechanisms.
Prerequisites: CHEM 3890-CHEM 3900, CHEM 4100 or equivalent or permission of instructor.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6080 - Advanced Inorganic Chemistry I: Organometallic Chemistry (3 Credits)
Last Four Terms Offered: Spring 2024, Spring 2021, Spring 2019, Spring 2014
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6090 - Nanomaterials: Chemistry and Physics (3 Credits)
This course will provide a foundational background in the science of nanoscale materials, a research field that has been extremely active for more than twenty years. Simplified models of quantum mechanics, band theory, statistical mechanics, thermodynamics, and surface science will be presented. This theoretical background will be used to understand the structure and properties of inorganic materials, such as nanocrystals and nanowires, and organic materials, such as carbon nanotubes, graphene, and p-conjugated molecules. Previous exposure to quantum mechanics at the level of the Schrodinger equation will be assumed. The intended audience is first-year graduate students and upper-level undergraduate students in chemistry and related fields, including applied physics, physics, and materials/chemical/electrical/mechanical engineering.
Prerequisites: CHEM 3890/CHEM 3900 or equivalent.
Enrollment Information: Open to: undergraduates who have taken the prerequisite courses or equivalents.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Fall 2015
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6250 - Advanced Analytical Chemistry I (3 Credits)
Application of NMR spectroscopy and high-resolution mass spectroscopy in organic chemistry, metabolomics, chemical biology, synthesis, inorganic chemistry, and polymer chemistry. Optional labs provide hands-on experience with NMR and MS instruments in the Cornell Chemistry Department and at Boyce Thompson Institute.
Prerequisites: CHEM 3880 or CHEM 3890 or equivalent.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6290 - Electrochemistry (3 Credits)
Fundamentals and applications of electrochemistry. Topics include the fundamentals of electrode kinetics, electron transfer theory, the electrical double layer, diffusion, and other modes of mass transport. A broad range of electrochemical methods, techniques and instrumentation will also be covered. Additional subjects may be covered depending on class interest.
Prerequisites: MATH 2130.
Last Four Terms Offered: Spring 2025, Spring 2022, Spring 2021, Spring 2019
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6291 - Electrochemistry of Energy Materials (3 Credits)
Electrochemistry is involved with electrified interfaces and the interaction/interconversion of chemical and electrical energy. This course focuses on the fundamentals of interfacial phenomena including electrode kinetics, electron transfer theory, the electrical double layer, mass transport, and diffusion processes. The course will cover a broad range of electrochemical methods to advance our understanding of structure-property relationships of energy materials. The course will also include selected current topics including: (1) Advanced renewable energy conversion and storage technologies, such as CO2 reduction, H2 production, lithium batteries, and solar cells. (2) Introduction to the state-of-the-art development of analytical methods including electron microscopy and X-ray methods. (3) Electrochemistry with interdisciplinary overlap with solid-state chemistry and materials science, such as photoelectrochemistry, organic electrochemistry, and bioelectrochemistry.
Prerequisites: physical chemistry (CHEM 3870 or 3890/ 3900) or equivalent.
Last Four Terms Offered: Fall 2024
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6400 - Bioinorganic Chemistry (3 Credits)
Last Four Terms Offered: Spring 2025
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6450 - Principles of Chemical Biology (3 Credits)
This course provides an introduction to both the fundamental biochemistry of living systems, including the structure and synthesis of biological macromolecules, and modern approaches that combine organic chemistry with emerging techniques from the chemical and life sciences to interrogate biological systems.
Prerequisites: CHEM 3570-CHEM 3580 or CHEM 3590-CHEM 3600 or equivalent.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6650 - Advanced Organic Chemistry (3 Credits)
The course focuses on stereoelectronic properties of organic compounds, conformational analysis, reaction thermodynamics and kinetics, stereochemistry, reactive intermediates, and catalysis. Case studies will focus on applications of these concepts and corresponding techniques that lead to creative design of selective organic synthesis and mechanistic insights into complex organic transformations. A particular emphasis is on the development of chemical and mechanistic intuition that will facilitate the students' laboratory research efforts.
Prerequisites: CHEM 3900 and CHEM 3580, or CHEM 3600, or equivalents, or permission of instructor.
Enrollment Information: Primarily for: graduate students, seniors and juniors.
Last Four Terms Offered: Spring 2025, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6660 - Synthetic Organic Chemistry (3 Credits)
Modern techniques and strategies of organic synthesis including catalysis, radical chemistry, photochemistry, and electrochemistry, application of organic reaction mechanisms and retrosynthetic analysis to the problems encountered in rational multistep synthesis, with particular emphasis on modern development in synthesis design.
Prerequisites: CHEM 6650 or permission of instructor.
Enrollment Information: Primarily for: graduate students and upperclass undergraduates.
Last Four Terms Offered: Fall 2024, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6690 - Modern Catalytic Reactions in Organic Synthesis (3 Credits)
Catalysis is fundamental and essential to modern organic synthesis. This course will cover topics in transition metal catalysis, biocatalysis, photoredox catalysis, and electrosynthesis with a focus on reaction mechanism and synthetic applications. Topics of current interest are emphasized. Transition metal-based catalysts are invaluable in both organic and polymer synthesis. This course begins with an overview of organometallic chemistry and catalysis. Subsequent modules on catalytic synthesis of small molecules and polymers are then presented. Topics of current interest are emphasized.
Prerequisites: CHEM 3580 or CHEM 3600, and CHEM 4100, or permission of instructor.
Enrollment Information: Primarily for: graduate students or advanced undergraduates.
Last Four Terms Offered: Spring 2025, Spring 2024, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6700 - Fundamental Principles of Polymer Chemistry (3 Credits)
Emphasizes general concepts and fundamental principles of polymer chemistry.
Prerequisites: CHEM 3580 or CHEM 3600, or permission of instructor.
Enrollment Information: Primarily for: chemistry graduate students and advanced undergraduate chemistry majors.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6860 - Physical Chemistry of Proteins (3 Credits)
Physical studies of proteins, with emphasis on using single molecule methodologies and on studies of metalloproteins. Topics include: Physical/chemical concepts that include chemical structure and conformation of proteins, protein folding energy landscape, electron transfer theory, enzyme catalysis, chemical kinetics, and single-molecule kinetics. Experimental methodologies that include absorption and emission spectroscopy, fluorescence energy resonance transfer, confocal microscopy, total internal reflection fluorescence, single molecule spectroscopy, time correlated single photon counting, fluorescence correlation spectroscopy, atomic force microscopy, optical tweezers, magnetic tweezers, super-resolution imaging with optical microscopy. Protein structure and function that includes metalloprotein structure/function (bioinorganic chemistry), GFP and variants, protein labeling, motor proteins, protein-protein interactions, protein-DNA interactions, and live-cell imaging.
Prerequisites: CHEM 3880 or CHEM 3900, or equivalents.
Enrollment Information: Enrollment preference given to: graduate students.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6880 - Basics of Biophysical Chemistry (3 Credits)
This course builds on principles of physical chemistry as can be applied to molecular biochemistry and cell biology. Topics include thermodynamics of solutions, equilibrium binding and kinetics of biomolecular processes, oxidation-reduction reactions and electrochemical potential of membranes, and spectroscopy to examine structures and dynamics.
Prerequisites: Prerequisite or corequisite:CHEM 3870, CHEM 3890, or permission of instructor.
Last Four Terms Offered: Spring 2025, Spring 2024
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6890 - Honors Physical Chemistry I (4 Credits)
CHEM 6890-CHEM 6900 is a year-long sequence covering key topics in physical chemistry. CHEM 6890 introduces the use of mathematics and physics to investigate chemical systems. The fundamental principles of quantum mechanics are introduced and applied to understanding the structure and spectra of atoms and molecules. Specific topics include exact and approximate solutions to the Schrodinger equation, angular momentum, bonding and molecules, and spectroscopy.
Enrollment Information: Enrollment limited to: graduate students.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 6900 - Honors Physical Chemistry II (4 Credits)
CHEM 6900 is a continuation of CHEM 6890 and discusses the thermodynamic behavior of macroscopic systems in the context of quantum and statistical mechanics. After an introduction to the behavior of ensembles of quantum mechanical particles, the laws of thermodynamics, concepts of equilibrium, and chemical kinetics are covered in detail.
Enrollment Information: Enrollment limited to: graduate students.
Last Four Terms Offered: Spring 2025, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 7650 - Physical Organic Chemistry and Determination of Reaction Mechanisms (3 Credits)
Last Four Terms Offered: Spring 2023, Spring 2014, Fall 2009
Schedule of Classes (https://classes.cornell.edu/)

CHEM 7870 - Computational Methods of Physical Chemistry (3 Credits)
This course will introduce students to analytical and computational methods useful for graduate-level research in both experimental and theoretical physical chemistry. These methods will be used to explore interesting topics in quantum mechanics and statistical mechanics. The goal of this course is to bridge the gap between the analytical techniques taught in introductory courses and the computational (and visualization) methods required for modern research problems. Topics explored will include: scientific programming and visualization, numerical solution of the Schrodinger equation, linear and nonlinear optimization techniques, stochastic/Monte Carlo methods, and Machine Learning.
Prerequisites: one year of undergraduate physical chemistry, three semesters of calculus, and one year of college physics.
Last Four Terms Offered: Spring 2025, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 7880 - Modern Methods in Structural Biology (3 Credits)
Course will cover: 1) the physics of scattering and image formation, 2) macromolecular crystallography, 3) small-angle X-ray scattering, and 4) cryo-electron microscopy. Students will learn the theoretical principles of structural biology and gain practical experience with modern methods in data processing, structure determination, refinement, validation, and interpretation.
Prerequisites: two semesters of college-level courses in: calculus (MATH 1110 and MATH 1120, 4 AP credits and MATH 1910), and physics (PHYS 1101 and 1102, PHYS 2207 and 2208, PHYS 1112 and 2213, PHYS 1116 and 2217), or their equivalents.
Last Four Terms Offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 7910 - Advanced Spectroscopy (3 Credits)
The chief aim of this course is to provide an understanding of how the tools of modern spectroscopy can be applied to unravel the structural and dynamical properties of molecular systems, with a focus on optical techniques. The course will briefly cover the theoretical basis of light-matter interactions and factors governing the vibrational and electronic spectra of diatomic and polyatomic molecules. The main portion of the course will address current topics in spectroscopic research with a survey of different techniques and the theory behind them. By the end of the course, students will be equipped to understand and interpret the results of a wide array of steady-state and optical spectroscopic techniques applied to complex molecules.
Enrollment Information: Enrollment limited to: graduate students studying Chemistry, Physics, Applied and Engineering Physics, and Engineering (Chemical, Electrical, Materials Science, and Mechanical), and advanced undergraduate students.
Last Four Terms Offered: Fall 2024, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

CHEM 7930 - Quantum Mechanics I (3 Credits)
A modern introduction to quantum mechanics (QM). Topics will include: the quantum state vector, the probabilistic interpretation of QM, the mathematical language of QM, angular momentum, QM in the continuum, solutions to the Schrodinger equation for simple 1D applications, the coulomb potential and the hydrogen-atom, independent particles, the variational approach, and time-independent perturbation theory.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Schedule of Classes (https://classes.cornell.edu/)

CHEM 7940 - Quantum Mechanics II (3 Credits)
Last Four Terms Offered: Spring 2025, Spring 2023, Spring 2022, Spring 2019
Schedule of Classes (https://classes.cornell.edu/)

CHEM 7960 - Statistical Mechanics (3 Credits)
Introduces the fundamentals of statistical mechanics: ensembles, distributions, averages, and fluctuations, building to the treatment of systems of interacting molecules. Topics from equilibrium statistical mechanics include structure and thermodynamics of molecular liquids, critical phenomena, and computational statistical mechanics. Topics from nonequilibrium statistical mechanics include spectroscopy, chemical kinetics, transport, and the microscopic origins of irreversibility.
Last Four Terms Offered: Fall 2024, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)