CHEMISTRY (CHEM)

CHEM 5300. Independent Study. (1-3 Credits)
May be repeated for a total of 12 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205300)

CHEM 5301. Microstructural and Morphological Analyses. (3 Credits)
(Also offered as IMS 5301.) Lecture on sample preparation and analyses for optical and electron microscopy methods including scanning electron microscopy, transmission electron microscopy, energy dispersive X-ray analysis, focused ion beam methods, and electron energy loss spectroscopy.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205301)

CHEM 5302. Structural Analysis. (3 Credits)
(Also offered as IMS 5302.) Lecture on sample preparation and analyses for X-ray diffraction, X-ray fluorescence, X-ray imaging, Rietveld refinement, Thin Film X-ray Analyses, and In Situ methods.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205302)

CHEM 5303. Compositional Analyses. (3 Credits)
(Also offered as IMS 5303.) Lecture on sample preparation and analyses, for characterization of compositions of materials. Methods to be discussed include titrations, atomic absorption, inductively coupled plasma mass spectrometry, infrared, Raman, Ultraviolet visible, fluorescence, chromatography, and mass spectrometry.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205303)

CHEM 5304. Surface and Interfacial Analysis. (3 Credits)
(Also offered as IMS 5304.) Lecture on sample preparation and analyses for surfaces and interfaces, including scanning Auger microscopy, secondary ion mass spectrometry, X-ray photoelectron spectroscopy, contact angle measurements, and temperature program methods.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205304)

CHEM 5310. Seminar. (1 Credit)
Reports and discussion of topics of current interest in a variety of fields of chemistry.
May be repeated for a total of 3 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205310)

CHEM 5324. Advanced Inorganic Chemistry I. (3 Credits)
Synthetic methods in inorganic chemistry; the application of physical methods to the investigation of inorganic compounds.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205324)

CHEM 5325. Advanced Inorganic Chemistry II. (3 Credits)
In depth study of general principles of inorganic chemistry; the structure of the elements and of inorganic compounds; group theory; different approaches to understanding the chemical bond.
Enrollment Requirements: CHEM 5324.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205325)

CHEM 5326. Advanced Inorganic Chemistry III. (3 Credits)
Main group and transition metal compounds with inorganic and organic ligands; the study of the transition metals is in preparation for CHEM 5327.
Enrollment Requirements: CHEM 5325.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205326)

CHEM 5327. Advanced Inorganic Chemistry IV. (3 Credits)
Transition metal chemistry; organometallic and coordination compounds of the transition elements, including the lanthanides and actinides; selected topics in bioinorganic chemistry.
Enrollment Requirements: CHEM 5326.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205327)

CHEM 5331. Advanced Instrumental Analysis. (3 Credits)
Provides graduate students with the foundations necessary to understand and apply chemical analyses and instrumental techniques.
Enrollment Requirements: Recommended preparation: A course in advanced Analytical Chemistry.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205331)

CHEM 5336. Electroanalytical Chemistry. (3 Credits)
A study of the theoretical and practical basis for electroanalytical methods. Topics include voltammetric methods of analysis (including polarography, cyclic voltammetry, rotating disk voltammetry, pulse and square-wave methods, and stripping analysis), coulometric, and chronoamperometric methods. Recent advances using micro- and modified electrodes, thin-layer and flow cells, electrochemical sensors and detectors, and bioelectrochemistry may be included.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205336)

CHEM 5337. Optical Methods of Analysis. (3 Credits)
A discussion of fundamental principles, instrumentation and applications of some spectroscopic techniques of analytical chemistry including Raman spectroscopy, molecular fluorescence spectroscopy, atomic spectroscopy.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205337)

CHEM 5338. Separation Methods. (3 Credits)
A study of the theoretical and practical basis for modern separation methods. Topics to be discussed include the various methods dealing with gas-liquid, liquid-liquid, liquid-solid, gas-solid, ion-exchange, size exclusion, chromatography, electrophoresis, and mass spectrometry.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205338)

CHEM 5340. Electronic Interpretation of Organic Chemistry. (2 Credits)
Approaches to writing organic reaction mechanisms.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205340)

CHEM 5341. Advanced Organic Chemistry. (3 Credits)
Review of the fundamentals of bonding, stereochemistry and conformations and basic reactions from undergraduate organic chemistry. These fundamental principles will then be elaborated to include more advanced concepts of reactions and reactivity.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205341)

CHEM 5343. Organic Reactions. (3 Credits)
Nomenclature. Classes of compounds. A focus upon those reactions in which C-C bonds are formed. Emphasis on the fundamentals of each reaction, their utility and applications. A background of functional group exchanges; reaction control by steric, electronic, and topological considerations.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205343)

CHEM 5344. Concepts in Organic Chemistry. (3 Credits)
Structure and mechanism. Such topics as chemical bonding, stereochemistry, conformation, molecular orbital theory and applications, acids and bases, and study of organic reaction mechanisms, including kinetics, substitutions, rearrangements and photochemical reactions.
Enrollment Requirements: CHEM 5343.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205344)

CHEM 5345. Determination of Organic Structures. (3 Credits)
Structural problem solving using fundamental data including spectroscopic and wet chemical techniques.
Enrollment Requirements: CHEM 5343.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205345)

CHEM 5347. Organic Synthesis. (3 Credits)
An investigation of efficient strategies for the synthesis of natural and unnatural organic molecules. Topics include: retrosynthetic analysis, synthetic strategies, common carbon-carbon bond formation reactions, multiple bond disconnection strategies (applications of pericyclic reactions), organometallic coupling reactions, radical and carbene reactions in organic synthesis, strategies to construct carbocyclic and heterocyclic ring systems.
Enrollment Requirements: CHEM 5343 and CHEM 5344.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205347)

CHEM 5350. Advanced Physical Chemistry I. (3 Credits)
Thermodynamics, quantum mechanics and reaction dynamics, including enthalpy, entropy, free energy, equilibrium, quantum behavior of electrons and molecules, atomic and molecular spectroscopy, and theories of reaction rates.
Enrollment Requirements: Not open to students who have passed CHEM 5351, 5352, 5353, or 5356.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205350)

CHEM 5351. Quantum Chemistry I. (3 Credits)
Concepts of the quantum theory starting with an historical introduction and proceeding to the formulation of the Schrödinger equation and its exact solutions. Other topics include group theory, angular momentum, and approximate methods with applications to atomic and molecular structure and spectroscopy.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205351)

CHEM 5353. Chemical Kinetics. (3 Credits)
Empirical and theoretical treatment of reaction rates. Experimental methods and treatment of data. Simple kinetic forms. Deduction of reaction mechanisms. Reaction energetics. Theories of elementary reaction rates. Diffusion. Homogeneous and heterogeneous catalysis. Extrakinetic probes of mechanism.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205353)

CHEM 5354. Molecular Modeling. (3 Credits)
Current topics in molecular simulations and modeling with hands-on computational experiments: molecular mechanics and its implementation via molecular dynamics, modeling of ligand-protein interactions, free energy calculations, molecular orbital theory, ab initio and density functional theory methods, quantum mechanics/molecular mechanics, and computational chemistry software.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205354)

CHEM 5357. Surface Science. (3 Credits)
A study of the fundamentals of surfaces, crystals, adsorbates, and surface analysis techniques. Application of general, physical, and analytical chemistry concepts in surface science.
Enrollment Requirements: Not open for credit to students who have passed CHEM 5393 when offered as "Surface Science."
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205357)

CHEM 5360. Biological Chemistry I. (3 Credits)
Recent advances in understanding the mechanisms of chemical processes in biological systems. Chemical perspectives or problems of biological significance at the interfaces of the various divisions of chemistry.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205360)

CHEM 5361. Biological Chemistry II. (1-3 Credits)
Selected topics in Biological Chemistry. Building on the concepts developed in CHEM 5360.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205361)

CHEM 5370. Environmental Chemistry I. (3 Credits)
Sources, transport, effects, fate, analytical chemistry, monitoring and management of chemical species; chemical principles, equilibria and reactions. Water and atmospheric pollution; acid rain, global warming, ozone.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205370)

CHEM 5371. Environmental Chemistry II. (3 Credits)
Inorganic metals and organic chemicals in the environment; energy sources; fossil fuels, nuclear power, fuel cells, and alternatives.
Enrollment Requirements: CHEM 5370 or 4370.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205371)

CHEM 5380. Polymer Synthesis. (3 Credits)
(Also offered as POLY 5380.) Chemistry of the formation of high polymers, including kinetics, mechanisms, and stereochemistry of step growth and addition polymerization. Recent advances in polymer synthesis.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205380)

CHEM 5381. Polymer Physical Chemistry. (3 Credits)
(Also offered as POLY 5381.) A molecular description of the fundamental physico-chemical aspects of polymer solutions and solids. Considers thermodynamics, chain statistics, dynamics, and structure of polymer molecules.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205381)

CHEM 5382. Polymer Characterization I. (3 Credits)
(Also offered as POLY 5382.) Experimental techniques for characterizing polymers on a molecular level, with emphasis on the provision of a working knowledge of instrumental analysis. Experiments include dilute solution viscosity, vapor pressure osmometry, gel permeation chromatography, chemical and spectroscopic analysis.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205382)

CHEM 5384. Polymer Characterization II. (3 Credits)
(Also offered as POLY 5384.) Experimental techniques for characterizing polymers on a macroscopic scale, with emphasis on provision of a working knowledge of instrumental analysis. Experiments include calorimetry, mechanical analysis, surface characterization, and structure determination.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205384)

CHEM 5388. Infrared Spectroscopy of Polymers. (3 Credits)
The nature of the interaction of IR radiation with molecules, modern spectrometer design, non-conventional sampling techniques, and applications to polymer-related problems.
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205388)

CHEM 5393. Special Topics in Physical Chemistry. (1-3 Credits)
May be repeated for a total of 12 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205393)

CHEM 5394. Special Topics in Polymer Chemistry. (1-3 Credits)
May be repeated for a total of 12 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205394)

CHEM 5395. Special Topics in Analytical Chemistry. (1-3 Credits)
May be repeated for a total of 12 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205395)

CHEM 5396. Special Topics in Inorganic Chemistry. (1-3 Credits)
May be repeated for a total of 12 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205396)

CHEM 5397. Special Topics in Organic Chemistry. (1-3 Credits)
Enrollment Requirements: CHEM 5343.
May be repeated for a total of 12 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205397)

CHEM 5398. Variable Topics in Chemistry. (1-3 Credits)
Themes applicable to students in all divisions of chemistry.
Enrollment Requirements: Open to graduate students in Chemistry and related areas.
May be repeated for a total of 12 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205398)

CHEM 5695. Special Topics in Biological Chemistry. (1-3 Credits)
Advanced concepts and themes centered on topics in biological chemistry.
May be repeated for a total of 12 credits
View Classes (https://catalog.uconn.edu/course-search/?details&code=CHEM%205695)