CHEMISTRY (CHE)

CHE 500 Selected Topics (1-6 Credits)
Arts & Sciences
Exploration of a topic (to be determined) not covered by the standard curriculum but of interest to faculty and students in a particular semester. *
Repeatable

CHE 533 The Science and Artisanship of Glass (1 Credit)
Arts & Sciences
Primarily for students in the science field. Covers history of scientific glass, different composition, safety and uses. Students will learn how to form glass in a flame. Additional work required of graduate students.

CHE 546 Molecular Spectroscopy and Structure (1-9 Credits)
Arts & Sciences
For the nonspecialist. Three topics each semester, chosen from the list below. Students may register for one, two, or three modules.
546M Atomic Spectroscopy and Angular Momentum 1; 546M Laser Chemistry and Spectroscopy 1; 546M Symmetry and Group Theory 1; 546M Electronic Spectroscopy 1; 546M Nuclear Magnetic Resonance Spectroscopy 1; 546M Vibrational Spectroscopy 1; 546M Laser Applications of Molecular Spectroscopy 1
Repeatable 6 times for 12 credits maximum
Prereq: CHE 356

CHE 575 Organic Spectroscopy (3 Credits)
Arts & Sciences
Use of mass spectrometry and infrared, ultraviolet-visible, and nuclear magnetic resonance spectroscopy.
Prereq: CHE 325
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/); Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 580 International Course (1-12 Credits)
Arts & Sciences
Offered through SUAbroad by educational institution outside the United States. Student registers for the course at the foreign institution and is graded according to that institution's practice. SUAbroad works with the S.U. academic department to assign the appropriate course level, title, and grade for the student's transcript.
Repeatable

CHE 600 Selected Topics (1-6 Credits)
Arts & Sciences
Exploration of a topic (to be determined) not covered by the standard curriculum but of interest to faculty and students in a particular semester.
Repeatable

CHE 611 Inorganic Chemistry (3 Credits)
Arts & Sciences
Double-numbered with CHE 411
Descriptive and structural inorganic chemistry and underlying principles.
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/); Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 612 Metals in Medicine (3 Credits)
Arts & Sciences
Double-numbered with CHE 412
Bonding, stereochemistry, and properties of metallo-drugs and diagnostic agents. Topics include platinum compounds for treating cancer, gadolinium and technetium in biomedical imaging, and porphyrins in photo-dynamic therapy. Additional work required of graduate students.
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/)

CHE 614 Introduction to Medicinal Chemistry (3 Credits)
Arts & Sciences
Double-numbered with CHE 414
The fundamental principles of medicinal chemistry focusing on design and synthesis of pharmaceuticals. Structural elucidation, and physical-chemical properties of pharmaceutical drug candidates will be presented. Additional work required of graduate students.
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/); Communication Skills (https://coursecatalog.syracuse.edu/shared-competencies/communication-skills/); Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 615 Main Group Chemistry (3 Credits)
Arts & Sciences
The s- and p-block elements and their compounds, chemical properties, reactivity, structure, function, and applications. Organometallic, coordination chemistry and solid state aspects of main group inorganic chemistry employing physical methods to investigate observed trends.

CHE 616 Solid State Chemistry (3 Credits)
Arts & Sciences
The description and understanding of extended chemical structures, phase diagrams, and the interplay of chemical-bonding-structure. Symmetry and other factors governing the structures and physical properties of solid state materials.

CHE 622 Inorganic Laboratory Technique (1 Credit)
Arts & Sciences
Double-numbered with CHE 422
Basic experimental techniques used in inorganic chemistry.
Advisory recommendation Prereq: CHE 611
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/); Communication Skills (https://coursecatalog.syracuse.edu/shared-competencies/communication-skills/); Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 625 Crystallography (3 Credits)
Arts & Sciences
Double-numbered with CHE 425
Modern methods of structure determination using x-ray crystallography. Symmetry and space groups will be developed, the mathematical foundation of practical crystallography. Model structures will be determined. Additional work required of graduate students.

CHE 626 Organometallic Chemistry (3 Credits)
Arts & Sciences
Topics in current organometallic and organotransition metal chemistry emphasizing structure, bonding, properties, reactions, and reaction mechanisms of organometallic species including stoichiometric and catalytic reagents in asymmetric and related pathways.

CHE 627 Organic Chemistry of Biological Molecules (3 Credits)
Arts & Sciences
Double-numbered with CHE 427
Structure, reactivity, synthesis and biosynthesis of compounds constituting the building blocks of biological macromolecules. The role of biological molecules as templates for stereoselective organic synthesis to introduce advanced topics in stereochemistry, spectroscopy and mechanistic analysis of complex organic reactions.
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/); Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 635 Physical Cell Biology (3 Credits)
Arts & Sciences
Cross-listed with PHY 635, BIO 635, CEN 635, BEN 635
This interdisciplinary class for science and engineering students provides an introduction to the quantitative description of biological systems and processes. The focus is on the biological and physical aspects of structure and function of cells and their subsystems.

CHE 636 Advanced Physical Chemistry (3 Credits)
Arts & Sciences
Double-numbered with CHE 436
Applications of thermodynamics and quantum mechanics to chemical bonding, molecular properties, chemical kinetics, structure of matter, spectroscopy.

CHE 638 Open Problems in Soft Interfaces (3 Credits)
Arts & Sciences
Cross-listed with BIO 638, PHY 638, CEN 638, BEN 638
In this seminar course on soft and biological materials and interfaces, teams from science and engineering will identify, discuss and assess current articles from the literature. Writing skills related to publishing peer-reviewed research are introduced.

CHE 645 Quantum Mechanics in Chemistry (3 Credits)
Arts & Sciences
The fundamentals of quantum mechanics with application to simple systems, complex atoms, and molecules.

CHE 656 Chemical Thermodynamics (3 Credits)
Arts & Sciences
Phenomenological approach. Chemical equilibria and solution behavior. Principles of molecular thermodynamics introduced.

CHE 666 Statistical Mechanics (3 Credits)
Arts & Sciences
Quantum-statistical treatment in terms of canonical and grand canonical ensembles of systems of noninteracting and interacting particles. Chemical applications of statistical thermodynamics, elementary theory of transportation processes, fluctuations, and irreversible processes.

CHE 670 Experience Credit (1-6 Credits)
Arts & Sciences
Participation in a discipline or subject related experience. Student must be evaluated by written or oral reports or an examination. Permission in advance with the consent of the department chairperson, instructor, and dean. Limited to those in good academic standing.
Repeatable

CHE 674 Structural and Physical Biochemistry (3 Credits)
Arts & Sciences
Double-numbered with CHE 474
Thermodynamics, kinetics, and bonding associated with biological molecules. The course also utilizes computerbased molecular modeling tools for analyzing the structures of drugs, proteins, and nucleic acids. Additional work required of graduate students.
Shared Competencies: Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 675 Advanced Organic Chemistry (3 Credits)
Arts & Sciences
Structure and stereochemistry, chirality, conformational analysis. Molecular orbital theories and applications to organic chemistry. Aromaticity. Introduction to organic mechanisms. Methods of deciphering organic mechanisms.

CHE 676 Introduction to Organic Synthesis: Methodology (3 Credits)
Arts & Sciences
Functional group transformations and carbon-carbon bond-forming reactions. Basic design strategies and advanced synthetic techniques including protection and functional group equivalency.

CHE 677 Proteins and Nucleic Acids Lab (3 Credits)
Arts & Sciences
Cross-listed with BCM 677
Double-numbered with CHE 477, BCM 477
Experimental methods for biologically synthesizing and chemically purifying macromolecules in order to analyze their structure and function, including: polymerase chain reaction; site-directed mutagenesis; Protein expression and purification; nucleic acid and protein electrophoresis. Additional work required of graduate students.
Shared Competencies: Critical and Creative Thinking (https://coursecatalog.syracuse.edu/shared-competencies/critical-and-creative-thinking/); Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 678 Perspectives in Biochemistry (3 Credits)
Arts & Sciences
Cross-listed with BCM 678
Survey of Biochemistry with emphasis on the unifying concepts of Chemistry and Biology, requiring a graduate-level background in science.

CHE 685 Organic Mechanisms (3 Credits)
Arts & Sciences
Ionic mechanisms: displacements, addition eliminations, arrangements. Catalysis. Free radical mechanisms. Molecular mechanisms, including applications of orbital symmetry and frontier molecular orbital theory to organic reactions.

CHE 686 Advanced Organic Synthesis: Design (3 Credits)
Arts & Sciences
The design, planning, and execution of multi-step organic syntheses. Asymmetric, enzymatic, and solid phase synthetic methods. Retrosynthetic analysis and combinatorial techniques.

CHE 690 Independent Study (1-6 Credits)
Arts & Sciences
In-depth exploration of a problem or problems. Individual independent study upon a plan submitted by the student. Admission by consent of supervising instructor or instructors and the department.
Repeatable

CHE 799 Seminar in General Chemistry (1 Credit)
Arts & Sciences
Aims to raise student awareness of current cutting-edge topics in the chemical sciences and expose students to active researchers in the chemical community by attending research seminars in the department. Registered students are required to attend the regularly-scheduled weekly lectures.
Repeatable 4 times for 4 credits maximum

CHE 800 Selected Topics (1-6 Credits)
Arts & Sciences
Exploration of a topic (to be determined) not covered by the standard curriculum but of interest to faculty and students in a particular semester. *
Repeatable

CHE 970 Experience Credit (1-6 Credits)
Arts & Sciences
Participation in a discipline or subject related experience. Student must be evaluated by written or oral reports or an examination. Permission in advance with the consent of the department chairperson, instructor, and dean. Limited to those in good academic standing.
Repeatable

CHE 990 Independent Study (1-6 Credits)
Arts & Sciences
Exploration of a problem, or problems, in depth. Individual independent study upon a plan submitted by the student. Admission by consent of supervising instructor(s) and the department.
Repeatable

CHE 997 Masters Thesis (1-15 Credits)
Arts & Sciences
Repeatable

CHE 999 Doctoral Dissertation (1-15 Credits)
Arts & Sciences
Repeatable