CHEMISTRY (CHE)

CHE 103 Chemistry in the Modern World (4 Credits)
Arts & Sciences
Basic concepts and principles of chemistry. Applications of chemistry to problems in the modern world. Will not satisfy prerequisite requirements for advanced courses in chemistry. (First in a sequence, to be followed by CHE 113.)

CHE 106 General Chemistry Lecture I (3 Credits)
Arts & Sciences
Fundamental principles and laws underlying chemical action, states of matter, atomic and molecular structure, chemical bonding, stoichiometry, properties of solutions, chemical equilibria, and introductory thermochemistry. Credit is given for CHE 106 or 109.
Coreq: CHE 107
Shared Competencies: Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 107 General Chemistry Laboratory I (1 Credit)
Arts & Sciences
Experimental study of basic principles and techniques of chemistry. States of matter, determination of formulas and molecular weights, simple volumetric and gravimetric analysis, heats of reaction. Equilibrium, rates of reactions, and qualitative analysis. Credit is given for CHE 107 or 129.
Coreq: CHE 106 or 109
Shared Competencies: Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 109 General Chemistry Lecture I (Honors and Majors) (3 Credits)
Arts & Sciences
General chemistry for students in the Honors Program, chemistry majors, and others with strong science interests. Quantitative, physical, and inorganic chemistry; applications in current research. Credit is given for CHE 106 or 109.

CHE 113 Forensic Science (4 Credits)
Arts & Sciences
Introduction to forensic science with focus upon the application of scientific methods and techniques to criminal justice and law. Methods specifically relevant to crime detection and analysis will be presented. Laboratory included.
Shared Competencies: Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 116 General Chemistry Lecture II (3 Credits)
Arts & Sciences
Builds upon the fundamental chemical principles learned in CHE 106 and introduces chemical kinetics and thermodynamics, intermolecular forces, advanced chemical equilibria, oxidation/reduction, and modern materials. Credit is given for CHE 116 or CHE 119, but not both.
Coreq: CHE 117; Prereq: CHE 106 or CHE 109 or AP Chem exam score min 5
Shared Competencies: Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 117 General Chemistry Laboratory II (1 Credit)
Arts & Sciences
Noncovalent chemistry, understanding symmetry and chirality, empirical and rational aspects of thermodynamics of dissolving salts equilibrium of buffers and solubility and redox potentials, separation and identification of metal cations. Credit given for CHE 117 or 139 but not both.
Prereq: CHE 107 or 129 or AP Chem exam score min 5; Coreq: CHE 116 or 119 or AP Chem exam score min 5
Shared Competencies: Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 119 General Chemistry Lecture II (Honors and Majors) (3 Credits)
Arts & Sciences
For students in the Honors Program, chemistry majors and others with strong science interests. Builds upon the fundamental chemical principles learned in CHE 109. Credit is given for CHE 116 or 119, but not both.
Prereq: CHE 106 or 109 or AP Chem exam score min 5

CHE 129 General Chemistry Laboratory I (Honors and Majors) (1 Credit)
Arts & Sciences
For Honors, Chemistry majors and others with strong science interests. Introduction to chemical laboratory techniques. Application of modern chemical apparatus and experiments relevant to environmental chemistry. Credit is given for CHE 107 or CHE 129, but not both.
Coreq: CHE 106 or 109 or AP Chem exam score min 5

CHE 139 General Chemistry Laboratory II (Honors and Majors) (1 Credit)
Arts & Sciences
Introduction to basic and advanced chemical laboratory techniques. Preparation for individual research. Idea development and proposal design. Data analysis and oral presentation skills. Credit is given for CHE 117 or CHE 139, but not both.
Prereq: CHE 107 or 129 or AP Chem exam score min 5; Coreq: CHE 116 or 119 or AP Chem exam score min 5

CHE 180 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 SU academic department to assign the appropriate course level, title, and grade for the student's transcript.
Repeatable

CHE 190 Independent Study (1-6 Credits)
Arts & Sciences
Repeatable

CHE 200 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 270 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 275 Organic Chemistry I (3 Credits)
Arts & Sciences
Chemistry of carbon compounds, their nomenclature, structure, stereochemistry, and properties. Introduction to organic reactions and mechanisms.
Prereq: CHE 116 or 119 or AP Chem exam score min 5
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 276 Organic Chemistry I Laboratory (2 Credits)
Arts & Sciences
Laboratory to accompany CHE 275. Experiments illustrate modern laboratory techniques in organic chemistry, with an emphasis on basic separations, purifications, and analysis of experimental data. Introduction to organic synthesis.
Prereq: CHE 117 or 139 or AP Chem exam score min 5; Coreq: CHE 275
Shared Competencies: Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 280 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 290 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 300 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 325 Organic Chemistry II (3 Credits)
Arts & Sciences
Continuation of CHE 275. Emphasis on reaction and mechanism in organic chemistry, multi-step synthesis, and structural analysis.
Prereq: CHE 275

CHE 326 Organic Chemistry II Laboratory (2 Credits)
Arts & Sciences
Laboratory to accompany CHE 325. Further development of organic laboratory skills and techniques. Experiments illustrate principles of organic reactions and structure determination.
Prereq: CHE 276; Coreq: CHE 325

CHE 335 Chemical and Biochemical Analysis with Laboratory (4 Credits)
Arts & Sciences
Lecture and laboratory on the theory of quantitative analysis and instrumental techniques and their application to the investigation of chemical and biochemical problems.
Prereq: (CHE 116 or 119 or AP Chem exam score min 5) and (CHE 117 or 139 or AP Chem exam score min 5)

CHE 346 Physical Chemistry I (3 Credits)
Arts & Sciences
Properties of gases, liquids, and solids. Elementary thermodynamics and chemical applications. Chemical and phase equilibrium. Laws of solutions.
Prereq: (CHE 116 or CHE 119 or AP Chem exam score min 5) and (MAT 286 or MAT 296); Coreq: PHY 212

CHE 347 Physical-Analytical Chem Lab (2 Credits)
Arts & Sciences
Foundation of experimental techniques in physical and analytical chemistry. Introduction to instrument design, simple electronics, and error analysis. Construction of a pH meter, computer simulation of Maxwell distribution, and additional experiments focusing on basic concepts.
Prereq: CHE 275 and 276; Coreq: CHE 346

CHE 356 Physical Chemistry II (3 Credits)
Arts & Sciences
Electrochemistry. Introduction to quantum mechanics, molecular structure spectra. Basic statistical mechanics. Chemical kinetics and structure of condensed phases.
Prereq: CHE 346

CHE 357 Physical Chemistry Laboratory (2 Credits)
Arts & Sciences
Reinforcement of basic principles taught in CHE 347 by completion of well-selected, modern physical chemistry experiments.
Prereq: CHE 347; Coreq: CHE 356

CHE 380 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 400 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 411 Inorganic Chemistry (3 Credits)
Arts & Sciences
Double-numbered with CHE 611
Descriptive and structural inorganic chemistry and underlying principles.
Prereq: CHE 116 or 119 or AP Chem exam score min 5

CHE 412 Metals in Medicine (3 Credits)
Arts & Sciences
Double-numbered with CHE 612
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.
Prereq: CHE 474

CHE 414 Introduction to Medicinal Chemistry (3 Credits)
Arts & Sciences
Double-numbered with CHE 614
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.
Prereq: CHE 325

CHE 422 Inorganic Laboratory Technique (1 Credit)
Arts & Sciences
Double-numbered with CHE 622
Basic experimental techniques used in inorganic chemistry.
Prereq: CHE 411
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 425 Crystallography (3 Credits)
Arts & Sciences
Double-numbered with CHE 625
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 427 Organic Chemistry of Biological Molecules (3 Credits)
Arts & Sciences
Double-numbered with CHE 627
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.
Prereq: CHE 325

CHE 436 Advanced Physical Chemistry (3 Credits)
Arts & Sciences
Double-numbered with CHE 636
Applications of thermodynamics and quantum mechanics to chemical bonding, molecular properties, chemical kinetics, structure of matter, spectroscopy.
Prereq: CHE 356

CHE 444 Forensic Chemical Analysis (4 Credits)
Arts & Sciences
Cross-listed with FSC 444
Lecture content, delivered online, and laboratory on analytical methods of forensic chemistry. Underlying theory and direct experience in various chemical tests and spectroscopic methods.
Prereq: (CHE 116 or 119 or AP Chem exam score min 5) and (CHE 117 or 139 or AP Chem exam score min 5)
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 450 Introduction to Chemical Research (1-4 Credits)
Arts & Sciences
Research problem carried out under the supervision of a faculty member.
Repeatable 7 times for 16 credits maximum

CHE 470 Experience Credit (1-6 Credits)
Arts & Sciences
Participation in a discipline- or subject-related experience. Students must be evaluated by written or oral reports or an examination. Limited to those in good academic standing.
Repeatable

CHE 474 Structural and Physical Biochemistry (3 Credits)
Arts & Sciences
Double-numbered with CHE 674
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.
Prereq: CHE 325
Shared Competencies: Scientific Inquiry and Research Skills (https://coursecatalog.syracuse.edu/shared-competencies/scientific-inquiry-and-research-skills/)

CHE 477 Proteins and Nucleic Acids Lab (3 Credits)
Arts & Sciences
Cross-listed with BCM 477
Double-numbered with CHE 677, BCM 677
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.
Prereq: CHE 474 or BIO 326 or BIO 575

CHE 480 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 490 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 499 Honors Capstone Project (1-3 Credits)
Arts & Sciences
Completion of an Honors Capstone Project under the supervision of a faculty member.
Repeatable 3 times for 3 credits maximum

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.
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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

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