CHM—CHEMISTRY AND CHEMICAL BIOLOGY

COLLEGE OF ARTS AND SCIENCES
For descriptions of graduate-level courses, please visit www.registrar.neu.edu/cdr.html.

CHM U100 Chemistry/Chemical Biology at Northeastern 1 SH
Intended for freshmen in the College of Arts and Sciences. Introduces students to liberal arts; familiarizes them with their major; develops the academic skills necessary to succeed (analytical ability and critical thinking); provides grounding in the culture and values of the University community; and helps to develop interpersonal skills—in short, familiarizes students with all skills needed to become a successful university student.

CHM U101 General Chemistry for Health Sciences 4 SH
Provides a one-semester introduction to general chemistry for the health sciences. Covers the fundamentals of elements and atoms; ionic and molecular structure; chemical reactions and their stoichiometry, energetics, rates, and equilibriums; and the properties of matter as gases, liquids, solids, and solutions. Other topics include acids and bases, and nuclear chemistry. Applications to the health sciences are included throughout. Coreq. CHM U102 and CHM U103.

CHM U102 Lab for CHM U101 1 SH
Accompanies CHM U101. Covers a range of topics from the course, such as qualitative and quantitative analysis and the characteristics of chemical and physical processes. Includes measurements of heat transfer, rate and equilibrium constants, and the effects of temperature and catalysts. Emphasis is on aqueous acid-base reactions and the properties and uses of buffer systems. Coreq. CHM U101 and CHM U103.

CHM U103 Recitation for CHM U101 0 SH
Accompanies CHM U101. Covers various topics from the course. Coreq. CHM U101 and CHM U102.

CHM U104 Organic Chemistry for Health Sciences 4 SH
Provides a one-semester introduction to organic chemistry for the health sciences. Covers the fundamentals of the structure, nomenclature, properties, and reactions of the compounds of carbon. Also introduces biological chemistry including amino acids, proteins, carbohydrates, lipids, nucleic acids, hormones, neurotransmitters, and drugs. Applications to the health sciences are included throughout. Coreq. CHM U105 and CHM U106. Prereq. CHM U101.

CHM U105 Lab for CHM U104 1 SH
Accompanies CHM U104. Covers a range of topics from the course, such as the properties and elementary reactions of hydrocarbons, alcohols, ethers, carbonyl compounds, carbohydrates, and amines. Coreq. CHM U104 and CHM U106.

CHM U106 Recitation for CHM U104 0 SH
Accompanies CHM U104. Covers various topics from the course. Coreq. CHM U104 and CHM U105.

CHM U107 Introduction to Forensic Chemistry 4 SH
Designed to provide students with insights into forensic science from a fundamental, chemical perspective. Explores the challenges and methodologies of forensic chemistry and addresses some misrepresentations of forensics by television dramas. Topics covered include drug analysis, arson investigation, questioned document analysis, serology, DNA evidence, fiber analyses, and weapon impressions.

CHM U151 General Chemistry for Engineers 4 SH
Corresponds to one semester of study in important areas of modern chemistry, such as details of the gaseous, liquid, and solid states of matter; intra- and intermolecular forces; and phase diagrams. Presents the energetics and spontaneity of chemical reactions in the context of chemical thermodynamics, while their extent and speed is discussed through topics in chemical equilibria and kinetics. Aspects of electrochemical energy storage and work are considered in relation to batteries, fuel, and electrolytic cells. Coreq. CHM U152 and CHM U153.

CHM U152 Lab for CHM U151 1 SH
Accompanies CHM U151. Complements and reinforces the material in CHM U151 with emphasis on examples of interest in the context of modern materials, energy storage, and conversion. Coreq. CHM U151 and CHM U153.

CHM U153 Recitation for CHM U151 0 SH
Accompanies CHM U151. Offers a weekly sixty-five-minute drill/discussion session conducted by chemistry faculty or graduate teaching assistants. Discusses the homework assignments of CHM U151 in detail with emphasis on student participation. Coreq. CHM U151 and CHM U152.

CHM U211 General Chemistry 1 4 SH
Introduces the principles of chemistry, focusing on the states and structure of matter and chemical stoichiometry. Presents basic concepts and definitions, moles, gas laws, atomic structure, periodic properties and chemical bonding, all within a contextual framework. Coreq. CHM U212 and CHM U213.

CHM U212 Lab for CHM U211 1 SH
Accompanies CHM U211. Covers a range of topics from the course including qualitative and quantitative analysis and the characteristics of chemical and physical processes. Coreq. CHM U211 and CHM U213.

CHM U213 Recitation for CHM U211 0 SH
Accompanies CHM U211. Covers various topics from the course. Coreq. CHM U211 and CHM U212.
CHM U214 General Chemistry 2 4 SH
Continues CHM U211. Introduces the principles of chemical equilibrium, the rates and mechanisms of chemical reactions, and energy considerations in chemical transformations. Covers solutions, chemical kinetics, chemical equilibria, chemical thermodynamics, electrochemistry, and chemistry of the representative elements. Such contextual themes as energy resources, smog formation, and acid rain illustrate the principles discussed. Coreq. CHM U215 and CHM U216. Prereq. CHM U211.

CHM U215 Lab for CHM U214 1 SH
Accompanies CHM U214. Covers a range of topics from the course, such as measurements of heat transfer, rate and equilibrium constants, and the effects of temperature and catalysts. Particular attention is paid to aqueous acid-base reactions and to the properties and uses of buffer systems. Quantitative analysis of chemical and physical systems is emphasized throughout. Coreq. CHM U214 and CHM U216.

CHM U216 Recitation for CHM U214 0 SH

CHM U217 General Chemistry 1 for Chemical Science Majors 4 SH
Offers the first of a two-semester sequence (with CHM U220) of guided inquiries into the principles of chemistry, such as the origins and properties of the elements, nuclear chemistry, atomic structure, chemical reactions in the gas phase and in solutions, stoichiometric calculations, chemical bonding, intermolecular forces, and the properties of gases and solids. Coreq. CHM U218 and CHM U219.

CHM U218 Lab for CHM U217 2 SH

CHM U219 Recitation for CHM U217 0 SH
Accompanies CHM U217. Provides students with opportunities to work interactively with instructors and other students to learn and apply the scientific method. Coreq. CHM U217 and CHM U218.

CHM U220 General Chemistry 2 for Chemical Science Majors 4 SH
Continues CHM U217. Offers the second of a two-semester sequence (following CHM U217) of guided inquiries into the principles of chemistry including the structure of solids, thermochemistry, thermodynamics, chemical kinetics, chemical equilibrium, acids and bases, and electrochemistry and materials chemistry. Coreq. CHM U221 and CHM U222; may substitute CHM U215 for CHM U221. Prereq. CHM U217.

CHM U221 Lab for CHM U220 2 SH
Accompanies CHM U220. Explores the structure of solids, thermochemistry, thermodynamics, chemical kinetics, chemical equilibrium, acids and bases, and electrochemistry and materials chemistry. The results of experiments form the basis for problem-solving sessions in CHM U220. Coreq. CHM U220 and CHM U222.

CHM U222 Recitation for CHM U220 0 SH
Accompanies CHM U220. Provides students with opportunities to work interactively with instructors and other students to learn and apply the understandings acquired in lab and lecture. Coreq. CHM U220 and CHM U221.

CHM U311 Organic Chemistry 1 4 SH

CHM U312 Lab for CHM U311 1 SH
Accompanies CHM U311. Introduces basic laboratory techniques, such as distillation, crystallization, extraction, chromatography, characterization by physical methods, and measurement of optical rotation. These techniques serve as the foundation for the synthesis, purification, and characterization of products from microscale syntheses integrated with CHM U311. Coreq. CHM U311.

CHM U313 Organic Chemistry 2 4 SH
Continues CHM U311. Focuses on additional functional group chemistry including alcohols, ethers, carbonyl compounds, and amines, and also examines chemistry relevant to molecules of nature. Introduces spectroscopic methods for structural identification. Coreq. CHM U314. Prereq. CHM U311.

CHM U314 Lab for CHM U313 1 SH
Accompanies CHM U313. Basic laboratory techniques from CHM U312 are applied to chemical reactions of alcohols, ethers, carbonyl compounds, carbohydrates, and amines. Introduces basic laboratory techniques including infrared (IR) spectroscopy and nuclear magnetic resonance (NMR) spectroscopy as analytical methods for characterization of organic molecules. Coreq. CHM U313.

CHM U315 Organic Chemistry 1 for Chemistry Majors 4 SH
Reviews the basics of bonding and thermodynamics of organic compounds as well as conformational and stereochemical considerations. Presents the structure, nomenclature, and reactivity of hydrocarbons and their functional derivatives. Highlights key reaction mechanisms, providing an introduction to the methodology of organic synthesis. Coreq. CHM U316. Prereq. CHM U214 or CHM U220.
CHM U316 Lab for CHM U315 2 SH
Accompanies CHM U315. Introduces basic laboratory techniques, such as distillation, crystallization, extraction, chromatography, characterization by physical methods, and measurement of optical rotation. These techniques serve as the foundation for the synthesis, purification, and characterization of products from microscale syntheses integrated with CHM U315. Coreq. CHM U315.

CHM U317 Organic Chemistry 2 for Chemistry Majors 4 SH

CHM U318 Lab for CHM U317 2 SH
Accompanies CHM U317. Introduces basic laboratory techniques including infrared (IR) spectroscopy and nuclear magnetic resonance (NMR) spectrometry as analytical methods for characterization of organic molecules. These methods serve as the basis for characterization of products from microscale syntheses. Coreq. CHM U317.

CHM U321 Analytical Chemistry 4 SH
Introduces the principles and practices in the field of analytical chemistry. Focuses on development of a quantitative understanding of homogeneous and heterogeneous equilibria phenomena as applied to acid-base and complexometric titrations, rudimentary separations, optical spectroscopy, electrochemistry, and statistics. Coreq. CHM U322. Prereq. CHM U151 or CHM U214.

CHM U322 Lab for CHM U321 1 SH
Accompanies CHM U321. Lab experiments provide hands-on experience in the analytical methods introduced in CHM U321, specifically, silver chloride gravimetry, complexometric titrations, acid-base titrations, UV-vis spectroscopy, cyclic voltammetry, Karl Fischer coulometry, and modern chromatographic methods. Coreq. CHM U321.

CHM U331 Bioanalytical Chemistry 4 SH
Develops good critical thinking and problem-solving skills through the exploration of open-ended group projects in a laboratory-based course centered on the analytical chemistry of biomolecules. Develops an understanding of the practice and business aspects of analytical chemistry as they relate to research and development labs in the biotechnology/pharmaceutical industry. Coreq. CHM U332. Prereq. CHM U214.

CHM U332 Lab for CHM U331 1 SH
Accompanies CHM U331. Working in teams, students investigate real-world, open-ended research problems in the field of bioanalytical chemistry, broadly defined using modern analytical instrumentation. Coreq. CHM U331.

CHM U341 Forensic Chemistry 1 3 SH
Provides students with insights into forensic science from a fundamental, chemical perspective. Explores the challenges and methodologies of forensic chemistry and addresses some misrepresentations of forensics by television dramas. Topics covered include drug analysis, arson investigation, questioned document analysis, serology, DNA evidence, fiber analyses, and weapon impressions. Coreq. CHM U342. Prereq. (a) CHM U217 and CHM U220 or (b) CHM U211, CHM U214, and CHM U321 or (c) CHM U151 and CHM U321.

CHM U342 Lab for CHM U341 1 SH
Accompanies CHM U341. In the laboratory, a crime scene is staged. Students must determine what evidence is useful and what instrumentation to use. Instructional guidance is provided, but the methodologies are developed by the students, who need to rely on the lessons presented in lecture to “solve the case.” An important aspect of this process is for the students to learn details of evidence collection. Forensic samples are often contaminated and standard protocols are not always available. After a brief class discussion, students perform whatever experiments on the evidence they deem necessary to try to determine the events of the crime. Coreq. CHM U341.

CHM U401 Physical Chemistry 1 4 SH
Traces the development of chemical thermodynamics through the three major laws of thermodynamics. These are applied to thermochemistry, chemical reaction and phase equilibria, and the physical behavior of multicomponent systems. Emphasizes quantitative interpretation of physical measurements. Coreq. CHM U402. Prereq. CHM U151 or CHM U214, MTH U341, and MTH U343.

CHM U402 Lab for CHM U401 1 SH
Accompanies CHM U401. Demonstrates the measurement of selected physical chemical phenomena presented in CHM U401, introducing experimental protocol and methods of data analysis. Experiments include investigations of gas nonideality and critical phenomena, electrochemical measurement of equilibrium, construction of phase diagrams, and bomb and differential scanning calorimetry. Coreq. CHM U401.
CHM U403 Physical Chemistry 2  4 SH
Continues CHM U401. Presents theory of electrolytes and electrochemistry with analytical applications. Chemical reaction kinetics are introduced and applied to study complex reaction mechanisms. Molecular transport properties, including diffusion, sedimentation, and electrophoresis, are explored. The fundamentals of quantum mechanics and spectroscopy are introduced and applied to molecular structure determination and chemical analysis. Coreq. CHM U404. Prereq. CHM U401.

CHM U404 Lab for CHM U403  1 SH
Accompanies CHM U403. Explores the principles covered in CHM U403 by laboratory experimentation. Experiments include measurement of reaction kinetics, such as excited state dynamics, measurement of gas transport properties, atomic and molecular absorption and emission spectroscopy, infrared spectroscopy of molecular vibrations, and selected applications of fluorimetry. Coreq. CHM U403.

CHM U421 Biophysical Chemistry  4 SH
Applies advanced principles of physical chemistry to biochemical systems. Explores modern biotechnological methods in terms of the underlying physical phenomena. Covers biochemical thermodynamics, physical characterization and structural methods, single-molecule methods, statistical mechanics of biopolymer folding, transport properties, and an introduction to biomolecular modeling. Prereq. CHM U401 and BIO U323.

CHM U501 Inorganic Chemistry  4 SH
Presents the following topics: basic concepts of molecular topologies, coordination compounds, coordination chemistry, isomerism, electron-transfer reactions, substitution reactions, molecular rearrangements and reactions at ligands, and biochemical applications. Prereq. CHM U401.

CHM U521 Instrumental Methods of Analysis  1 SH
Introduces the instrumental methods of analysis used in all fields of chemistry, with an emphasis on understanding not only the fundamental principles of each method but also the basics of the design and operation of the relevant instrumentation. Prereq. CHM U321 and CHM U401.

CHM U522 Instrumental Methods of Analysis Lab  4 SH
Accompanies CHM U521. Lab experiments provide hands-on experience in the instrumental methods of analysis discussed in CHM U521, such as high-performance liquid chromatography, gas chromatography, mass spectrometry, capillary electrophoresis, atomic absorption, cyclic voltammetry, and UV-vis spectroscopy. Prereq. CHM U321 and CHM U401.

CHM U531 Chemical Synthesis Characterization  1 SH
Introduces advanced techniques in chemical synthesis and characterization applicable to organic, inorganic, and organometallic compounds. Techniques used include working under inert atmosphere, working with liquefied gases, and handling moisture-sensitive reagents, NMR, IR, and UV-vis spectroscopy. Prereq. CHM U313.

CHM U532 Chemical Synthesis Characterization Lab  4 SH
Accompanies CHM U531. Covers topics from the course through various experiments. Prereq. CHM U313.

CHM U600 Research Skills and Ethics in Chemistry  3 SH
Covers ethics in science; documentation of work in your laboratory notebook; safety in a chemical research laboratory; principles of experimental design; online computer searching to access chemical literature; reading and writing technical journal articles; preparation and delivery of an effective oral presentation; and preparation of a competitive research proposal. Prereq. CHM U313.

CHM U611 Analytical Separations  3 SH
Describes the theory and practice of separating the components of complex mixtures in the gas and liquid phases. Methods to enhance separation efficiency and detection sensitivity are also included. Includes thin layer, gas and high-performance liquid chromatography (HPLC), and recently developed techniques based on HPLC, including capillary and membrane-based separation, and capillary electrophoresis. Prereq. CHM U521.

CHM U612 Principles of Mass Spectrometry  3 SH
Describes the theory and practice of ion separation in electrostatic and magnetic fields and their subsequent detection. Topics include basic principles of ion trajectories in electrostatic and magnetic fields, design and operation of inlet systems and electron impact ionization, and mass spectra of organic compounds. Prereq. CHM U521.

CHM U613 Optical Methods of Analysis  3 SH
Describes the application of optical spectroscopy to qualitative and quantitative analysis. Includes the principles and application of emission, absorption, scattering, and fluorescence spectroscopies, spectrometer design, elementary optics, and modern detection techniques. Prereq. CHM U521.

CHM U614 Electroanalytical Chemistry  3 SH
Describes the theory of electrode processes and modern electroanalytical experiments. Topics include the nature of the electrode-solution interface (double layer models), mass transfer (diffusion, migration, and convection), types of electrodes, reference electrodes, junction potentials, kinetics of electrode reactions, controlled potential methods (cyclic voltammetry, chronopotentiometry), chronocoulometry and square wave voltammetry, and controlled current methods (chronopotentiometry). Prereq. CHM U521.
CHM U620 Protein Chemistry 3 SH
Examines proteins (what they are, where they come from, and how they work) in the context of analytical analysis and molecular medicine. Covers the chemical properties of proteins, protein synthesis, and the genetic origins of globular proteins in solution, membrane proteins, and fibrous proteins. Discusses the physical intra- and intermolecular interactions that proteins undergo along with descriptions of protein conformation and methods of structural determination. Explores protein folding as well as protein degradation and enzymatic activity. Highlights protein purification and biophysical characterization in relation to protein analysis, drug design, and optimization. Prereq. Permission of instructor.

CHM U621 Principles of Chemical Biology for Chemists 3 SH
Explores the use of natural and unnatural small molecule chemical tools to probe macromolecules, including affinity labeling and click chemistry. Covers nucleic acid sequencing technologies and solid phase synthesis of nucleic acids and peptides. Discusses in vitro selection techniques, aptamers, and quantitative issues in library construction. Uses molecular visualization software tools to investigate structures of macromolecules. Coreq. CHM U622. Prereq. CHM U220, CHM U317, CHM U331, CHM U403, CHM U521, and junior or senior standing.

CHM U622 Lab for CHM U621 1 SH
Accompanies CHM U621. Complements and reinforces the concepts from CHM U621 with emphasis on fundamental techniques. Offers an opportunity to complete independent projects in modern chemical biology research. Coreq. CHM U621.

CHM U626 Organic Synthesis 1 3 SH
Surveys types of organic reactions including stereochemistry, influence of structure and medium, mechanistic aspects, and synthetic applications. Prereq. CHM U313.

CHM U627 Mechanistic and Physical Organic Chemistry 3 SH
Surveys tools used for elucidating mechanisms including thermodynamics, kinetics, solvent and isotope effects, and structure/reactivity relationships. Discusses molecular orbital theory, aromaticity, and orbital symmetry. Also explores reactive intermediates including carbenes, carbonium ions, radicals, biradicals and carbanions, acidity, and photochemistry. Prereq. CHM U313 or CHM U403.

CHM U628 Spectroscopy of Organic Compounds 3 SH
Determines organic structure based on proton and carbon nuclear magnetic resonance spectra, with additional information from mass and infrared spectra and elemental analysis. Presents descriptive theory of nuclear magnetic resonance experiments and applications of advanced techniques to structure determination. Includes relaxation, nuclear Overhauser effect, polarization transfer, and correlation in various one- and two-dimensional experiments. Prereq. CHM U313.

CHM U629 Identification of Organic Compounds 2 SH
Determines the identity of unknown organic compounds by measurement of their physical constants, elemental analysis, preparation of derivatives, and spectroscopic methods (IR and NMR). The unknowns include single compounds, two- and three-component mixtures separable by extraction, and chromatography. Prereq. CHM U313 or CHM U317.

CHM U636 Thermodynamics 3 SH
Covers first law of thermodynamics, thermochemistry, second and third laws of thermodynamics, free energies, and reaction and phase equilibriums. Introduces the Boltzmann distribution, partition functions and their application to thermodynamics, and phase space. Applies statistical thermodynamics to selected physical systems. Prereq. CHM U403.

CHM U637 Foundations of Spectroscopy 3 SH
Covers the fundamentals of quantum mechanics, with applications to spectroscopy of atoms, molecules, and proteins. Topics include introduction to quantum mechanics; mathematical tools; rigid rotor; microwave spectroscopy; harmonic oscillator; infrared and Raman spectroscopy; hydrogen atom; emission spectra; electron spin; and applications to molecular and biological systems. Prereq. CHM U403.

CHM U638 Molecular Modeling 3 SH
Introduces molecular modeling methods that are basic tools in the study of macromolecules. Structured partly as a practical laboratory using a popular molecular modeling suite, and also aims to elucidate the underlying physical principles upon which molecular mechanics is based. These principles are presented in supplemental lectures or in laboratory workshops. Prereq. CHM U403.

CHM U639 Chemical Kinetics 3 SH
CHM U660 Analytical Biotechnology 3 SH
Focuses on the analysis of biological molecules, which include nucleic acids, proteins, carbohydrates, lipids, and metabolites. Methods used for isolation, purification, and characterization of these molecules are discussed. Prereq. CHM U611 or CHM U613.

CHM U669 Environmental Analytical Chemistry 3 SH
Describes the application of instrumental methods for analyzing environmental samples for major, minor, and trace components of toxicological concern. Topics include sampling strategies for natural systems, determination of trace metals in natural waters and biologicals, determination of xenobiotics by GC, LC, GC-MS, and LC-MS, remote sensing of atmospheric pollutants, molecular biomarkers, and detection of protein and DNA adducts. Prereq. CHM U613.

CHM U672 Organic Synthesis 2 3 SH
Continues CHM U626. Surveys types of organic reactions including stereochemistry, influence of structure and medium, mechanistic aspects, and synthetic applications. Prereq. CHM U626.

CHM U676 Bioorganic Chemistry 3 SH
Covers host-guest complexation by crown ethers, cryptands, podands, spherands, and so on; molecular recognition including self-replication; peptide and protein structure; coenzymes and metals in bioorganic chemistry; nucleic acid structure; interaction of DNA with proteins and small molecules including DNA-targeted drug design; catalytic RNA; and catalytic antibodies. Prereq. CHM U627.

CHM U686 Fundamentals of Molecular Structure and Electronics 3 SH
Continues topics in CHM U637, which include many-electron atoms, simple diatomic molecules, conjugated pi-electron systems, the electronic structure of molecules, molecular modeling, and modeling of proteins and biological systems. Prereq. CHM U637.

CHM U687 Principles of Solid State Chemistry 3 SH
Provides an overview of solid-state materials from a chemistry perspective. Specific perspectives are those of classification, characterization, and structure-property relationships, and synthesis and design of tailor-made materials to meet future technological needs. Relevant theory and practice of spectroscopic methods is included, as well as concepts of physics involved with structure-property relationships. Prereq. CHM U501.

CHM U688 Principles of Magnetic Resonance 3 SH
Presents the physical principles underlying magnetic resonance spectroscopy including Fourier transform theory, classical and quantum-mechanical treatments of spin angular momentum, the Bloch equations, spin relaxation, and density matrix formalism applied to chemical and molecular dynamics. Different magnetic resonance methods are introduced, with emphasis on time-domain nuclear magnetic resonance (NMR) methods such as phase cycling, two-dimensional spectroscopy, and selective pulse sequences. A special topic may be included from among the following: magnetic resonance imaging (MRI), solid-state NMR (CP-MAS), or macromolecular structure. Prereq. CHM U637.

CHM U696 Organometallic Chemistry 3 SH
Focuses on organometallic chemistry of the transition metals, addressing the structure, bonding, and reactivity patterns of transition metal organometallic complexes with applications to organic synthesis. Topics include metal carbonyls, metal p-complexes, insertion and elimination reactions, and catalysis using transition metal organometallic compounds. Prereq. CHM U501.

CHM U698 Physical Methods in Chemistry 3 SH

CHM U750 Senior Research 4 SH
Conducts original experimental work under the direction of members of the department on a project. Introduces experimental design based on literature and a variety of techniques depending upon the individual project. Coreq. CHM U770. Prereq. CHM U403.

CHM U770 Chemistry Capstone 4 SH
Integrates and assesses both curricular and experiential aspects of undergraduate chemical education. Requires written and oral presentations related to cooperative education or other experiential activities, and to the senior research project. Reporting on the research project requires extensive library and Internet research of background and scientific principles, and organization and interpretation of results. Includes class discussion and critiquing of materials presented. Coreq. CHM U750.

CHM U901 Undergraduate Research 4 SH
Conducts original research under the direction of members of the department. Prereq. CHM U313 or CHM U321, 64 SH toward degree, permission of instructor and the department, and minimum GPA 2.800 in CHM major.
CHM U921 Directed Study 1 SH
CHM U922 Directed Study 2 SH
CHM U923 Directed Study 3 SH

Offers independent work under the direction of members of the department on a chosen topic. Course content depends on instructor. Prereq. 64 SH toward degree, permission of instructor and the department, and minimum GPA 2.800 in CHM major.

CHM U924 Directed Study 4 SH

Offers independent work under the direction of members of the department on a chosen topic. Course content depends on instructor. Prereq. CHM U313, CHM U321, 64 SH toward degree, permission of instructor and the department, and minimum GPA 2.800 in CHM major.

CHM U970 Junior/Senior Honors Project 1 4 SH

Focuses on in-depth project in which a student conducts research or produces a product related to the student’s major field. Culminating experience in the University Honors Program. Combined with Junior/Senior Project 2 or college-defined equivalent for 8 credit honors project. Prereq. Honors program participation.

CHM U971 Junior/Senior Honors Project 2 4 SH

Focuses on second semester of in-depth project in which a student conducts research or produces a product related to the student’s major field. Culminating experience in the University Honors Program. Prereq. CHM U970 and honors program participation.