Chemistry (CHE)

All courses in a chemistry or biochemistry major program must be taken with a letter grade, except those designated as satisfactory-unsatisfactory (S/U).

126 Chemistry and Society (3)
- Prerequisites: MAT 150 or equivalent. Designed for non-science majors. Introduces the basic concepts of chemistry and examines them in terms of real-world examples. Satisfies general curriculum distribution requirements. May be taken as preparatory course for CHE 152 but is not applicable toward a chemistry major or minor. Lecture only. (*fall, spring, summer I and II)

128 Introductory Chemistry (3)
- Prerequisite: MAT 150 or equivalent. This course deals with the fundamental principles of chemical science and basic calculations in science. Topics include theory, gases, states of matter, solutions, acid and base theory, equilibrium and oxidation–reduction. The course is intended for science majors in preparation for taking CHE 150/152/153. Satisfies general curriculum distribution requirements. Lecture only. Students must complete CHE 128 with a grade of “C” or better to register for CHE 150/152/153. (*fall semester)

150 Chemistry for Health Care Professions (4)
- Prerequisite: MAT 150, CHE 128 (with a grade of “C” or better) or waiver. Investigates the fundamental principles of general chemistry, organic chemistry and biochemistry. Topics include chemical bonding, nomenclature, gases, states of matter, solutions, acid and base theory, equilibrium and oxidation–reduction, organic functional groups, stereochemistry, carbohydrates, lipids, proteins and nucleic acids. The course is intended for nursing majors. Lecture only. (*fall and spring semester)

152 General Chemistry I (3)
- Prerequisite: MAT 160, CHE 128 (with a grade of “C” or better) or waiver. Current enrollment in or successful completion of CHE 153 (with a grade of “C” or better) required. Expands on the basic concepts of chemistry. Topics include chemical nomenclature, stoichiometric relationships, the chemistry of gases, atomic structure, chemical bonding, and molecular geometry. (*fall and summer I)

153 General Chemistry I Laboratory (1)
- Prerequisite: current enrollment in or successful completion of CHE 152 (with a grade of “C” or better). Laboratory experiments supplement lecture material presented in CHE 152. (*fall and summer I)

154 General Chemistry II (3)
- Prerequisites: CHE 152 and 153 (both with a grade of “C” or better), MAT 170 and current enrollment in or successful completion of CHE 155 (with a grade of “C” or better). A continuation of General Chemistry I. Topics include solution chemistry, kinetics, equilibrium, thermodynamics, electrochemistry and nuclear chemistry. (*spring and summer II)

155 General Chemistry Laboratory II (1)
- Prerequisites: CHE 152 and 153 (both with a grade of “C” or better), and current enrollment in or successful completion of CHE 154 (with a grade of “C” or better). Laboratory experiments supplement lecture material presented in CHE 154. (spring and summer II)

180 Environmental Chemistry (4)
- Prerequisites: CHE 154 and 155 (both with a grade of “C” or better). Lecture segment provides an introduction to the chemistry of the processes involved in air, water and soil pollution. Laboratory segment covers techniques and analyses similar to those used by state and federal regulatory agencies. Does not apply toward a major in chemistry. Lecture-Laboratory. (*spring semester)
232 Organic Chemistry I (3)
Prerequisites: CHE 154 and 155 (both with a grade of “C” or better). A study of the chemical properties and reactions of carbon and its derivatives. Topics include bonding, nomenclature, stereo chemistry, substitution, elimination and free radical reactions, organometallic compounds, infrared and nuclear magnetic resonance spectroscopy and the chemistry of alkyl halides, alcohols, epoxides, glycols, alkenes and alkynes. (*fall and summer I)

233 Organic Chemistry I Laboratory (1)
Prerequisites: CHE 154 and 155 (both with a grade of “C” or better), and current enrollment in or successful completion of CHE 232 (with a grade of “C” or better). Experiments focus on organic laboratory techniques and synthetic organic chemistry. (*fall and summer I)

234 Organic Chemistry II (3)
Prerequisite: CHE 232 and 233 (both with a grade of “C” or better). A continuation of Organic Chemistry I. Topics include the chemistry of benzene, aldehydes, ketones, carboxylic acids and their derivatives, amines, polycyclic and heterocyclic compounds, condensation reactions, and special topics such as carbohydrates, amino acids, proteins or pericyclic reactions. (*spring and summer II)

235 Organic Chemistry II Laboratory (1)
Prerequisites: CHE 232 and 233 (both with a grade of “C” or better), and current enrollment in or successful completion of CHE 234 (with a grade of “C” or better). Experiments involve qualitative organic analysis, IR and NMR spectroscopy and organic synthesis. (*spring and summer II)

245 Inorganic Chemistry (4)
Prerequisites: CHE 154 and CHE 155 (both with a grade of “C” or better). An introduction to the basic principles of bonding with an introduction to molecular orbital theory. An extensive survey of the periodic properties of the elements supplemented with representative reactions for the Main Group elements. Additional topics include acid/base theory and crystal field theory for the first row transition elements. Lecture – Laboratory (spring semester)

305 Applied Physical Chemistry (3)
Prerequisites: CHE 310 (with a grade of “C” or better), MAT 260 and chemistry lower core. An introduction to principles and applications of physical chemistry. Topics include states and properties of matter, thermodynamics and its application to chemical and biochemical systems, phase and chemical equilibrium, electrochemistry and chemical kinetics. This is a lecture-only, non-laboratory course. (fall semester)

310 Analytical Chemistry (4)
Prerequisites: CHE 154 and 155 (both with a grade of “C” or better). An advanced treatment of chemical equilibrium and its application to the quantitative analysis of materials. Emphasizes gravimetric, volumetric, spectrophotometric and potentiometric methods of analysis. May be used toward a minor in chemistry. Lecture-Laboratory. (*fall semester)

320 Biochemistry (3)
Prerequisites: CHE 234 and 235 (both with a grade of “C” or better), and chemistry lower core. A study of the chemical properties and biological functions of the atoms, molecules, macromolecules and macromolecular complexes that contribute to living systems. Topics include pH, structure and function of carbohydrates, proteins, lipids, and nucleic acids, enzyme kinetics, the major metabolic cycles and their cellular control processes. May be used toward a minor in chemistry. Lecture only. (*fall and spring semesters)

352 Physical Chemistry I (3)
Prerequisites: CHE 310 (with a grade of “C” or better), MAT 261, and chemistry lower core. Topics include gases and kinetic molecular theory, the laws of thermodynamics, phase equilibrium, ideal and non-ideal solutions, electrochemistry and surface phenomena. Lecture only. (*fall semester)
353 Physical Chemistry I Laboratory (1)
Prerequisites: CHE 310 (with a grade of “C” or better), MAT 261, and chemistry lower core, and current enrollment in or successful completion of CHE 352. Introduction to advanced chemical laboratory techniques. (*fall semester)

354 Physical Chemistry II (3)
Prerequisites: CHE 352 and 353. A continuation of Physical Chemistry I. Topics include kinetics, photochemistry, quantum mechanics, spectroscopy and X-ray diffraction. Lecture only. (*spring semester)

355 Physical Chemistry II Laboratory (1)
Prerequisites: CHE 352 and 353, and current enrollment in or successful completion of CHE 354. Continuation of physical chemistry laboratory. (*spring semester)

410 Senior Seminar (2)
An in-depth, independent literature-based study of a current topic in chemistry or biochemistry. A final paper and presentation are required.

420 Advanced Biochemistry (4) (W)
Prerequisite: CHE 320 (with a grade of “C” or better) and chemistry lower core. This course is an extension of CHE 320 (Biochemistry) with an emphasis on advanced theory and methods, including enzyme kinetics, pharmacokinetics, pharmacodynamics, Gibbs free energy calculations, and synthetic bio-organic chemistry. Additionally, the specialized biochemistry of several organs, tissues and diseases are discussed. Graded laboratory reports, project presentations and exams are employed to assist the student in mastering the fundamental concepts presented during both the lecture and laboratory portions of the course. Lecture–laboratory. (*spring semester)

425 Advanced Inorganic Chemistry (3)
Prerequisites: CHE 245 and 310 (both with a grade of “C” or better), MAT 261 and chemistry lower core. Studies atomic and molecular structure, types of chemical bonding, periodic relationships, typical reactions of inorganic substances, and the modern experimental methods used in inorganic chemistry. Lecture–Laboratory. (*spring semester)

426 Advanced Organic Chemistry (4)
Prerequisites: Chemistry lower core, CHE 234, 235L, 352 and 353L. Pre- or co-requisites: CHE 354 and 355L. This course is designed to cover many of the topics discussed in Organic Chemistry I and II in more depth. Topics may include the general study of organic reaction mechanisms including Eyring plots, Hammond’s postulate, Curtin-Hammett principle, isotope effects and acid-base catalysis; conformational control; stereoelectronics; Hückel molecular orbital theory; pericyclic reactions; aromaticity; free-radical species and reactions; nucleophilic substitutions; eliminations; additions; multi-step synthetic strategies; retrosynthetic strategies; and natural product synthesis. In addition, the student is expected to develop literature research skills by preparing and presenting a project involving the total synthesis of a naturally occurring compound or a topic of current interest. Lecture only. (*spring semester)

430 Advanced Instrumental Chemistry (4)
Prerequisites: CHE 310, 234 and 235 (all with a grade of “C” or better). Studies the theory and practice of modern instrumental methods of chemical analysis. Methodology includes spectrophotometric, chromatographic, electroanalytical, and nuclear techniques. Additionally, students are required to retrieve scientific information from primary, secondary and tertiary literature sources. Lecture–Laboratory. (*spring semester)

440 Quality Assurance (3)
Prerequisites: CHE 310 and 320 (both with a grade of “C” or better), CRM 307 and MAT 201. This course provides an outline of the key components of QA/QC. The need to produce sound scientific data using appropriate standards and controls, written procedures,
and method validation are explored. The key principles in any QA/QC laboratory program with reference to the FDA, EPA, ISO guidelines, together with specific examples from different specializations in those particular fields are described. Can be used to satisfy the CHE 499 requirement in chemistry. Lecture only. (*fall semester)

445 Advanced Spectroscopy (4)
Prerequisites: CHE 352 and CHE 353L (both with a grade of “C” or better). Pre- or co-requisites: CHE354 and CHE355L. This course is designed to cover current spectroscopic methods for organic structure determination. Topics include elemental analysis, mass spectrometry, infrared spectroscopy, and nuclear magnetic resonance spectroscopy and their use in organic structure determination. In addition, students are expected to develop literature research skills by preparing and presenting a project involving the determination of the molecular structure of a naturally occurring compound. (*spring semester)

451 Introduction to Research (2-4)
Prerequisites: CHE 310, 234, 235 and 320 (all with a grade of “C” or better). Qualified students in junior year choose project subject in consultation with chemistry faculty member. Requires laboratory research and a written report presented to, and reviewed by, the chemistry faculty. Students must also make an oral presentation of the results of their work. Graded on a pass-fail basis. (*fall and spring semesters, based on availability of faculty)

453 Chemistry Internship (1-4)
Prerequisites: CHE 310, 234, 235 and 320 (all with a grade of “C” or better), and 56 semester hours of credit with a minimum GPA of 2.5 in the major, or approval of department chairperson. Provides practical experience in chemistry-related programs in a firm or agency, under the supervision of faculty and firm representatives. May be accomplished on a part-time basis, and may be repeated for a total of four hours of credit. Graded on pass-fail basis. (*fall and spring semesters)

460 Introduction to Forensic Research (2)
Prerequisites: CHE 440 (Quality Assurance) and CRM 312. This course will consist of an internship in a forensic laboratory or equivalent where the student will conduct analyses in a specialization area of interest. The products of this experience will be a presentation at a professional conference and/or campus seminar, plus a written paper. Students must apply for this internship a semester in advance. Graded on a pass-fail basis. (*fall and spring semesters)

470 Techniques in Tissue Culture (4)
Prerequisite: Lower level chemistry core. Pre- or co-requisite: CHE 320. This course is an introduction to techniques in animal tissue culture, the science of growing individual cells \textit{in vitro} (outside the original animal). These techniques provide the basis for carrying out diverse research projects in the medical research, clinical and biotechnology fields. This laboratory-intensive course provides hands-on experience in cell growth and propagation, subculture, cloning, cryopreservation and proper aseptic technique. Lecture-laboratory. (*fall and spring semesters)

480 Forensic Toxicology (3)
Prerequisites: CHE 310 and 320 (both with a grade of “C” or better), CRM 307 and BIO 320. This course provides a comprehensive overview of the basic principles of toxicology and the practical aspects of forensic toxicology. The toxic agents most commonly resulting in legal problems in our society and the process by which our judicial system is aided by scientific investigation will be discussed. Other topics include the biotransformation of toxicants, chemical carcinogenesis, mutagenesis, teratogenesis, systemic toxicology, the biochemistry of poisons, and the control of poisonous material. Laboratory investigations involve toxicological analysis by microscopy, thin layer chromatography, spot testing, gas-liquid chromatography, mass spectrometry, and infrared analysis. Can be used to satisfy the CHE 499 requirement in chemistry. Lecture-Laboratory (*fall semester)
499 Special Topics in Chemistry (3-4)
Prerequisite: consent of instructor. A lecture and/or laboratory course offered at the discretion of the chemistry faculty. Subject may be chosen from theoretical and/or practical applications in biochemistry or analytical, inorganic, physical or organic chemistry. Available only to BS chemistry and biochemistry majors. (*fall and spring semesters, based on availability of faculty)

Communication (COM)

204 Beginning Design (4) (A)
Cross-listed with ART 204. A studio/performance-oriented course covering the fundamental principles of visual organization. Emphasizes two-dimensional design and the use and theory of color. (*fall and spring semesters)

206 Intro Graphic Design (4) (A)
Cross-listed with ART 206. A studio/performance-oriented course that is an introductory study of the creative processes associated with the graphic design field. Emphasis on creative problem-solving, basic design principles and the integration of type and imagery as applied to realistic graphic design problems. Laboratory fee required. (*fall and spring semesters)

208 Beginning Photography (4) (A)
Cross-listed with ART 208. A studio/performance-oriented course; an introduction to materials and techniques of photography. (*fall and spring semesters)

210 Beginning Digital Arts (4) (A)
Cross-listed with ART 210. A studio/performance-oriented course. Introduction to the use of computer hardware and software from an aesthetic point of view. This course introduces the basics of desk-top publishing and emphasizes the creative use of layout and drawing programs. Laboratory fee required.

211 Art and Technology (4) (A)
Cross-listed with ART 211. Art and Technology is a lecture course conceived to provide a context for the development of art and its interrelations with technology. Students study the definition of multimedia and its evolution toward hypermedia. Special emphasis is placed on the creation and transformation of technology used in the 20th century, such as radio, television, computers, the Internet and networked environments. Developments are related to historic art movements.

215 Graphic Design II (4) (A)
Cross-listed with ART 215. A studio/performance-oriented course that is a continuation of Art 206. Introduction to Graphics Design II emphasizes the development of the creative process as applied to design problem solving. Focus is on the development of ideas and the tools used to execute design solutions. Subjects covered include print advertising, brochures, logotypes, signage, packaging and illustration, and how each ties in with marketing strategy. Laboratory fee required. (*fall and spring semesters)

217 3-D Animation (4) (A)
Cross-listed with ART 217. A studio/performance-oriented course that is an introduction to three-dimensional computer animation exploring the basic techniques of modeling and animation. The course also includes necessary aspects of texture mapping, deformation, motion control, lighting, cameras and rendering. Laboratory fee required. (*fall and spring semesters)

224 Mass Media and Society (4)
Studies the fundamentals of communication theory to provide a foundation for understanding how the mass media work, how they influence us, how we can analyze them, and how we can effectively use them. Students can apply these critical skills to their roles as responsible consumers and communication professionals. May be used to fulfill the general distribution requirements for the social sciences if not used for the major. (*fall and spring semesters)