UNDERGRADUATE COURSES OF STUDY

CHEMISTRY

CHEM 101.INTRODUCTION TO CRIMINALISTICS

Students will learn how science aids the criminal justice system through crime scene analysis, the collection and preservation of evidence, and laboratory techniques. Laboratory methods commonly employed in the analysis of evidence will be discussed. Topics include drugs, fingerprints, ballistics, and trace evidence. Three hours lecture weekly. (General Education – Science and Mathematical Reasoning non-laboratory science) ***Three credit hours.***

CHEM 103.CONSUMER CHEMISTRY

A basic course for non-science majors that stresses the fundamental concepts of chemistry and applies them to the everyday world of the consumer. Topics covered include the metric system, atomic structure, chemical formulas, nuclear medicinal chemistry, organic polymer chemistry, dental chemistry, home products such as soaps and detergents, pharmaceutical drug chemistry, acids and bases, and food chemistry. Three hours lecture, three hours laboratory weekly. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

CHEM 105.SURVEY OF GENERAL CHEMISTRY

A survey of general chemistry for non-science majors. Biochemically significant substances and phenomena are used as the basis for understanding principles of general chemistry. Recommended course for nursing majors. Topics include atomic structure, chemical bonding, chemical nomenclature, stoichiometry, properties of gases, nuclear chemistry, acids, and bases. Three hours lecture, three hours laboratory weekly. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

CHEM 106.SURVEY OF ORGANIC AND BIOCHEMISTRY

A survey of organic chemistry and biochemistry for non-science majors. Biochemically significant substances and phenomena are used as the basis for understanding principles of organic chemistry and biochemistry. Recommended course for nursing majors. Topics include organic nomenclature, drawing organic structures, functional groups, common organic reactions, carbohydrates, lipids, proteins, and metabolism. Three hours lecture, three hours laboratory weekly. Prerequisite: CHEM 105 or CHEM 111. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

CHEM 111.GENERAL CHEMISTRY I

First semester course for science majors. A systematic treatment of chemical principles. Topics include atomic structure, chemical bonding, chemical nomenclature, stoichiometry, and properties of gases. Three hours lecture, three hours laboratory weekly. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

CHEM 112.GENERAL CHEMISTRY II

Second semester course for science majors. A systematic treatment of chemical principles. Topics include properties of solutions, thermodynamics, equilibrium principles, kinetics, acid-base theory, and electrochemistry. Three hours lecture, three hours laboratory weekly. Prerequisite: CHEM 111. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

CHEM 140. GENERAL, ORGANIC, AND BIOCHEMISTRY

One semester course for non-science majors interested in a health related profession. Biochemically significant substances and phenomena are used as the basis for understanding principles of general, organic, and biochemistry. Topics include measurement; dimensional analysis; chemical compounds and their bonds; redox reactions and energetics of chemical reactions; gases; solutions; acids and bases; nuclear chemistry; structural formulas, chemical and physical properties of organic compounds, carbohydrates, lipids, proteins, and metabolism. Recommended course for RN to BSN majors. Three hours lecture weekly. ***Three semester hours.***

CHEM 197.SCIENTIFIC COMMUNICATIONS I

This course is a study of all aspects of technical communications in both academic and professional contexts. Emphasis will be placed on how to interpret and produce various methods of data representations. One hour lecture weekly. Prerequisite: CHEM 111. ***One credit hour.***

CHEM 198.SCIENTIFIC COMMUNICATIONS II

This course is a study of all aspects of technical communications in both academic and professional contexts. Emphasis is placed on how to interpret and produce evidence-based arguments in written media. One hour lecture weekly. ***One credit hour.***

CHEM 199.SCIENTIFIC COMMUNICATIONS III

This course is a study of all aspects of technical communications in both academic and professional contexts. Emphasis will be placed on how to interpret and produce evidence-based arguments in oral presentations. One hour lecture weekly. ***One credit hour.***

CHEM 205.CHEMISTRY OF BREWING

This course studies the chemistry of the brewing process. It will cover the history of major developments in the brewing process, the chemistry of converting grains into malt, the chemistry of converting malt into wort, and the chemistry of the fermentation process that will convert the wort into a finished beer. The basics of quality control and quality assurance will also be covered. Prerequisite: Students must be 21 years of age or older on the first day of class. Three hours lecture weekly. ***Three credit hours.***

CHEM 221.ORGANIC CHEMISTRY I

A study of aliphatic hydrocarbons, alkyl halides, alcohols, ethers, and related compounds with an emphasis on nomenclature, physical properties, preparation reactions, general reactions, mechanisms, and synthesis. Isomerism and stereochemistry are discussed in relationship to all organic groups. Lecture is accompanied by laboratory work involving the preparation, analysis, and purification of organic compounds. Three hours lecture, three hours laboratory weekly. Prerequisite: CHEM 112. ***Four credit hours.***

CHEM 222.ORGANIC CHEMISTRY II

A study of aromatics, aldehydes, ketones, carboxylic acids, carboxylic acid derivatives, amines, polycyclic and heterocyclic aromatics, and related compounds with an emphasis on nomenclature, preparation reactions, general reactions, mechanisms, and spectroscopic identification. Lecture is accompanied by laboratory work reinforcing concepts learned in the classroom. Three hours lecture, three hours laboratory weekly. Prerequisite: CHEM 221. ***Four credit hours.***

CHEM 260.MICROSCOPICAL METHODS

Practical applications of polarized light microscopy; a study of how microscopes can be used to measure optical properties and obtain chemical information from extremely small samples. Topics include optics, micrometry, crystallography, microchemistry, optical staining, and microthermal methods. Prerequisite: CHEM 221. Three hours lecture weekly. ***Three credit hours.***

CHEM 301. BIOCHEMISTRY

This course examines fundamental concepts in biochemistry focused upon the major macromolecules and chemical properties of living systems. Primary topics include the structure, function, and metabolism of amino acids, proteins, carbohydrates, lipids, and nucleic acids; the physical properties of water, pH, and biological buffers; enzyme kinetics and regulation. Three hours lecture weekly. Prerequisite: "C" or better in CHEM 221 or CHEM 222. ***Three credit hours.***

CHEM 311.INTERMEDIATE ORGANIC CHEMISTRY

This course is an intermediate treatment of various organic reactions and includes extending and reinforcing the principles and concepts of organic chemistry introduced in CHEM 221 and CHEM 222, specifically functional groups, nomenclature, stereochemistry, polymers, reactions, synthesis, and mechanisms. Three hours lecture weekly. Prerequisite: "C" or better in CHEM 222. ***Three credit hours.***

CHEM 330.ANALYTICAL CHEMISTRY

A study of the basic techniques used in the separation and analysis of chemical substances. Gravimetric, volumetric, spectrophotometric, electrochemical, chromatographic, and potentiometric techniques will be discussed and utilized. Three hours lecture, six hours laboratory weekly. Prerequisites: CHEM 112 and MATH 211. ***Five credit hours.***

CHEM 331.CHEMICAL INSTRUMENTATION

The theory and practice of modern methods of instrumental analysis, chromatographic, and spectroscopic techniques are discussed and utilized. Topics include UV-visible, infrared, Raman, atomic absorption and emission, electron microscopy, fluorescence, mass spectrometry, liquid chromatography, and gas-liquid chromatography. Three hours lecture, three hours laboratory weekly. Prerequisite: CHEM 112. ***Four credit hours.***

CHEM 341.INORGANIC CHEMISTRY

This course is a study of the principles underlying the structure, occurrence, and synthesis of inorganic substances. Topics covered include atomic and molecular structure, periodic relationships, chemical bonding, molecular symmetry, chemistry and the structure of non-transition elements, chemistry and the structure of transition elements, and modern experimental methods in inorganic chemistry. Three hours lecture and three hours laboratory weekly. Prerequisites: CHEM 222 and CHEM 331. ***Four credit hours.***

CHEM 351.MASS AND ENERGY BALANCES

This course is an introduction to fundamental concepts of chemical engineering, including mass and energy balances, PVT relationships for gases and vapors, and elementary phase equilibria; problem-solving and computer skills are developed in the lab. Three hours lecture, two hours laboratory weekly. Prerequisites: CHEM 112, PHYS 212, and MATH 142. ***Four credit hours.***

CHEM 360.TOXICOLOGY

Basic principles of toxicology including quantitation of toxicity, biochemical action of toxicants, and population effects of poisons are studied. Both legacy and emerging contaminants are addressed (pesticides, industrial pollutants, metals, pharmaceuticals) in the context of sources, sinks, and efforts to create regulations. Prerequisites: CHEM 221 and BIOL 112. Three hours lecture weekly. ***Three credit hours.***

CHEM 381.CULTURAL PERSPECTIVES OF POLLUTION

In this course, the science of pollution will be reviewed in order to reveal its causes and effects. The course will examine how cultures other than our own regard and respond to pollution. Students will develop a critical understanding of these relationships as they study several developing areas of the world. Awareness of various cultural perspectives is essential for an accurate comprehension of the impacts of pollution, as well for an understanding of what is possible in the way of adaptation and mitigation solutions to the challenge. (General Education – World Cultures) ***Three credit hours.***

CHEM 390.SPECIAL TOPICS IN CHEMISTRY

Courses designed to provide in-depth study of various topics in chemistry. Specific topics will be announced in advance. Prerequisite: Approval of instructor. (Limited to a maximum of four credit hours toward degree requirements.) ***One to four credit hours.***

CHEM 401.PHYSICAL CHEMISTRY I

A theoretical and experimental study of observed chemical phenomena through the lens of thermodynamics. Includes properties of gases, internal energy, entropy, enthalpy, and Gibbs Free energy. Single and multicomponent systems will be discussed. Three hours lecture, three hours laboratory weekly. Prerequisite: PHYS 201 or 211. ***Four credit hours.***

CHEM 402.PHYSICAL CHEMISTRY II

A theoretical and experimental study of observed chemical phenomena, atomic and molecular level interpretation of chemical behavior. Includes quantum mechanics, molecular structure via spectroscopic methods, and kinetics. Three hours lecture, three hours laboratory weekly. Prerequisite: CHEM 401. ***Four credit hours.***

CHEM 406, 407, 408, 409, 410. RESEARCH

These courses include research on special topics for juniors and seniors in Chemistry. The courses are limited to a maximum of four credit hours toward major requirements and are offered on demand to qualified students. These courses are not sequential. Prerequisites: A minimum GPA of 3.0 is required along with instructor permission. ***Zero to four credit hours.***

CHEM 420.ENVIRONMENTAL CHEMISTRY

Origins, transport, reactions, effects, and fates of chemical species in water, air, terrestrial, and biotic environments. The theory and practice of modern chemical instrumentation are applied to environmental samples from a variety of sources. Three hours lecture weekly. Prerequisites: CHEM 221. ***Three credit hours.***

CHEM 490.INTERNSHIP IN CHEMISTRY

This course gives students practical experience in an approved chemistry-related work situation. The experience will be supervised by a member of the chemistry faculty. The student will be required to maintain a journal of experiences and will submit it and a final paper and/or presentation describing the experience and the knowledge gained from it. The student is responsible for meeting all living and travel expenses related to this course. A minimum of 3 hour per week of on-the-job experience for at least 11 weeks is required for each hour of credit earned in the course. This course may be repeated for a maximum of 12 credit hours. The prerequisites: CHEM 112 and instructor permission. Graded pass/fail. ***One to twelve credit hours.***