Course Descriptions

CHEM 101 The Chemistry of Life (Gen. Ed. Goal 6) An exploration of the origin of life on a molecular basis; a familiarization with the basic chemistry of living organisms and their environment; an understanding of the laws that govern life; and a discussion on the fate of life as a consequence of drugs and man's chemical pollution of the earth's atmosphere, soil and water. Designed as a terminal non-laboratory course for the liberal arts non-science student. CHEM 103 General Chemistry (Gen. Ed. Goal 6, Lab) A study of the fundamental chemical laws and theories, with laboratory, for students not planning to major in chemistry. CHEM 107 Principles of Chemistry (Gen. Ed. Goal 6, Lab) A study of the fundamental principles of chemistry, with laboratory, for students planning to major in chemistry and others for whom the course is a departmental requirement. Offered Fall Semester only. CHEM 108 Principles of Chemistry and Quantitative Analysis (Gen. Ed. Goal 6, Lab) A continuation of Principles of Chemistry covering the fundamental principles of chemistry with major emphasis on the theory and techniques of quantitative analysis, including an introduction to instrumentation. Laboratory. Offered Spring Semester only. Prerequisite: CHEM 107 Principles of Chemistry or equivalent. CHEM 131 Science - Environment and Health (Gen. Ed. Goal 6, Lab) An integrative laboratory science course to prepare non-science majors to make informed decisions relating to the environment, health, and technology. Central principles of physical, environmental, and biological chemistry are discussed, with application of these principles to current events. Assignments and laboratory sessions apply theoretical principles to everyday life. Prerequisite: MATH 123 College Algebra is recommended background. CHEM 201 Organic Chemistry A one-semester course designed to provide a concise introduction to the fundamental and most important principles of organic chemistry. Compounds are discussed in terms of their structure, reactions, importance in nature and applications to allied fields. Laboratory. Prerequisite: CHEM 103 General Chemistry. CHEM 207 Organic Chemistry I An in-depth course which covers structure, properties, preparation and reactions of the principal classes of organic compounds. Emphasis is on reaction mechanisms, discussed in the context of transition state theory, and on the relationships between structure, properties and reactivity. Laboratory work, coordinated with lectures, introduces the standard techniques (distillation and reflux, crystallization and melting points, extraction, column and gas chromatography, IR and UV-VIS spectroscopy) used in synthesis, purification and identification of organic compounds, and illustrates some typical reactions of alkanes, alkenes and alcohols. Prerequisite: CHEM 108 Principles of Chemistry and Quantitative Analysis. CHEM 208 Organic Chemistry II Continuation of Organic Chemistry I. Topics include the use of organometallic reagents in synthesis, application of isotopes to mechanistic studies, kinetics and rate equations, chemistry of diverse types of aromatic compounds, enolization and related syntheses, nitrogen compounds, 1H and 13C NMR spectroscopy, orbital symmetry and pericyclic reactions. Laboratory work reinforces the concepts and techniques covered earlier, and also

includes NMR, a kinetics vs. equilibrium control study, and rate and activation energy measurements. Prerequisite: CHEM 207 Organic Chemistry I. CHEM 301 Biochemistry I A study of the physico-chemical aspects of biological activity; the chemistry of carbohydrates, lipids, nucleic acids, amino acids and proteins, kinetics and enzymes; bioenergetics; coenzymes; and intermediary metabolism of carbohydrates, fats and nitrogen-containing materials such as amino acids, proteins and related compounds, and photosynthesis. The underlying theme of this course is not merely a cataloging of the structure and metabolism of biological compounds, but rather is an understanding of the cell molecular logic of living organisms. Laboratory. Prerequisites: CHEM 207 Organic Chemistry I and completion of college level mathematics requirement, preferably MATH 123 College Algebra. CHEM 303-4 Physical Chemistry I and II An introduction to the principles of physical chemistry. The topics treated include chemical thermodynamics, phase equilibria, solutions, the kinetic theory of gases, chemical kinetics, electrochemistry, spectroscopy and quantum chemistry. Laboratory. Prerequisite: PHYS 211-2 Principles of Physics I and II and two (2) courses in calculus. CHEM 321 Instrumental Analysis An introduction to the theory and application of common chemical instrumentation with associated laboratory. Basic electronics (voltage dividers, passive filters, simple op-amps, s/n enhancement), electrochemical methods (differential pulse polarography and stripping analysis), spectroscopic methods (UV-Vis, AA, Fl, NMR, Mass spec), chromatographic methods (GC, HPLC), and radiochemical methods (activation and dilution analysis). Prerequisite: CHEM 207 Organic Chemistry I and CHEM 303 Physical Chemistry I. CHEM 332 Biochemistry II A continuation of CHEM 301 Biochemistry I, which covers basic nucleotide chemistry. Informational biomolecules, nucleotide metabolism, cell signaling and regulatory mechanisms, molecular physiology, protein structure and catalysis, regulation of biochemical processes, and integrated metabolic systems are studied in-depth. Laboratory emphasizes enzyme isolation, molecular modeling, and analytical biotechnology methods. Prerequisites: CHEM 208 Organic Chemistry II and CHEM 301 Biochemistry I CHEM 401 Inorganic Chemistry An introduction to the theories of structure and bonding used in inorganic chemistry and a study of the descriptive chemistry of the elements and their representative compounds. Topics covered include atomic structure and trends in the periodic table, structure and bonding in crystalline lattices, valence bond and molecular orbital theories of covalent bonding, descriptive chemistry of the non-transition elements, properties of transition metals, and structure and bonding in transition metal complexes interpreted in terms of the valence bond, crystal field and molecular orbital theories. Laboratory. Prerequisite: CHEM 303-4 Physical Chemistry I and II (CHEM 304 Physical Chemistry II may be taken concurrently). CHEM 409 Nutritional Biochemistry/Metabolism A detailed investigation of protein, carbohydrate, lipid, and nucleic acid metabolism in the total scheme of integrated metabolic systems. Direct and circumstantial relationships involving animal and human nutrition in normal and pathological health conditions are discussed wherever a dietary or nutritional component is involved. Prerequisite: CHEM 301 Biochemistry I CHEM 411 Advanced Organic Chemistry - Reactions and Synthesis A discussion of reactions widely used in organic synthesis in sufficient depth to allow for an understanding of the selectivity of the reaction and its stereochemical outcome. The use of protective groups and synthetic equivalents is illustrated in multistep synthesis. Prerequisite: CHEM 208 Organic Chemistry II. CHEM 412 Advanced Organic Chemistry - Mechanism and Structure A focus on theoretical aspects of organic chemistry, and experimental evidence on which the theories are built. The topics include aromaticity, orbital symmetry, HMO theory and calculations; linear free-energy relationships, kinetics, and isotope effects; acids

and bases, solutions, and ion pairs; reactive intermediates - carbocations, carbanions and free radicals; electrocyclic reactions, cycloadditions, and sigmatropic shifts; photochemistry. Prerequisite: CHEM 208 Organic Chemistry II, CHEM 303-4 Physical Chemistry I and II (CHEM 304 Physical Chemistry II may be taken concurrently). CHEM 414 Advanced Physical Chemistry An introduction to statistical thermodynamics. The Maxwell-Boltzmann statistics as well as quantum statistics are treated. The relationship between partition functions and thermodynamic properties is developed. Gaseous, liquid and solid state systems are discussed in light of the concepts of statistical thermodynamics. Prerequisite: CHEM 303-4 Physical Chemistry I and II. CHEM 416 Advanced Inorganic Chemistry An application of the theories of bonding and structure studied in Inorganic Chemistry to inorganic systems of both classic and current interest. To complement the study of these model systems, some descriptive chemistry of the less common but important elements is included. In addition, the structures and bonding theories of metals, semiconductors, and nonstoichiometric compounds are introduced. Finally, students are introduced to the study of symmetry in chemistry from the point of view of group theory. Prerequisite: CHEM 401 Inorganic Chemistry. CHEM 421 Advanced Analytical Chemistry A discussion of topics selected from recent literature in chromatography, ion selective electrodes and sensors, atomic spectroscopy, surface analysis, Fourier transform methods, computerized data acquisition, data treatment, and laboratory automation. Prerequisite: CHEM 208 Organic Chemistry II, CHEM 304 Physical Chemistry II, and CHEM 321 Instrumental Analysis. CHEM 490 Directed Study in Chemistry An in-depth study of a selected advanced chemistry topic or topics under the direction of a chemistry faculty member. The grade is based on a written report of the study and/or oral exam. CHEM 497/498 Chemical Research I and II An application of the Scientific Method to an original research problem. During the first semester formal course work includes the Scientific Method, the choice of a research problem, the chemical literature, advanced safety issues, the interpretation of data, and the reporting of results. Students initiate a research project with a faculty member and make significant progress on the project. The research project will then be completed in the second semester, resulting in a formal written report and seminar presentation. Prerequisite: Permission of the instructor.

Course Descriptions for Food Science

FDSC 151 Principles of Food Science (Gen. Ed. Goal 6) A study of food systems as chemical entities. This course employs biological sciences, physical sciences, and engineering in the study of the nature of foods, causes of deterioration, and the principles underlying food processing. Emphasis is placed on food research in the twenty-first century. Note: Students cannot receive credit for both FDSC 151 Principles of Food Science and FDSC 161 Introduction to Food Science and Technology FDSC 161 Introduction to Food Science and Technology (Gen. Ed. Goal 6, Lab) An introduction to food science and technology based on an understanding of the chemical principles regulating the properties of food. This course employs physical sciences, biological sciences, and engineering in the study of the nature of food, food safety, and the technology underlying the processing and preservation of food. Laboratory sessions coordinated with the lectures illustrate and reinforce the important relationships between chemical principles and food. Note: Students cannot receive credit for both FDSC 161 Introduction to Food Science and Technology and FDSC 151 Principles of Food Science. FDSC 351 Food Engineering and Processing An integrated approach of food engineering principles and food processing techniques. Topics include thermodynamics, fluid flow and heat transfer, evaporation, refrigeration, psychrometry, drying, distillation,

and the essential food processing methods that ensure attainment of food product wholesomeness. Laboratory. Prerequisite: Permission of instructor. FDSC 405 Food Analysis A study of the fundamental principles of food analysis with the laboratory work including both the classical and the more recent sophisticated methods of analysis. Prerequisite: CHEM 301 Biochemistry I. FDSC 408 Food Chemistry A study of the chemistry of food constituents and the chemical and biological changes occurring in foods during storage and processing. The approach is from a cellular and molecular level. Prerequisite: CHEM 301 Biochemistry I. FDSC 490 Directed Study in Food Science An original problem to be selected and researched under the direction of a faculty member. A written presentation of the research findings is required. Prerequisite: Permission of the instructor. FDSC 495 Food Industrial Practicum Enhancement of student's practical knowledge of food science by participating in projects sponsored by industrial and/or governmental agencies. Prerequisite: Permission of instructor.