CHM 130 GENERAL, ORGANIC AND BIOCHEMISTRY

COURSE DESCRIPTION:
Prerequisites: Mat 070 or DMA 010, 020, 030, 040, 050, 060; and RED 080 OR DRE 097, or satisfactory score on placement test
Corequisites: CHM 130A

This course provides a survey of basic facts and principles of general, organic, and biochemistry. Topics include measurement, molecular structure, nuclear chemistry, solutions, acid-base chemistry, gas laws, and the structure, properties and reactions of major organic and biological groups. Upon completion, students should be able to demonstrate an understanding of fundamental chemical concepts. This course has been approved to satisfy the Comprehensive Articulation Agreement for transferability as a premajor and/or elective course requirement. Course Hours Per Week: Class, 3. Lab, 0. Semester Hours Credit, 3.

LEARNING OUTCOMES:
Upon completion of this course, the student will demonstrate basic knowledge in the following:
1. Fundamental chemical concepts in general chemistry.
2. Fundamental chemical concepts in organic chemistry.
3. Fundamental concepts of biochemistry.
4. Fundamental concepts of cell structure and cell membranes

Students will learn to conduct basic chemical experiments when following written protocols showing thorough familiarity with safe operation of standard laboratory equipment.

OUTLINE OF INSTRUCTION:

I. Measurement in chemistry
   A. Metric system
   B. Unit conversions and dimensional analysis
   C. Density and specific gravity
   D. Temperature scales

II. Properties of matter
   A. States of matter
   B. Physical and chemical changes
   C. Physical and chemical properties
   D. Mixtures
   E. Elements
   F. Compounds

III. Structure of matter
   A. Law of definite proportions
   B. Atomic structure
   C. Periodic table
D. Nuclear chemistry

IV. Chemical bonding
   A. Types of chemical bonding (ionic, polar covalent, nonpolar covalent)
   B. Writing formulas for compounds
   C. Naming compounds
   D. Formula weights

V. Chemical equations
   A. Types of equations
   B. Balancing equations
   C. Chemical equilibrium
   D. Reaction rates and catalysis

VI. Energy and matter
   A. Energy transfer associated with chemical reactions and physical processes
   B. Energy changes and specific heat capacity
   C. Intermolecular forces and physical properties that depend on them

VII. Chemical mole and mole-based calculations
   A. The mole concept
   C. Stoichiometric calculations

VIII. Gas Laws
   A. Charles Law
   B. Boyles Law
   C. Gay-Lussac’s Law
   D. Universal Gas Law
   E. Dalton’s Law
   F. Henry’s Law

IX. Oxygen
   A. Physical and chemical properties
   B. Ozone
   C. Oxidation-reduction reactions

X. Water
   A. Chemical and physical properties
   B. Hydrogen bonding

XI. Solutions
   A. Properties of true solutions
   B. Properties of colloidal solutions
   C. Properties of suspensions
   D. Solubility and miscibility,
   E. Concentration

X. Ionization and dissociation
XI. Acids and bases
   A. Properties of Arrhenius acid bases
   B. Properties of Bronsted-Lowry acids and bases
   C. pH
   D. Neutralization
   E. Titration
   F. Buffers

XII. Organic chemistry
   A. Hydrocarbons
   B. Alcohols, alkyl halides, ethers
   C. Aldehydes and ketones
   D. Carboxylic acids
   E. Esters
   F. Amides
   G. Organic acids
   H. Cyclic organic compounds
   I. Heterocyclic organic compounds
   J. Amines
   K. Isomerism

XIII. Biochemistry
   A. Carbohydrates
   B. Lipids
   C. Proteins
   D. Enzymes
   E. Nucleic Acids

XIV. Cell Structure and Function
   A. Function of cell structure
   B. Cell Membranes

REQUIRED TEXTBOOKS and MATERIALS:

Textbook “Introduction to General, Organic and Biochemistry“, a 2016 custom edition (by Bettelheim / Starr / Taggart / Evers / Starr) packaged with a PAC (Printed Access Card to access OWLV2). The PAC gives you an access to homework assignments, online tutorials and quizzes.

Lab handouts (posted on the course Sakai websites).

Chemistry splash guard safety goggles with indirect vents.