NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
CHM 121-122 - HEALTH SCIENCE CHEMISTRY I-II (4 CR.) (4 CR.)

Course Description

Introduces the health science student to concepts of inorganic, organic, and biological chemistry as applicable to the allied health profession. Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week.

General Course Purpose

The purpose of this course is to provide a general background in chemistry for those students who do not intend to enroll in further courses in chemistry.

CHM 121 - HEALTH SCIENCE CHEMISTRY I

Course Prerequisites/Corequisites

Prerequisites for CHM 121 are satisfactory placement scores for MTH 151 (or completion through unit 5 in an MTT course) and ENG 111.

Course Objectives

As a result of the learning experience provided in this course, the student should be able to:

- Define and apply basic terminology
- Balance simple chemical equations
- Apply principles of scientific method and measurement
- Use symbols, formulas and nomenclature correctly
- Perform simple stoichiometric calculations
- Demonstrate an understanding of the principles of atomic structure and the periodic table
- Solve simple gas law problems
- Determine the type of bonding and polarity of simple compounds
- Determine solution concentration and pH
- Relate concentration and temperature of reaction rate
- Recognize and explain the system aspects of our environment
- Predict and explain the effects of air and water pollution
- Predict and explain the effects of pollutants on living organisms

Major Topics to be Covered

- Matter and energy
  - nature of matter
  - state of matter
  - identification of matter
  - types of energy
- Introduction to scientific measurement
  - SI units
  - Scientific notation
  - Significant figures
  - Accuracy and precision
  - Energy
• Atomic structure and the periodic table
  o Development of modern theory of atomic structure
  o Nuclear and electronic structure
  o Relation between electronic structure and chemical properties

• Chemical nomenclature
  o Naming compounds
  o Writing formulas for compounds

• Stoichiometry
  o Balancing chemical equations
  o Mass and mole calculations based on chemical equation

• Heat and calorimetry
  o Energy (enthalpy) relations in chemical processes
  o Calorimetry

• Chemical bonding
  o Ionic bonding
  o Covalent bonding
  o Electronegativity and polarity

• Physical states of matter
  o Properties of gases
  o Properties of liquids
  o Properties of solids

• Aqueous solutions
  o Solubility of solids, liquids and gases
  o Solution concentration calculations
  o Colligative properties
  o Electrolytes and non-electrolytes
  o Reactions in aqueous solutions

• Acids and bases
  o Definitions
  o Neutralization and titration
  o pH
  o Buffers

• Chemical dynamics
  o Relation of concentration and temperature to reaction rate
  o Catalysts

• Oxidation - reduction
  o Oxidation numbers
  o Redox reaction in solution
  o Balancing redox equations

• Nuclear chemistry
  o Types of radiation
  o Biological effects of radioactivity
  o Mass-energy relationships
**Optional Topics**

- Environmental chemistry
- Descriptive chemistry of metals and non-metals

**CHM 122 - HEALTH SCIENCE CHEMISTRY II**

**Course Prerequisites/Co-requisites**

Prerequisite for CHM 122 is CHM 121.

**Course Objectives**

As a result of the learning experiences provided in this course, the student should be able to:

- Recognize the properties of simple organic compounds
- Predict and explain the typical reactions of simple organic compounds
- Name and write formulas for simple organic compounds
- Recognize the characteristic structures of carbohydrates, lipids, fats, hormones, vitamins, proteins, nucleic acids, enzymes
- Recognize the metabolism and functions of the above compounds in life processes

**Major Topics to be Covered**

- Nature of organic compounds
  - Classification
  - Nomenclature
  - Structure and physical properties
  - Chemical properties
  - Isomerism—
    - Structural
    - Geometric
    - Optical
    - Uses and hazards

- Classes of organic compounds
  - Saturated and unsaturated hydrocarbons
  - Aromatic hydrocarbons
  - Halogen derivatives of hydrocarbons
  - Alcohols
  - Ethers
  - Aldehydes
  - Ketones
  - Acids
  - Esters
  - Amides
  - Amines
  - Organic compounds of phosphorus and sulfur
• Biochemistry
  o Structures and reactions of
    ▪ Carbohydrates
    ▪ Lipids
    ▪ Proteins
    ▪ Nucleic acids

Optional Topics

• Enzymes and their mechanisms
• DNA and protein synthesis
• Digestion
• Metabolism
• Hormones and vitamins
• Bodily fluids
• Environmental chemistry

Lab Objectives

As a result of the laboratory learning experiences, the student should be able to:

• Practice safe procedures in the laboratory
• Achieve competencies in:
  o Precise weighing
  o pH measurement
  o Volume measurement
  o Quantitative measurement
  o Titration
  o Distillation