

CHE - CHEMISTRY

CHE 101 Introduction to General Chemistry

CHE 101 is a one semester course covering the fundamentals of general chemistry. It is designed to fulfill the requirements of certain allied health and nursing programs. It also is appropriate as a basic chemistry course or as a science elective for students who are not science, engineering, or mathematics majors. Although not a prerequisite, this course may also serve as preparatory course for CHE 110 – General Chemistry I. Topics include: atomic theory, chemical bonding, structure, reactivity, stoichiometry, basic chemical equilibrium, gas laws, solutions, acids and bases, and nuclear chemistry.

Upon successful completion of this course, students should be able to:
Define chemistry as the study of matter.

Describe its transformations and the energy associated with these transformations.

Apply the concepts of atomic theory and atomic structure to describe elements and how they combine to form compounds.

Predict and identify the products and reactants of a chemical reaction, and quantify the amounts of materials consumed and produced using basic stoichiometry.

Apply the concepts of the kinetic molecular theory and the ideal gas law to predict the behavior of gases.

Describe the basics of solution stoichiometry.

Perform calculations including concentrations, dilution and simple acid base chemistry.

Use nuclear chemistry to describe radioactive decay.

Collect, analyze and interpret experimental data from the performance of inorganic laboratory experiments.

Apply safe laboratory skills to solve problems in a cooperative environment.

College Academic Learning Goal Designation: Scientific Reasoning (SI)

Prerequisites: MAT 050 and ((ENG 050 and REA 050) or ENG 099* or REA 075). Successful College Placement Test Scores may be accepted.

*(Courses may be taken concurrently)

4 Credits3 Weekly Lecture Hours

3 Weekly Lab Hours

CHE 102 Introduction to Organic and Biological Chemistry

CHE 102 is a one semester course covering the fundamentals of organic and biological chemistry. It is designed to fulfill the requirements of certain allied health and nursing programs. It also is appropriate as a science elective for students who are not science, engineering, or mathematics majors. Although not a prerequisite, this course may also serve as a preparatory course for CHE 200 – Organic Chemistry I. This course is dedicated to understanding the structure, properties and chemistry of a variety of organic and biological molecules. Topics include: saturated and unsaturated hydrocarbons, organic molecules containing oxygen and sulfur, carbohydrates, carbonyl compounds, lipids, proteins, and nucleic acids.

Upon successful completion of this course, students should be able to:
Recognize and name compounds belonging to different classes of organic molecules.

Draw Fischer projections of organic molecules and identify any chiral carbons.

Predict the products of the reactions of organic molecules.

Identify carbohydrates, proteins, nucleic acids and lipids and discuss their biological importance.

Recall the structures of amino acids and identify the structural levels of proteins.

Describe the function of an enzyme, discuss factors that affect enzyme activity, and explain how inhibitors work.

Recall the structures of nucleotides and relate them to the structure of DNA and RNA.

Describe protein synthesis from DNA.

Apply safe laboratory skills to solve problems in a cooperative environment.

Prerequisite: CHE 101.

4 Credits3 Weekly Lecture Hours

3 Weekly Lab Hours

CHE 110 General Chemistry I

This course is the first part of a rigorous, mathematics based college chemistry sequence. This course is designed for students majoring in science or engineering fields. Basic laws and theories of chemistry including: chemical bonding, chemical reactions, the mole and stoichiometry, gas laws, solution chemistry, thermochemistry, chemical periodicity and atomic structure will be covered. NOTE: A grade of C or better is required for MAT 128 to fulfill prerequisite.

Upon successful completion of this course, students should be able to:

Define chemistry as the study of matter, its properties and changes and the energy associated with these changes.

Use the metric system as a tool for performing and applying scientific measurements.

Identify and classify substances with regard to composition, state, purity, and modes of separation.

Apply the knowledge of the periodicity of the elements toward the description of chemical bonding.

Solve mathematical problems related to chemical reactions and the mole concept including solution stoichiometry.

Apply the kinetic molecular theory to account for the properties of gases and use the gas laws in calculations.

Describe and calculate heat in chemical reactions and physical processes.

Explain the relationship between the Periodic Table and Atomic Structure.

Describe chemical bonding using Lewis structures, VSEPR theory and the valence bond theory.

Collect experimental data utilizing modern chemistry laboratory techniques, problem solve and analyze the data to formulate appropriate conclusions and compile lab reports.

College Academic Learning Goal Designation: Scientific Reasoning (SI)

Prerequisite: ((ENG 050 and REA 050) or ENG 099* or REA 075) and (MAT 100 or MAT 110 or (MAT 128 grade of C or better), MAT 140* or MAT 141* or MAT 150* or MAT 151* or MAT 152* or MAT 160* or MAT 161* or MAT 200* or MAT 230* or MAT 260* or MAT 261*) Appropriate placement test scores may be accepted *Courses marked with a star may be taken concurrently.

4 Credits3 Weekly Lecture Hours

3 Weekly Lab Hours

CHE 111 General Chemistry II

This course is the second part of a rigorous, mathematics based college chemistry sequence. This course is designed for students majoring in science or engineering fields. Basic laws and theories of chemistry including: colligative properties, kinetics, chemical equilibrium, acid-based equilibria, solubility and complex ion equilibria, thermodynamics, oxidation-reduction reactions, electrochemistry and nuclear chemistry will be covered.

Upon successful completion of this course, students should be able to:

Describe the major types of intermolecular forces and the role they play in the properties of solids and liquids.

Describe the properties and behavior of solutions.

Perform calculations involving solution concentrations and colligative properties.

Apply the principles of kinetics to chemical systems.

Apply the principles of chemical equilibrium to chemical systems.

Evaluate and apply modern theories of acids and bases, especially the concept of pH.

Apply the concepts of solubility and complex ion formation.

Discuss and apply the fundamentals laws of thermodynamics, free energy and entropy.

Discuss and apply the principles of electrochemistry to chemical systems.

Describe the basic concepts of nuclear chemistry.

Demonstrate an ability to utilize modern chemistry laboratory techniques and equipment.

Prerequisite: CHE 110 with a grade of C or better and (MAT 151 with a grade of C or better or **placement** into MAT 152 or higher).

4 Credits3 Weekly Lecture Hours

3 Weekly Lab Hours

CHE 200 Organic Chemistry I

An integrated study of carbon compounds with emphasis on structure, stereochemistry, reactions and synthesis. Laboratory work will emphasize record keeping, separation, purification and identification using chromatography.

Upon successful completion of this course, students should be able to:

Describe the chemical bonding in organic compounds.

Analyze the thermodynamic and kinetic relationship in organic reactions.

Describe the physical properties, stereochemistry, preparation, reactions and multistep synthesis of hydrocarbons.

Demonstrate laboratory procedures for record keeping, separation, purification and identification using chromatography.

Prerequisite: CHE 111.

5 Credits4 Weekly Lecture Hours

3 Weekly Lab Hours

CHE 201 Organic Chemistry II

The study of organic compounds containing oxygen and nitrogen. The structure, stereochemistry, reactions, and multistep synthesis of organic nitrogen and oxygen will be studied. Syntheses and instrumental analysis (IR and NMR) will be emphasized in the laboratory.

Upon successful completion of this course, students should be able to:

Analyze organic compounds using spectroscopy.

Explain elimination and substitution reactions.

Describe the physical properties, stereochemistry, preparation, reactions and multistep synthesis of organic oxygen and nitrogen compounds.

Describe the general characteristics of carbohydrates, lipids and proteins.

Prepare compounds using complex syntheses.

Demonstrate a knowledge of scientific references and an ability to search the scientific literature.

Prerequisite: CHE 200.

5 Credits4 Weekly Lecture Hours

3 Weekly Lab Hours