



South Central College

# CHEM 108 Introduction to Chemistry

## Common Course Outline

### Course Information

<b>Description</b>	A one-semester introduction to the field of chemistry, this course is designed to allow the student to understand how chemistry relates to everyday life and to learn some of the language and concepts of chemistry. This course uses a math-based approach. The course is designed to prepare students for Principles of Chemistry I or to be utilized as a general Liberal Arts and Sciences course. Lecture and a 2 hour lab are included. (Prerequisite: MATH 0085 or a score of 75.5 or higher on the Elementary Algebra portion of the Accuplacer test.) (MNTC 3: Natural Sciences)
<b>Total Credits</b>	4
<b>Total Hours</b>	80

### Types of Instruction

#### Instruction Type

**Credits/Hours**

Classroom Presentation

On-Campus Lab

### Pre/Corequisites

Prerequisite Math 0085 or a score of 75.5 or higher on the elementary algebra portion of the accuplacer test.

### Course Competencies

#### 1. Use scientific methods of measurement.

##### Learning Objectives

- Use the metric system of measurement in a laboratory setting and in problem solving.
- Write numbers in scientific notation.
- Solve density problems.
- Solve metric conversion problems.
- Describe the meaning of accuracy and precision in measurement.
- Recognize proper use of significant figures in problem solving.
- Calculate density in a laboratory setting using appropriate tools and measurement techniques.

#### 2. Relate matter and energy.

##### Learning Objectives

- Identify substances as solids, liquids or gases based on properties such as shape and volume; and by the arrangement, interaction, and movement of particles.
- Calculate heat loss or gain in calories using specific heat.
- Recognize that heat is a form of energy.

Identify energy as potential or kinetic.

**3. Classify matter.**

**Learning Objectives**

Differentiate between elements, compounds, and mixtures.

Classify mixtures as homogeneous or heterogeneous.

Identify properties and changes as physical or chemical.

Describe the properties of metals, nonmetals, and metalloids.

Identify groups and periods on the periodic table.

Locate alkali metals, alkaline earth metals, halogens, noble gases, and transition elements on the periodic table and recognize their properties.

Discuss the functions and dietary sources of six elements found in the human body.

Analyze a mixture in the laboratory using liquid chromatography.

Calculate the percent water in a compound using appropriate laboratory techniques.

**4. Demonstrate knowledge of atomic models.**

**Learning Objectives**

**9. Predict the effects of changes on chemical equilibrium and reaction rates.**

**Linked External Standards**

3a - Demonstrate understanding of scientific theories.

**Learning Objectives**

Recognize the effect of concentration, heat, surface area, and catalysts on rate of reaction.

Apply LeChatelier's principle to equilibrium reactions.

Apply LeChatelier's principle to biological systems, such as the carbonic acid / bicarbonate buffer system.

Determine factors which affect reaction rates through experimentation in the laboratory.

**10. Solve problems using the gas laws.**

**Linked External Standards**

3a - Demonstrate understanding of scientific theories.

**Learning Objectives**

Calculate the change in volume of gas in a closed system using Boyle's, Charles, Guy-Lussac's, Avogadro's, and the combined gas law.

Calculate the partial pressure of gases in a system using Dalton's law.

Describe the effect of gas laws on biological systems, for example, gases in the lungs or blood gases.

Observe the effects of changes in temperature, volume, and pressure of a gas through laboratory experimentation.

Draw conclusions on the effects of changes in temperature, volume, and pressure of a gas based on laboratory observations.

**11. Demonstrate understanding of solutions.**

**Linked External Standards**

3a - Demonstrate understanding of scientific theories.

**Learning Objectives**

Identify the solute and solvent in a solution.

Classify solutions as saturated, unsaturated or supersaturated.

Differentiate between electrolytes and nonelectrolytes.

Explain the meaning of "like dissolves like".

Explain the effect of temperature and pressure on solubility.

Calculate the percent concentration of a solute in a solution.

Describe osmosis and dialysis.

Calculate molarity.

Calculate the concentration of a solution that has been diluted.

Determine the molecular weight of an unidentified compound in the laboratory using freezing point depression.

**12. Demonstrate understanding of acids, bases, and buffers.**

**Linked External Standards**

3a - Demonstrate understanding of scientific theories.

**Learning Objectives**

Write names and formulas for inorganic acids and bases.

Define acids and bases using the Arrhenius and Bronsted-Lowry definitions.

Calculate the pH of strong acids and strong bases.

Write balanced equations for reactions of acids and bases.

Perform an acid-base titration in the laboratory.

Determine the effect of adding acid and base to a buffer system through experimentation in the laboratory.

**13. Demonstrate basic knowledge of radioactivity.**

**Learning Objectives**

Describe alpha, beta, and gamma radiation.

Describe the measurement of radiation.

Discuss the biological effects of radiation.

