**COLLIN COLLEGE**

**COURSE SYLLABUS**

Course Information

**Course Number:** CHEM 1409

**Course Title**: General Chemistry for Engineering Majors

**Course Description**:

Lecture: Fundamental principles of chemistry for engineering; topics include measurements, fundamental properties of matter, states of matter, chemical reactions, acid‐base concepts, chemical stoichiometry, periodicity of elemental properties, atomic structure, chemical bonding, molecular structure, solutions, properties of gases, phase‐diagrams, chemical thermodynamics, kinetics, introduction to chemical equilibrium, and an introduction to descriptive inorganic chemistry and organic chemistry.

Lab: Basic laboratory experiments supporting theoretical principles presented in lecture; introduction of the scientific method, experimental design, chemical instrumentation, data collection and analysis, and preparation of laboratory reports. This is a co-requisite for CHEM 1409 lecture.

**Course Credit Hours**: 4

Lecture Hours: 3

Lab Hours: 3

Recitation Hours: 1

**Prerequisite**: MATH 1314 equivalent or higher level within the last 5 years with a grade of "C" or better.

**Student Learning Outcomes**:

**State-mandated Outcomes:** Upon successful completion of this course, students will:

Lecture

1. Define the fundamental properties of matter.
2. Classify matter, compounds, and chemical reactions.
3. Convert units of measure and demonstrate dimensional analysis skills.
4. Determine the basic nuclear and electronic structure of atoms.
5. Identify trends in chemical and physical properties of the elements using the Periodic Table.
6. Describe the bonding in and the shape of simple molecules and ions.
7. Solve stoichiometric problems.
8. Use the rules of nomenclature to name chemical compounds.
9. Write chemical formulas.
10. Write and balance equations.
11. Define the types and characteristics of chemical reactions including acids and bases.
12. Use the gas laws and basics of the Kinetic Molecular Theory to solve gas problems.
13. Articulate the importance of intermolecular interactions and predict trends in physical properties.
14. State the characteristics of liquids and solids, including phase diagrams and spectrometry.
15. Apply the principles of equilibrium to chemical systems using Le Chatelier’s Principle to predict the effects of concentration, pressure, and temperature changes on equilibrium mixtures.
16. Analyze and perform calculations with the thermodynamic functions, enthalpy, entropy, and free energy.
17. Discuss the construction and operation of galvanic and electrolytic electrochemical cells, and determine standard and non-standard cell potentials.

Lab

1. Use basic apparatus and apply experimental methodologies used in the chemistry laboratory.
2. Demonstrate safe and proper handling of laboratory equipment and chemicals.
3. Conduct basic laboratory experiments with proper laboratory techniques.
4. Make careful and accurate experimental observations.
5. Relate physical observations and measurements to theoretical principles.
6. Interpret laboratory results and experimental data, and reach logical conclusions.
7. Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports.
8. Design fundamental experiments involving principles of chemistry and chemical instrumentation.
9. Identify appropriate sources of information for conducting laboratory experiments involving principles of chemistry.

**Withdrawal Policy:** See the current *Collin Registration Guide* for last day to withdraw.

**Collin College Academic Policies:** See the current *Collin Student Handbook.*

**Americans with Disabilities Act Statement:** Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student’s responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

*Fall 2018 New*