**COLLIN COLLEGE**

**COURSE SYLLABUS**

Course Information

**Course Number:** CHEM 1412

**Course Title:** General Chemistry II

**Course Description:**

Lecture: Chemical equilibrium; phase diagrams and spectrometry; acid-base concepts; thermodynamics; kinetics; electrochemistry; nuclear chemistry; an introduction to organic chemistry and descriptive inorganic chemistry.

Lab: Basic laboratory experiments supporting theoretical principles presented in CHEM 1312; introduction of the scientific method, experimental design, chemical instrumentation, data collection and analysis, and preparation of laboratory reports.

**Course Credit Hours:** 4

Lecture Hours: 3

Lab Hours: 3

Recitation: 1

**Prerequisite:** CHEM 1411 within the last five years with a grade of "C" or better.

**Student Learning Outcomes:**

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

Lecture

1. State the characteristics of liquids and solids, including phase diagrams and spectrometry.
2. Articulate the importance of intermolecular interactions and predict trends in physical properties.
3. Identify the characteristics of acids, bases, and salts, and solve problems based on their quantitative relationships.
4. Identify and balance oxidation-reduction equations, and solve redox titration problems.
5. Determine the rate of a reaction and its dependence on concentration, time, and temperature.
6. Apply the principles of equilibrium to aqueous systems using LeChatelier’s Principle to predict the effects of concentration, pressure, and temperature changes on equilibrium mixtures.
7. Analyze and perform calculations with the thermodynamic functions, enthalpy, entropy, and free energy.
8. Discuss the construction and operation of galvanic and electrolytic electrochemical cells, and determine standard and non‐standard cell potentials.
9. Define nuclear decay processes.
10. Describe basic principles of organic chemistry and descriptive inorganic chemistry.

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.

* **Additional Collin Outcomes:**  Upon successful completion of this course, students will:

1. Explain and calculate physical properties of solids, liquids and solutions at the macroscopic level and at the molecular level based on intermolecular forces; adequately represent the physical processes symbolically.
2. Derive rate law for organic and inorganic reactions from experimental data; qualitatively and quantitatively determine the effect of various factors on reaction rate and rate constant using critical thinking.
3. Qualitatively and quantitatively explain chemical equilibria including gaseous, heterogeneous, solution, as well as application of different acid-base theories, concepts of acid strength, pH, buffers, and titration curves; relationship of equilibrium with both kinetic and thermodynamic.
4. Using critical thinking define, predict and calculate entropy, enthalpy, and Gibbs free energy changes for a system both at standard and nonstandard conditions.
5. Symbolically, qualitatively and quantitatively describe all aspects of redox reactions, galvanic cells, and electrolytic cells.
6. Symbolically and quantitatively describe nuclear reactions and their energy
7. Safely work in teams in the laboratory to collect data (both electronically and manually), make measurements, make observations and conduct reactions; qualitatively and quantitatively and critically analyze lab data and communicate results using both written and electronic formats.

**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.