COURSE NUMBER: CHEM 1412

COURSE TITLE: General Chemistry II

CREDIT HRS: 4   LECTURE HRS: 3   LAB HRS: 3   CLN/REC HRS: 1

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

CO-REQUISITE: Concurrent enrollment in CHEM 1412 (laboratory) and CHEM 1412 (recitation). You may repeat this course only once after receiving a grade, including W.

COURSE DESCRIPTION:
A continuation of CHEM 1411 that addresses topics in chemical equilibria, acid-base theory, solubility, electrochemistry, nuclear chemistry, organic chemistry, biochemistry and states of matter. Laboratory exercises reinforce concepts presented in lecture and develop more advanced lab methods.

TEXTBOOK: Chemistry – An Atoms-Focused Approach, by Natalie Foster, Thomas R. Gilbert, Rein V. Kirss
ISBN 978-0-393-12420-4

SMART WORK HOMEWORK:
This course might involve online homework and would require you to have a pass code for Smart Work. Consult your instructor for further details.

SUPPLIES:
- Scientific calculator that has function keys for natural logarithms (ln key) and base 10 logarithms (log key) and perhaps other features for statistics, %, etc.

EXPECTED STUDENT LEARNING OUTCOMES:
Upon successful completion of this course, students will:
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.


10. Describe basic principles of organic chemistry and descriptive inorganic chemistry.

11. Use basic apparatus and apply experimental methodologies used in the chemistry laboratory.

12. Demonstrate safe and proper handling of laboratory equipment and chemicals.

13. Conduct basic laboratory experiments with proper laboratory techniques.

14. Make careful and accurate experimental observations.

15. Relate physical observations and measurements to theoretical principles.

16. Interpret laboratory results and experimental data, and reach logical conclusions.

17. Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports.

18. Design fundamental experiments involving principles of chemistry and chemical instrumentation.

19. Identify appropriate sources of information for conducting laboratory experiments involving principles of chemistry.

A. 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. (Critical Thinking, Communication Skills, and Empirical/Quantitative)

B. 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. (Critical Thinking and Empirical/Quantitative)

C. 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. (Critical Thinking, Communication Skills, and Empirical/Quantitative)

D. Using critical thinking; define, predict and calculate entropy, enthalpy, and Gibbs free energy changes for a system both at standard and nonstandard conditions. (Critical Thinking and Empirical/Quantitative)

E. Symbolically, qualitatively and quantitatively describe all aspects of redox reactions, galvanic cells, and electrolytic cells. (Critical Thinking and Empirical/Quantitative)

F. Symbolically and quantitatively describe nuclear reactions and their energy. (Empirical/Quantitative)

G. 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. (Critical Thinking, Communication Skills, Empirical/Quantitative, and Teamwork)
COURSE REQUIREMENTS:
Written exams, recitation and lab participation and other assignments as given by instructor.

COURSE FORMAT:
May include but not limited to lectures, transparencies, videos, computer software, demonstrations, hands-on exercises, and student presentations.

METHOD OF EVALUATION:
- Lecture average = 70% final grade
- Recitation = 10% final grade
- Lab average = 20% final grade
  100% TOTAL

Lecture average will consist of 4 equally weighted exams (including final). It may also consist of quizzes and/or assignments. See lecture instructor for specific breakdown of lecture component.

RECITATION:
Recitation is a component of this course that enhances critical thinking and problem solving. This component will include, but is not limited to, some hands-on activities as well as group activities/discussions, and writing. Attendance and participation will impact your grade.

ATTENDANCE POLICY:
Students should attend all classes, labs, and recitations. Your attendance and class participation will impact your grade. Ask your professor for the policy that pertains to your course section. Please see the schedule of classes for the last day to withdraw.


ADA STATEMENT:
It is the policy of Collin County Community College to provide reasonable and appropriate accommodations for individuals with documented disabilities. This College will adhere to all applicable Federal and state 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, (room G-200, Spring Creek Campus) or 972.881.5898, in a timely manner if he/she desire to arrange for accommodations.

ACADEMIC ETHICS:
The college may initiate disciplinary proceedings against a student accused of scholastic dishonesty. Scholastic dishonesty includes, but is not limited to, statements, acts, or omissions related to applications for enrollment or the award of a degree, and/or the submission of material as one’s own work that is not one’s own. Scholastic dishonesty may involve one or more of the following acts: cheating, plagiarism, collusion, and/or falsifying academic records.

Cheating is the willful giving or receiving of information in an unauthorized manner during an examination, illicitly obtaining examination questions in advance, using someone else’s work for assignments as if it were one’s own, copying computer or Internet files, and any other dishonest means of attempting to fulfill the requirements of a course.
Plagiarism is the use of an author’s words or ideas as if they were one’s own without giving credit to the source, including, but not limited to, failure to acknowledge a direct quotation.

Collusion is intentionally aiding or attempting to aid another in an act of scholastic dishonesty, including but not limited to, providing a paper or project to another student; providing an inappropriate level of assistance; communicating answers to a classmate during an examination; removing tests or answer sheets from a test site, and allowing a classmate to copy answers.