

**SEWARD COUNTY COMMUNITY COLLEGE
COURSE SYLLABUS**

I. TITLE OF COURSE: CH1515 - College Chemistry II

**II. COURSE DESCRIPTION: 5 credit hours
3 credit hours of lecture and 2 credit hours of lab per week.**

This is a continuation of General Chemistry I. Contents include states of matter, solution chemistry, rates of reactions, chemical equilibrium, acid-base chemistry, thermodynamics, electrochemistry, organic chemistry, and nuclear chemistry. Laboratory stress is on identification of anions and cations with some quantitative experiments. Analysis uses both wet procedures and some instrumentation. For each unit of credit, a minimum of three hours per week with one of the hours for class and two hours for studying/preparation outside of class is expected.

EduKan course number: CH178

Pre-requisite:
CH 1505 - Chemistry I.

III. PROGRAM AND/OR DEPARTMENT MISSION STATEMENT:

The Science Program at Seward County Community College provides opportunities to improve and enhance each student's understanding and comprehension of the natural world through a variety of courses and experience to develop a scientifically literate citizen.

IV. TEXTBOOK AND MATERIALS:

1. Burdge, Julia, Chemistry: Atoms First, 4th Ed., New York, NY: McGraw Hill
2. Anthony, S., Braun, K.L., and Mernitz, H., ChemConnections: Activity Workbook, New York, NY: W.W. Norton
3. Internet and SCCC portal access
4. Bryan, William SCCC College Chemistry Lab Manual.

V. SCCC OUTCOMES:

- 1: Read with comprehension, be critical of what they read, and apply knowledge gained to real life
- 2: Communicate ideas clearly and proficiently in writing, appropriately adjusting content and arrangement for varying audiences, purposes, and situations.
- 3: Communicate their ideas clearly and proficiently in speaking, appropriately adjusting content and arrangement for varying audiences, purposes, and situations.
- 4: Demonstrate mathematical skills using a variety of techniques and technologies.
- 5: Demonstrate the ability to think critically by gathering facts, generating insights, analyzing data, and evaluating information

8: Show the ability to contribute to political, civic, and community responsibilities as an informed member of society

VI. COURSE OUTCOMES:

1. Grasp the importance of Chemistry as it applies to everyday events.
2. Learn the kinds of problems that confront chemists and the various methods used to solve particular problems.
3. Expand basic knowledge of chemical laws and theories.
4. Perform chemical calculations.
5. Improve laboratory techniques while maintaining accepted safe laboratory procedures.
6. Analyze chemical reactions.
7. Enlarge chemical vocabulary.
8. Communicate ideas in both written and oral methods.
9. Plan, carry out and present a basic semester research project.
10. Determine concentrations of solutions expressed in polarity, molality, percent by mass, mole fraction, mole percent and ppm.
11. Solve kinetics problems, determine order of reactions, rate constants, and write reaction rate equations.
12. Write equilibrium expressions; Calculate reactions quotients and equilibrium constants; solve for equilibrium concentrations using the Method of Successive Approximations; Convert K_p to K_c and vice versa; Use LeChatelier's Principle to determine chemical shifts in equilibria, and calculate the Van't Hoff factor.
13. Write conjugate Acid-Base pair reactions. Express acids and bases using Arrhenius Theory, Bronsted-Lowry Theory, and Lewis Theory. Write and solve common ion and buffer problems. Calculate pH, pOH, pKa and pKb values for solutions.
14. Understand five types of energy, useful work, entropy and the Second Law of Thermodynamics; determine ΔG values and the variations of ΔG° with temperature changes.
15. Measure half-cell potentials, analyze galvanic cells, and study corrosion electrolysis and solve half-cell problems. Calculate electrochemical stoichiometry problems.
16. Write reaction for the formation of metallic complexes. Examine metals of the main groups, Groups IB, IIB and transition elements and their chemistry.
17. Learn the basic nomenclature for alkanes, alkenes, alkynes, alcohols, aldehydes, ketones, ethers and amines, with a brief introduction to aromatic compounds and halides.
18. Get a brief introduction to radioactivity, half-life, fission and fusion reactions. Examine nucleides stability and the types of particle/electromagnetic wave emissions during nuclear decay.
19. Develop skillful laboratory techniques of cation and anion separation and identification.
20. Apply the quantitative analysis methods to soil and water samples.
21. Use spectrophotometers in quantitative iron determinations.

VII. COURSE OUTLINE:

1. Clearly distinguish between the gaseous state, the liquid state.

2. Learn about solution formation, types of solutions, colligative properties, and colloid formation.
3. Know that five factors effect the rate of the reaction.
4. Calculate the rate of a reaction.
5. Determine the half-life for first and second order reactions.
6. Learn dynamic equilibria.
7. Learn the use of the equilibrium constant and the applications of LeChatelier's Principle.
8. Compare definitions of Acids and bases according to Arrhenius Theory, Bronsted-Lowry Theory, and Lewis Theory.
9. Understand how to obtain relative strengths of Acids and Bases, and the relation between self ionization of water and pH.
10. Write equilibrium reactions for weak acids and weak bases.
11. Know and solve problems using the Henderson-Hasselbalch equation.
12. Know the common-Ion effect, buffers, and acid-base titration curves.
13. Write the solubility product from equilibrium reactions.
14. Know the relationship between solubility and the common ion Effect.
15. Understand the complex-ion equilibria and the applications of solubility equilibria.
16. Know the Laws of Thermodynamics.
17. Learn about spontaneous processes and free energy.
18. Calculate free energies and equilibrium constants.
19. Review oxidation-reduction reactions in detail.
20. Learn how to construct a voltaic cell and electrolytic cell.
21. Discuss methods employed to provide cathodic protection from iron pipes and structures.
22. Know the different types of radiations, radioactivity, and nuclear bombardment reactions.
23. Calculate energy of nuclear reactions.
24. Distinguish between nuclear fission and nuclear fusion.
25. Learn some elements of metallurgy and the chemistry of the Main-Group metals, nonmetals, and the transition elements.
26. Learn the important uses of hydrocarbons, derivatives of hydrocarbons, and organic polymers.
27. Have a basic understanding of biochemistry and biological systems.

VIII. INSTRUCTIONAL METHODS:

1. Lecture – Discussion
2. Laboratory Experiments and Exercises
3. Problem Solving Assignments
4. Videos, DVD, and Computer Programs
5. Overhead Projections
6. Demonstrations Related to Concepts
7. Internet

IX. INSTRUCTIONAL AND RESOURCE MATERIALS:

1. Chemicals

2. Laboratory equipment
3. Overhead projections
4. DVD's, simulations, and other computer Software
5. Available instrumentation
6. Internet

X. METHODS OF ASSESSMENT:

SCCC Outcome #1 will be assessed and measured by comprehension of text reading assignments, a semester research project, participation in class discussion and through peer review assignments.

SCCC Outcome #2 will be assessed through the student's written essays and semester research paper.

SCCC Outcome #3 will be assessed by the student's expression of ideas through class discussion, peer workshops, and oral presentation of a semester research project.

SCCC Outcome #4 will be assessed and measured by homework, problems, short quizzes, tests, class discussion, and PLTL workshops.

SCCC Outcome #5 will be assessed and measured by lab experiments, a semester research paper, laboratory research assignment, PLTL workshops, application essay assignments, and writing of a laboratory procedures.

SCCC Outcome #8 will be assessed through class discussion and written reports on the effect of chemicals on ecological systems and how individuals affect the international, federal, state, and local government controls and regulations.

SCCC Outcome #9 Will be assessed through class attendance, group participation, and individual ethics used in data collection and research reporting.

1. Students will be given real life problems and assessed on how they apply the scientific method to arrive at a solution(s) to the problems.
2. Students will be given a pre-quiz and post-quiz on general unit conversions.
3. Additional assessment will come as students apply conversion to various problems and laboratory applications throughout the semester.
4. Students will be assessed on how they apply their knowledge of chemical reactions in a series of laboratory experiments. They will be given several possible starting reagents and asked to predict potential products or conclude no reaction would occur. They then will proceed to test their predictions in the lab setting.
5. A pre quiz and post-quiz will be used to directly assess the students understanding of chemical nomenclature. Additional assessment will be involved in problems covered throughout the semester.
6. Students will be given several consumer goods and asked to analyze the chemical ingredients. The ability of students to identify and determine the chemical composition of the

ingredients that are ionic compounds, acids, and hydrates will be assessed.

7. A pre-topic quiz will be given. After discussion of gas laws, students will then be given real-life problems dealing with gas laws. Their understanding of the gas laws will be assessed by how they solve these problems.

8. Assessment of heat exchange will be done in the laboratory setting with the students first predicting outcomes in terms of heat exchange and then testing their predictions.

9. The understanding of ionic and covalent bonding will be assessed through application to other conceptual problems.

10. The knowledge of valence shell electrons and periodicity will be assessed through pre and post quizzing, problem applications, and laboratory experiment analysis.

11. The student's knowledge of chemical states and transitions will be assessed through problems involving chemical equations with more than one chemical state and a laboratory experiment centering on the sublimation of moth balls.

12. The student's understanding of general acid/base concepts will be assessed by laboratory experimentation and the semester chemical product hunt.

13. Student's will be having the opportunity to examine a variety of applications of chemistry in the fields of agriculture, pharmacy, ecology, etc. in the US and around the world. Students will then be assessed through their contributions of viewpoints and observations to class discussion on the topics.

XI. ADA STATEMENT:

Under the Americans with Disabilities Act, Seward County Community College will make reasonable accommodations for students with documented disabilities. If you need support or assistance because of a disability, you may be eligible for academic accommodations. Students should identify themselves to the Dean of Students at 620-417-1106 or going to the Student Success Center in the Hobbie Academic building, room 149 A.

XII. CORE OUTCOMES PROJECT:

The learning outcomes and competencies detailed in this course outline or syllabus meet, or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents

KRSN: CHM1020

Syllabus Reviewed: 10/28/2021