Sul Ross State University
Syllabus for General Chemistry II:
CHEM 1312 2V1- 31218 (Summer II, 2022)

Class: General Chemistry II
Room: only web-based blackboard
Time: 10:30-12:05

Date: July 06 to August 08, 2022

Instructor: Dr. Hong Young Chang
Office: WSB 219
Office Hours: M-R 3:00-5:00pm via Zoom or phone
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OBJECTIVES

Student Learning Objectives (SLO):

A student graduating with the ***chemistry major*** is expected to demonstrate that (s)he is able to do the following:

1. Organic Chemistry—Students will be able to draw organic molecular structures and explain organic reactions, stereochemistry, structural analysis and reactions in biological systems.

2. Inorganic Chemistry—The student will be able to demonstrate understanding of coordination chemistry, valence theory, elementary actions and advanced molecular theory.

3. Analytical Chemistry—The student will be able to demonstrate an understanding of theory of analytical chemistry and conduct analytical analysis, including data analysis and calibration, equilibrium chemistry, gravimetric analysis, titrimetric analysis, spectroscopic analysis, and electrochemical analysis.

4. Physical Chemistry—The student will be able to demonstrate an understanding of the application and theory of physical chemistry, including topics such as atomic structure, electrochemistry, surface chemistry, solid-state chemistry, and thermodynamics.

5. Research—The student will collect and analyze published chemical literature and undertake a chemistry research project.

General Chemistry II Learning Objectives:

At the end of this course, a student should have a good understanding of:

1. The basic concepts of intermolecular forces
2. Physical properties of solutions
3. The basic concepts of chemical kinetics and equilibrium
4. The concepts of acid and bases
5. Laws of thermodynamics
6. Redox reactions

Core Objectives (CO):

1. **Critical Thinking Skills** – Students will gain/improve their critical thinking ability by solving real life chemistry problems through inquiry, analysis, and evaluation of available information. Students will be tested on their critical thinking ability in exams and through lab experiments.

2. **Communication Skills** – Students will have the opportunity of improving communication skills through oral discussion and writing reports (i.e. observation, explanation, and conclusion, etc.) on the experiments done in the lab sessions.

3. **Empirical and Quantitative Skills** – Students will use the mathematical skills needed to manipulate and analyze numerical data obtained through experimentation in order to form conclusions.

4. **Teamwork** – Students will use team-spirit and consider different points of view to work effectively while conducting experiments as a team working toward a shared purpose or goal.

Text Book: "***General Chemistry: The Essential Concepts 7th Edition***" by Raymond Chang and Kenneth A. Goldsby, McGraw-Hill, New York, United States of America, **2014**. (Older editions such as the 5th are 6th editions are ok to use).

Calculator: A scientific calculator is required for this course.

Web availability: This lecture class is done ***via only online by "Blackboard" of SRSU.*** There is no face-to-face attendance. Therefore, students have to set up their blackboard account to see the lecture video file. Download of Homework & Assignment, Announcements, and all exams will be done in the blackboard.
The lecture video files will be uploaded on the blackboard after class. Students can see the files.

The following chapters will be covered in General Chemistry II:

Chapter 6: Energy Relationships in Chemical Reaction

Chapter 12: Intermolecular Forces and Liquids and Solids

Chapter 13: Physical Properties of Solutions

Chapter 14: Chemical Kinetics

Chapter 15: Chemical Equilibrium

Chapter 16: Acids and Bases

Chapter 17: Acid-Base Equilibria

Chapter 18: Laws of Thermodynamics

Chapter 19: Redox Reactions

Students with Special Needs: *Sul Ross State University (SRSU) is committed to equal access in compliance with the Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request for accessibility service. Please contact Ms. Rebecca Greathouse Wren, M.Ed., LPC-S, Director/Counselor, Accessibility Services Coordinator, Ferguson Hall (Suite 112) at 432.837.8203; mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas 79832. E-mail: rebecca.wren@sulross.edu Students should then contact the instructor as soon as possible to initiate the recommended accommodations.*

Scholastic Dishonesty: *Students who violate the University rules on scholastic dishonesty are subject to penalties, including the possibility of an **F** in the course and/or dismissal from the University.* ***All assignments (including homework) need to be individually completed and not copied from another student's work.***

Homework & Assignments: There is homework assigned for each chapter. ***The homework will be solved in the SRSU Blackboard (multiple-choice homework).*** *You may try to solve the problem sets several times to attain the highest score. You need to keep their due day for each chapter. The due day for each chapter will be notified.*

Examinations: There will be ***three midterm examinations and a final examination. The final is mandatory*** and comprehensive style questions will be given. All examinations will be done inner the blackboard of SRSU. With the limited time, the problem sets of all examinations will be seen in the blackboard. Students can choose their convenient time to take the examinations. Multiple-attempt is not allowed for all examinations. ***Only one attempt is given for all examinations.*** NO MAKE-UP EXAMS WILL BE GIVEN.

NOTE: Homework and Exams ***MUST be completed in the blackboard of SRSU***!

ATTENDANCE: ***the attendance of students and the access of blackboard will be check-out.*** There is no face-to-face attendance in this class.

PERCENTAGE BREAKDOWN OF MARKS:

Homework & Assignment: 50% (each chapter has 30-35 problem sets)
Midterm Exams (10% each): 30%
Final Exam: 20%

Midterm Exam I: Monday, July 18th
Midterm Exam II: Tuesday, July 26th
Midterm Exam III: Wednesday, August 3rd
Final Exam: Monday, August 8th

Course Calendar

Lecture 1 (July 6): Discussion on Syllabus, exams and grade distributions. Importance of chemical energy. Types of energy, energy changes in chemical reactions and first law of thermodynamics

Lecture 2 (July 7): Enthalpy of chemical reactions and calorimetry: Discussion on selective questions and problems on chapter 6

Lecture 3 (July 8): Kinetic Molecular Theory of liquids and solids, types of intermolecular forces, and properties of liquids; Homework 1 due

Lecture 4 (July 11): liquid-vapor equilibrium, and liquid solid equilibrium. Phase diagram and discussion on selective questions and problems on chapter 12

Lecture 5 (July 12): Types of solutions, concentration units, factors affecting solubility colligative properties; discussion on selective questions and problems on chapter 13; Homework 2 due

Lecture 6 (July 13): Terminologies related to rate laws, first order, second order reactions, and experimental determinations of rate laws; Homework 3 due

Lecture 7 (July 14): Activation energy and temperature dependence of rate constants, elementary reactions, and catalysis

Lecture 8 (July 15): Exam Revision on Chapters 6, 12 and 13

Lecture 9 (July 18): Midterm Exam I; Chapters 6, 12 and 13 **(based on CDT, from 10:30 am to 6:00 pm, the exam I will be exposed on the blackboard)**

Lecture 10 (July 19): Discussion on selective questions and problems on chapter 14; The concepts of chemical equilibrium and equilibrium constants.

Lecture 11 (July 20): Reaction quotients, calculation of equilibrium concentrations; factors affecting chemical equilibrium; Homework 4 due

Lecture 12 (July 21): Discussion on selective questions and problems on chapter 15

Lecture 13 (July 22): Concepts of acids and bases, acid-base properties of water, pH, strength of acids and bases; Ionization constants of weak acids and bases, Homework 5 due

Lecture 14 (July 25): Exam Revision on Chapters 14 and 15; percent ionization; ionization constants of conjugate acid-base

Lecture 15 (July 26): Midterm Exam II Chapters 14 & 15 **(based on CDT, from 10:30 am to 6:00 pm, the exam II will be exposed on the blackboard)**

Lecture 16 (July 27): Acid-base properties of salts, Lewis acids and bases, discussion on selective questions and problems on chapter 16; Concept of buffer solution

Lecture 17 (July 28): Preparing buffer with a specific pH, strong acid-strong base titrations; Homework 6 due

Lecture 18 (July 29): Weak acid-strong base titrations, strong acid-weak base titrations, acid- base indicators

Lecture 19 (August 1): Solubility product, molar solubility, predicting precipitation reactions, Common ion effect and solubility, complex ion equilibria and solubility; discussion on selective questions and problems on chapter 17, spontaneous processes and entropy

Lecture 20 (August 2): Exam Revision on Chapters 16 and 17, second law of thermodynamics, Gibbs free energy and chemical equilibrium, Homework 7 due

Lecture 21 (August 3): Midterm Exam III Chapters 16 and 17 **(based on CDT, from 10:30 am to 6:00 pm, the exam III will be exposed on the blackboard)**

Lecture 22 (August 4): Discussion on selective questions and problems on chapter 18; Redox reactions, balancing redox equations, Homework 8 due.

Lecture 23 (August 5): Galvanic cells and standard reduction potentials; electromotive force (emf) and Nernst equation. Concepts of batteries, corrosion, and electrolysis; discussion on selective questions and problems on chapter 19; Homework 9 due.

Lecture 24 (August 8): Final Exam **(based on CDT, from 10:30 am to 6:00 pm, the problem sets of final exam will be exposed on the blackboard)**