

SUL ROSS STATE UNIVERSITY
Syllabus for General Chemistry II-21439
CHEM 1312-002 (Spring 2021)

General Chemistry II: Lecture (3 credits)
Room: WSB 307
Time: TR: 9:30-10:45 am
Date: Jan. 11 to May. 5

Instructor: Hong Young Chang
Office: WSB 219
Email: hxc19tv@sulross.edu
Office Hours: TBD

(The first two weeks (Jan. 11 to Jan. 22) is on-line class)
(Revert to Face-to-Face: Jan.25 to May.5)

Due to the COVID-19 pandemic, you must wear a suitable mask/face covering while on campus (including lectures & laboratories). You will be asked to leave the classroom if you come to class without a suitable mask/face covering.

<https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/diy-cloth-face-coverings.html>

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: 1. “*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 or 6th editions are ok to use).
2. “*OpenStax Chemistry 2e*” <https://openstax.org/details/books/chemistry-2e> by Paul Flowers, Klaus Theopold, Richard Langley, etc.

The SRSU library has one copy for the textbook of the General Chemistry in the “Textbook Collection” section. Please ask the library front desk if you need help finding this textbook. For the “OpenStax Chemistry 2e”, you can do free-downloading the book file as PDF. Among two textbooks, you can choose one.

Calculator: A scientific calculator is required for this course.

Cell phones **ARE NOT** permitted for use in exams and should be turned off during class time.

The following chapters will be covered in General Chemistry II:

Chapter 6: Energy Relationships in Chemical Reactions

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 and Solubility Equilibria

Chapter 18: Thermodynamics

Chapter 19: Redox Reactions and Electrochemistry

Homework & Assignments: There is two kinds of homework assigned for each chapter. *One 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. Their due day for each chapter will be notified.

*The other homework will be done with your pen. This homework style is short answer problem sets. After downloading and printing the homework sheet, you need to solve the problem sets. After solving the problem sets, you need to scan the sheet with your cellphone or scanner (your cellphone has this scanner function after downloading the corresponding application files. Please, turn in your homework as one PDF file). You also need to keep their due day for each chapter. **NO LATE HOMEWORK WILL BE ACCEPTED.** You may turn in this homework via email. Your professor will review and check this submitted homework to know whether you copy other students' homework or not.*

Examinations: There will be *three midterm* examinations and *a final* examination. The final is mandatory and comprehensive. *The final exam will be taken on as the face to face style.*

NO MAKE-UP EXAMS WILL BE GIVEN.

NOTE: all exams MUST be completed in pen as the face-to-face style!

ATTENDANCE PRERESQUITE: BEING ABSENT FROM MORE THAN 9 LECTURES WILL RESULT IN FAILING THE COURSE.

PERCENTAGE BREAKDOWN OF MARKS:

Homework & Assignments: 25%
(multiple-choice 12.5 % and short-answer 12.5%)
Each Midterm Exam (16.67%): 50%
Final Exam: 25%

Midterm Exam I: Thursday February 11th as face-to-face

Midterm Exam II: Thursday March 4th as face-to-face

Midterm Exam III: Thursday April 15th as face-to-face

Final Exam: Tuesday, May 4th at 9:30 am as face-to-face in WSB 307

Course Calendar

Lecture 1 (January 12): Discussion on Syllabus. Importance of chemical energy, types of energy, energy changes in chemical reactions

Lecture 2 (January 14): The first law of thermodynamics, enthalpy of chemical reactions, and calorimetry.

Lecture 3 (January 19): Discussion on selective questions and problems on Chapter 6, and kinetic molecular theory of liquids and solids,

Lecture 4 (January 21): Types of intermolecular forces, properties of liquids, liquid-vapor equilibrium, liquid-solid equilibrium, and solid-vapor equilibrium (*Short-Answer Homework Chapter 6 due*)

Lecture 5 (January 26): Phase diagrams and discussion on selective questions and problems on Chapter 12, types of solutions and concentration units

Lecture 6 (January 28): Factors affecting solubility and colligative properties (*Short-Answer Homework Chapter 12 due*)

Lecture 7 (February 2): Discussion on selective questions and problems on Chapter 12, and terminologies related to rate laws.

Lecture 8 (February 4): First & second order reactions and experimental determination of rate laws (*Short-Answer Homework Chapter 13 due*)

Lecture 9 (February 9): Exam Revision

Lecture 10 (February 11): **Exam I: Chapters 6, 12 & 13**

Lecture 11 (February 16): Activation energy and temperature dependence of rate constants, elementary reactions, reaction mechanism, and catalysis

Lecture 12 (February 18): Discussion on selective questions and problems on Chapter 14, the concepts of chemical equilibrium, and equilibrium constants

Lecture 13 (February 23): Reaction quotients, calculation of equilibrium concentrations, and factors affecting chemical equilibrium (*Short-Answer Homework Chapter 14 due*)

Lecture 14 (February 25): Discussion on selective questions and problems on chapter 15, concepts of acids and bases, acid-base properties of water, pH, strength of acids and bases, ionization constants of weak and bases, and percent ionization

Lecture 15 (March 2): Exam Revision (*Short-Answer Homework Chapter 15 due*)

Lecture 16 (March 4): **Exam II: Chapters 14 & 15**

NO CLASS: SPRING BREAK (March 8 to March 12)

Lecture 17 (March 16): Ionization constants of conjugate acids-bases, determination of pH for weak acids and bases using ICE tables, acid-base properties of salts, Lewis acids and bases, and discussion on selective questions and problems on Chapter 16

Lecture 18 (March 18): Common ion effect in chemical equilibrium, Henderson-Hasselbalch equation, concept of buffer solution, and preparing buffer with a specific pH (*Short-Answer Homework Chapter 16 due*)

Lecture 19 (March 23): Strong acid-strong base titrations, weak acid-strong base titrations, acid-base indicators

Lecture 20 (March 25): Solubility product, molar solubility, predicting precipitation reactions, common ion effect and pH on solubility

Lecture 21 (March 30): Discussion on selective questions and problems on Chapter 17, spontaneous processes and entropy, and microstates related to entropy

Lecture 22 (April 1): The second law of thermodynamics, entropy changes in systems and surroundings, and the third law of thermodynamics (*Short-Answer Homework Chapter 17 due*)

Lecture 23 (April 6): Gibbs free energy chemical equilibrium, and discussion on selective questions and problems on Chapter 18

Lecture 24 (April 8): Redox reactions, balancing redox equations, spontaneous Galvanic cells, and standard reduction (*Short-Answer Homework Chapter 18 due*)

Lecture 25 (April 13): Potentials electromotive force (emf), Nernst equation, concentration cells, concepts of batteries/ Revision for Exam III

Lecture 26 (April 15): **Exam III: Chapters 16, 17, & 18**

Lecture 27 (April 20): Concepts of corrosion, electrolysis, and discussion on selective questions and problems on Chapter 19 (*Short-Answer Homework Chapter 19 due*)

Lecture 28 (April 22): Final Exam Revision (Chapters 6, 12, 13, 14, 15)

Lecture 29 (April 27): Final Exam Revision (Chapters 16, 17, 18, 19)

NO CLASS: DEAD DAY (April 29)

Final Exam (Comprehensive): Tuesday, May 4th at 9:30 am-10:25 pm, WSB307

Students with Special Needs: *Sul Ross State University (SRSU) is committed to equal access in compliance with 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.*