

**SUL ROSS STATE UNIVERSITY**  
**Syllabus for General Chemistry I-11242**  
**CHEM 1312- 001 (Fall 2021)**

General Chemistry II: Lecture  
Room: WSB 307  
Time: TR: 9:30 am -10:45 am

Instructor: Dr. Hong Young Chang  
Office: WSB 219  
Email: [hxc19tv@sulross.edu](mailto:hxc19tv@sulross.edu)  
Office Hour: M-R 2:00-4:30pm  
(In person or zoom)  
(Appointments only)

**It is recommended to wear a suitable mask/face on campus (including lectures & laboratories) while you took COVID-19 Vaccine shots. There will be COVID-19 Tests in this semester. If you have tested positive for COVID-19 (or have been exposed to someone who has tested positive for COVID-19), please self-report: <https://srinfo.sulross.edu/covid-19/self-report/>. In order to self-report, you will need to be signed in with your SRSU credentials (yellow “log in” button on the bottom left-hand side of the above website). Other web-site of SRSU is also helpful for COVID-19.**

[COVID Regulations - SUL ROSS](#)

[Free COVID-19 testing for all SRSU students, faculty and staff comes to Alpine, August 27-28 - Sul Ross State University Athletics \(srlobos.com\)](#)

**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 7<sup>th</sup> 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

**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](mailto: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. Their 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. **NO MAKE-UP EXAMS WILL BE GIVEN.**

**NOTE: all exams MUST be completed in pen!**

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

**Grading:**

Homework & Assignments: 30%  
Each Midterm Exam (16.67%): 50%  
Final Exam: 20%

**Exam I:** Thursday, September 23<sup>rd</sup>

**Exam II:** Thursday, October 14<sup>th</sup>

**Exam III:** Thursday, November 18<sup>th</sup>

**Final Exam:** Monday, December 6<sup>th</sup> from 8:00 am to 10:00 am

## Course Calendar

**Lecture 1 (August 24):** Discussion on Syllabus. Importance of chemical energy, types of energy, energy changes in chemical reactions

**Lecture 2 (August 26):** The first law of thermodynamics, enthalpy of chemical reactions, and calorimetry.

**Lecture 3 (August 31):** Discussion on selective questions and problems on Chapter 6, and kinetic molecular theory of liquids and solids,

**Lecture 4 (September 2):** Types of intermolecular forces, properties of liquids, liquid-vapor equilibrium, liquid-solid equilibrium, and solid-vapor equilibrium (*Homework Chapter 6 due*)

**Lecture 5 (September 7):** Phase diagrams and discussion on selective questions and problems on Chapter 12, types of solutions and concentration units

**Lecture 6 (September 9):** Factors affecting solubility and colligative properties (*Homework Chapter 12 due*)

**Lecture 7 (September 14):** Discussion on selective questions and problems on Chapter 12, and terminologies related to rate laws.

**Lecture 8 (September 16):** First & second order reactions and experimental determination of rate laws (*Homework Chapter 13 due*)

**Lecture 9 (September 21):** Exam Revision

**Lecture 10 (September 23):** **Exam I (covers Chapters 6, 12 & 13)**

**Lecture 11 (September 28):** Activation energy and temperature dependence of rate constants, elementary reactions, reaction mechanism, and catalysis

**Lecture 12 (September 30):** Discussion on selective questions and problems on Chapter 14, the concepts of chemical equilibrium, and equilibrium constants

**Lecture 13 (October 5):** Reaction quotients, calculation of equilibrium concentrations, and factors affecting chemical equilibrium (*Homework Chapter 14 due*)

**Lecture 14 (October 7):** 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 (October 12):** Exam Revision (*Homework Chapter 15 due*)

**Lecture 16 (October 14):** **Exam II (covers Chapters 14 & 15)**

**Lecture 17 (October 19):** Ionization constants of conjugate acids-bases, determination of pH for weak acids and bases using ICE tables, acid-base properties of salts, Lewis's acids and bases, and discussion on selective questions and problems on Chapter 16

**Lecture 18 (October 21):** Common ion effect in chemical equilibrium, Henderson-Hasselbalch equation, concept of buffer solution, and preparing buffer with a specific pH (*Homework Chapter 16 due*)

**Lecture 19 (October 26):** Strong acid-strong base titrations, weak acid-strong base titrations, acid-base indicators

**Lecture 20 (October 28):** Solubility product, molar solubility, predicting precipitation reactions, common ion effect and pH on solubility

**Lecture 21 (November 2):** Discussion on selective questions and problems on Chapter 17, spontaneous processes and entropy, and microstates related to entropy

**Lecture 22 (November 4):** The second law of thermodynamics, entropy changes in systems and surroundings, and the third law of thermodynamics (***Homework Chapter 17 due***)

**Lecture 23 (November 9):** Gibbs free energy chemical equilibrium, and discussion on selective questions and problems on Chapter 18

**Lecture 24 (November 11):** Redox reactions, balancing redox equations, spontaneous Galvanic cells, and standard reduction (***Homework Chapter 18 due***)

**Lecture 25 (November 16):** Potentials electromotive force (emf), Nernst equation, concentration cells, concepts of batteries/ Revision for Exam III

**Lecture 26 (November 18):** **Exam III (covers Chapters 16, 17, & 18)**

**Lecture 27 (November 23):** Concepts of corrosion, electrolysis, and discussion on selective questions and problems on Chapter 19 (***Homework Chapter 19 due***)

**Thanksgiving Days (November 24 to November 26)**

**Lecture 28 (November 30):** **Final Exam Revision**



**NO CLASS: DEAD DAY (December 2)**

**Final Exam (*Mandatory and Comprehensive*): Monday, December 6<sup>th</sup> from 8:00 am to 10:00 am**