

SUL ROSS STATE UNIVERSITY
Syllabus for General Chemistry II-(CRN:21343)
CHEM 1312-001 (Spring 2023)

General Chemistry II: Lecture (3 credits)
Room: WSB 307
Time: T/Th: 12:30-1:45 pm

Instructor: Dr. Hong Young Chang
Office: WSB 219
Email: hxc19tv@sulross.edu
Office Hours: M-Th 2:00-6:30pm

Food & Drinks: There will be no eating or drinking in the classroom. If you need to take a sip of your drink during class time, you may leave the room to do so.

SRSU Disability Services: ADA (Americans with Disabilities Act):

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.***

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.

BSc in Chemistry Marketable Skills

1. Students will become good at punctuality and time management.
2. Students will analyze &/or synthesize molecules and perform spectroscopic characterization and interpret their results scientifically.
3. Students will become proficient at writing scientific papers and identifying appropriate references for their papers.
4. Students will become proficient at orally presenting scientific topics including the use of visual aids.

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. Chemical equilibrium in acid-base reactions
6. Laws of thermodynamics: Gibbs free energy and reaction spontaneity
7. Redox reactions
8. Organic molecules and hydrocarbons

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 and 6th editions are ok to use).

The SRSU library has one copy of the textbook of General Chemistry in the “Textbook Collection” section. Please ask the library front desk if you need help finding this textbook.

Suggested Reading and References:

1. “*OpenStax Chemistry 2e*” <https://openstax.org/details/books/chemistry-2e> by Paul Flowers, Klaus Theopold, Richard Langley, etc.
2. “*Chemistry LibreTexts*” (Beginning Chemistry (Ball), [Introductory, Conceptual, and GOB Chemistry - Chemistry LibreTexts](#))

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 11: Introduction to Organic Chemistry

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

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 in 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: 20%

(multiple-choice 10 % and short-answer 10 %)

Each Midterm Exam (20 %): 60%

Final Exam: 20%

Midterm Exam I: Tuesday, February 14th as face-to-face

Midterm Exam II: Thursday, March 23rd as face-to-face

Midterm Exam III: Thursday, April 27th as face-to-face

Final Exam: Wednesday, May 17th 10:15 AM–12:15 PM, face-to-face in WSB 307

CHEM1302 Course Calendar

* This course calendar could be changed. Before one week, your professor will let you know the changes.

Date	Lecture #	Chapter #	Topics	Due work
Jan.19	Lecture 1	Ch 6	Discussion on Syllabus. Importance of chemical energy, types of energy, energy changes in chemical reactions	
Jan.24	Lecture 2		The first law of thermodynamics, enthalpy of chemical reactions, and calorimetry.	
Jan.26	Lecture 3		Hess's law and standard enthalpy of formation & reaction. Discussion on selective questions and problems on Chapter 6	
Jan.31	Lecture 4	Ch 11	Classification of organic compounds and aliphatic/aromatic hydrocarbons and nomenclature on hydrocarbons and their structures.	Ch6 HW due
Feb.2	Lecture 5		Discussion on selective questions and problems in Chapter 11. Chemistry of the functional groups and Chirality-hardness of molecules, Types of intermolecular forces, properties of liquids, liquid-vapor equilibrium, liquid-solid equilibrium, and solid-vapor equilibrium.	
Feb.7	Lecture 6	Ch 12	Liquid-solid equilibrium, phase change & phase diagrams	Ch11 HW due
Feb.9	Lecture 7		Discussion on selective questions and problems on Chapter 12. Exam I revision	
Feb.14	Lecture 8	Test	Exam I Day (It covers Ch6, Ch11, & Ch12)	Ch12 HW due
Feb.16	Lecture 9	Ch 13	Factors affecting solubility , Types of solutions,	
Feb.21	Lecture 10		Concentration units & Colligative properties	
Feb.23	Lecture 11	Ch 14	Discussion on selective questions and problems on Chapter 13. Understanding of terminologies related to rate laws. Zero, first & second-order reactions	

Feb.28	Lecture 12		Experimental rate laws, activation energy and temperature dependence of rate constant	Ch13 HW due
Mar.2	Lecture 13		Elementary reactions, reaction mechanisms, and catalysis. Experimental determination of rate laws. Discussion on selective questions and problems on Chapter 14	
Mar.7	Lecture 14	Ch 15	Understanding on the concepts of chemical equilibrium, equilibrium constants, reaction quotients, calculation of equilibrium concentrations, and factors affecting chemical equilibrium.	
Mar.9	Lecture 15		Discussion on selective questions and problems on chapter 15	Ch14 HW due
Mar.21	Lecture 16	Review & Test	Exam II revision	
Mar.23	Lecture 17		Exam II (It covers Ch13, 14, & 15)	Ch15 HW due
Mar.28	Lecture 18	Ch 16	Understanding on 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	
Mar.30	Lecture 19		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	
Apr.4	Lecture 20		Discussion on selective questions and problems in Chapter 16. Common ion effect in chemical equilibrium, Henderson-Hasselbalch equation.	
Apr.6	Lecture 21	Ch 17	Strong acid-strong base titrations, weak acid-strong base titrations, acid-base indicators	Ch16 HW due
Apr.11	Lecture 22		Solubility product, molar solubility, predicting precipitation reactions, common ion effect and pH on solubility	
Apr.13	Lecture 23		Discussion on selective questions and problems in Chapter 17, spontaneous processes and entropy, and microstates related to entropy.	

Apr.18	Lecture 24	Ch 18	The second law of thermodynamics, entropy changes in systems and surroundings, and the third law of thermodynamics	Ch17 HW due
Apr.20	Lecture 25		Gibbs free energy chemical equilibrium, and discussion on selective questions and problems on Chapter 18	
Apr.25	Lecture 26	Review & Test	Exam III revision	
Apr.27	Lecture 27		Exam III (It covers Ch16, 17, &18)	Ch18 HW due
May.2	Lecture 28	Ch 19	Redox reactions, balancing redox equations, spontaneous Galvanic cells, and standard reduction	
May.4	Lecture 29		Discussion on selective questions and problems in Chapter 19.	
May.9	Lecture 30	Review & Test	Final exam revision	Ch19 HW due
May.17	Lecture 31		Wednesday, 10:15 AM to 12:15 PM, WSB307	