

# Sul Ross State University

## Syllabus for General Chemistry I: 2V1 CHEM 1311 - 31217 (Summer II, 2022)

**Class:** General Chemistry I  
Room: only Web Based Blackboard  
Time: 8:50 AM to 10:25

**Instructor:** Dr. Hong Young Chang  
Office: WSB 219  
Office Hours: M-R 3:00-5:00pm via  
Zoom or phone  
Email: hong.young.chang@sulross.edu  
Office Phone: (432) 837-8113

**Date:** July 6 to August 8, 2022

### 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 I Learning Objectives:*

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

1. The basic concepts and terms used in chemistry

2. The electronic structures of atoms and the periodic table
3. The basic concepts of chemical bonding
4. Chemical reactions in aqueous solutions
5. The ideal gas equation

**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 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 5<sup>th</sup> and 6<sup>th</sup> editions are ok to use).

**Calculator:** A scientific calculator is required for this course.

**Web Availability:** This lecture is done *via only online class 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 by the blackboard.

***The lecture video files will be uploaded on the blackboard.*** Students can see these files after class

The following chapters will be covered in General Chemistry I:

**Chapter 1:** Basic Concepts: Classification of Matter; Physical and Chemical Properties of Matter

**Chapter 2:** Atoms, Molecules, and Ions

**Chapter 3:** Stoichiometry

**Chapter 4:** Reactions in Aqueous Solutions

**Chapter 5:** The Ideal Gas Equation

**Chapter 7:** The Electronic Structure of Atoms

**Chapter 8:** The Periodic Table

**Chapter 9 and 10:** Chemical Bonding

**Homework & Assignments:** There will be the problem-sets assigned for each chapter. In only this class, Homework is to solve the given problem sets. Students who take this class do solve the problem sets in the blackboard. Multi-attempt will be given to solve the problem sets. The best score of your multi-attempts will be recorded as your final score for homework & assignment. Since all homework for each chapter has its due day, students have to finish their homework in the blackboard with keeping its due day.

**Announcements:** Students have to keep the announcements from professor. Because the face-to-face approach is not possible, students have to check their email all the time and they have to access their blackboard accounts frequently.

**Examinations:** There will be *three midterm* examinations and *a final* examination. The final is mandatory and comprehensive. All examinations are done inner blackboard of SRSU. In the limited time, the problem sets of all examinations will be seen in the blackboard. Multiple-attempt is not allowed for all examinations. **NO MAKE-UP EXAMS WILL BE GIVEN.**

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

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

**PERCENTAGE BREAKDOWN OF MARKS:**

**Homework & Assignment: 40%** (each chapter has 30-35 problem sets)

**Midterm Exams (13.3% each): 40%**

**Final Exam: 20%**

**Midterm Exam I: Thursday, July 14<sup>th</sup> (covers Ch1 & Ch2)**

**(1hr, by CDT: 1:00 pm to 8:00pm)**

**Midterm Exam II: Tuesday, July 26<sup>th</sup> (covers Ch3 & Ch4)**

**(1hr, by CDT: 1:00 pm to 8:00pm)**

**Midterm Exam III: Tuesday, August 2<sup>nd</sup> (covers Ch5, Ch7 & Ch8)**

**(1hr, by CDT: 1:00pm to 8:00pm)**

**Final Exam: Monday, August 8<sup>th</sup> (covers all chapters, but Ch3, Ch4, Ch9 & Ch10 mainly occupies) (1:30 hours, by CDT: 1:00pm to 8:00pm)**

**All Exams will be exposed on the blackboard. (Based on CDT, from 1:00 pm to 8:00 pm) You can choose your convenient time. All Exams will be done in non-class time.**

**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.*

**Academic Integrity:** *Academic dishonesty hurts everyone and reduces the value of college degrees. Doing someone else's work, presenting the ideas and work of others as your own, submitting the same paper for multiple classes, and/or failing to cite your sources when you utilize the ideas of others, are all examples of academic dishonesty. It is your responsibility to read and understand the university's policy on academic dishonesty in the SRSU Student Handbook, as all violations will be taken seriously and handled through the appropriate university process. The Student Handbook can be found at: <https://www.sulross.edu/catalog/undergraduate-academic-regulations-2/#1605412215143-c8b265dc-3e01>*

*In addition, please note that plagiarism detection software will be used in this class for written assignments.*

**Course Calendar:** The following pages includes the course calendar. You need to focus on date, lecture number, chapter number, topics, homework due day and examination days. This course calendar could be changed.



Date	Lecture #	Chapter #	Topic	Due work	Exam day
6-July	Lecture 1	Ch1	Discussion on Syllabus; Importance of chemistry; classifications of matter, overview of states and properties of matter, physical and chemical changes, units of measurements (length, volume, density, temperature etc.)		
7-July	Lecture 2		Significant figures and scientific notation Precision & accuracy and measurement uncertainty		
8-July	Lecture 3	Ch2	Dalton's atomic theory, discoveries of subatomic particles (electron, proton, and neutron), Rutherford's atomic model, atomic number, mass number, and isotopes	Due HW of Ch1	
11-July	Lecture 4		Molecules, compounds, ionic formula with Cross-Over Rule, molecular formula and empirical formulas		
12-July	Lecture 5		Common inorganic cations and anions Chemical nomenclature, naming of compounds, acids, bases, oxides, oxoacids, hydrates		
13-July	Lecture 6	Ch3	Molecular mass, mole, molar mass, atomic mass, and formula mass, mole concept	Due HW of Ch2	
14-July	Lecture 7		Mole concept again		<b>Exam I</b>

15-July	Lecture 8		Chemical equations and balancing chemical equations, calculations of product/reactant amounts using balanced chemical equations,		
18-July	Lecture 9		limiting reagents, and percent yields		
19-July	Lecture 10	Ch4	Classification of chemical reactions, Terminologies related to solute, solvent, solutions, electrolytes, nonelectrolytes, ionization, and hydration. Precipitation reactions, solubility, writing balanced ionic equations & net ionic equations	Due HW of Ch3	
20-July	Lecture 11		Acid-base concepts, hydronium ions (hydrated proton), Mono-/di-protic acids Acid-base reactions and neutralization reactions		
21-July	Lecture 12		Reduction-oxidation reactions and oxidation numbers Regular oxidation numbers in the periodic table.		
22-July	Lecture 13		oxidation-reduction reactions- types with examples Solution chemistry, solution stoichiometry, molarity, preparation of solutions, dilution, gravimetric analysis and titration		
25-July	Lecture 14	Ch5	Physical properties of gas and pressure unit Ideal gas law and its applications, gas stoichiometry- calculation of reactant/product amounts in gaseous reactions using ideal gas equation	Due HW of Ch4	

26-July	Lecture 15		Kinetic theory of ideal gases, deviation of deal gas, properties, modification of ideal gas law for real gases,		Exam II
26-July	Lecture 16	Ch7	Properties of waves, electromagnetic radiations Atomic spectra and Bohr atomic theory De Broglie equation, dual nature of particles, Schrodinger wave, equation and orbital concept, electronic configuration-Aufbau principle, Hund's rule, para magnetism	Due HW of Ch5	
27-July	Lecture 17		4 kinds of quantum numbers and electron configuration		
28-July	Lecture 18	Ch8	Introductory discussion on periodic table, classification of elements, Effective nuclear charge and screening effect Atomic sizes and radius Isoelectronic structures	Due HW of Ch7	
29-July	Lecture 19		Ionization energy (E), Electron affinity, Metal, metalloids, non-metal, halogen groups Periodic variation of properties of elements Group properties of elements		
1-Aug	Lecture 20	Ch9	Valence electrons, Lewis dot structures, Octet rules, ionic bonds, lattice energy (U), covalent bonds, covalent bond lengths, double bond and triple bond Polar covalent bonds and electronegativity	Due HW of Ch8	



2-Aug	Lecture 21		Drawing Lewis structures, formal charges, resonance structures, and exception of octet rules		<b>Exam III</b>
3-Aug	Lecture 22	Ch10	Valence shell electron pair repulsion (VSEPR) model Prediction molecular geometry Dipole moment and polar bonding Valence bond theory, hybridization (sp, sp <sup>2</sup> , sp <sup>3</sup> , etc.), sigma(σ) bond and pi(π) bond,	Due HW of Ch9	
4-Aug	Lecture 23		Molecular orbital theory and molecular orbital(MO) configurations	Due HW of Ch10	
8-Aug	Lecture 24		Final Exam day (via Blackboard), 2hrs		<b>Final Exam</b>

