

**Sul Ross State University**  
**Syllabus for General Chemistry I:**  
**CHEM 1311-001, CRN: 11389**  
**(Fall 2022)**

**Class:** General Chemistry I  
**Room:** WSB101  
**Time:** MWF: 10:00 to 10:50AM  
**Date:** Aug. 22 to Dec. 7, 2022

**Instructor:** Dr. Hong Young Chang  
**Office:** WSB 219  
**Office Hours:** M-R 3:00-5:00pm  
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## OBJECTIVES

### *Student Learning Objectives (SLO):*

A student graduating with a *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).

### **Reference Book:**

“*OpenStax Chemistry 2e*” <https://openstax.org/details/books/chemistry-2e> by Paul Flowers, Klaus Theopold, Richard Langley, etc.

**The SRSU library** has one copy of the textbook 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 free download the book file as a PDF. Among the two books described above, you can choose one.

**SRSU Library Services: The Sul Ross Library offers FREE resources and services to the entire SRSU community.** Access and borrow books, articles, and more by visiting the library’s website, [library.sulross.edu](http://library.sulross.edu). Off-campus access requires your LoboID and password. Check out materials using your photo ID. Librarians are a tremendous resource for your coursework and can be reached in person, by email ([srsulibrary@sulross.edu](mailto:srsulibrary@sulross.edu)), or phone (432-837-8123).

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

**Web Availability:** This lecture is done by face-to-face attendance. However, you need to do your homework **by “Blackboard” of SRSU**. In addition, Homework & Assignment, and Announcements, will be done on the blackboard and by email.

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

**Chapters 9 and 10:** Chemical Bonding

### **Homework & Assignments:**

There are two kinds of homework assigned. *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. The 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 turn in your homework. You also need to keep their due day for each chapter. **NO LATE HOMEWORK WILL BE ACCEPTED.** You need to turn in this homework face-to-face. Your professor will not accept this homework by 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. All exams will be taken on face to face.

**NO MAKE-UP EXAMS WILL BE GIVEN.**

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

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

### **PERCENTAGE BREAKDOWN OF MARKS:**

Homework & Assignments: 30%

(Blackboard multiple-choice homework 20 % and assigned short-answer 10 %)

Each Midterm Exam (16.67%): 50%

Final Exam: 20%

**Midterm Exam I:** Wednesday, September 14 (it covers chapters 1 & 2)

**Midterm Exam II:** Monday, October 17 (it covers chapters 3, 4 & 5)

**Midterm Exam III:** Monday, November 17 (it covers chapters 7 & 8)

**Final Exam:** Friday, December 2 from 10:15 am -12:15 am as face-to-face in WSB 101

**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>*

**Course Calendar:** The following pages include the course calendar. You need to focus on the date, lecture number, chapter number, topics, homework due day, and examination days. This course calendar could be changed. Before one week, your professor will let you know the changes.

Date	Lecture #	Chapter #	Topic	Due work
Aug. 22	Lecture 1	Ch 1	Discussion on Syllabus, the importance of chemistry	
Aug.24	Lecture 2		Classifications of matter, an overview of states and properties of matter, physicals, and chemical changes, units of measurements (length, volume, density, temperature, etc.)	
Aug. 26	Lecture 3		Scientific notation and significant figures, precision and accuracy	
Aug.29	Lecture 4		Discussion on selective questions and problems on chapter 1	
Aug.31	Lecture 5	Ch 2	Dalton's atomic theory, discoveries of subatomic particles (electron, proton, and neutron), Rutherford's atomic model	<b>Ch1 HW_Blc. due</b>
Sep. 2	Lecture 6		Atomic number, mass number, isotopes, molecules, compounds, ions, molecular formula, empirical formula	
Sep. 5	Lecture 7		Labor Day (Holiday)	

Sep. 7	Lecture 8		Chemical nomenclature, naming of compounds, acids, bases, oxides, and oxoacids	
Sep. 9	Lecture 9		Discussion on selective questions and problems on chapter 2	
Sep. 12	Lecture 10	Review & Test	Exam revision on chapter 1 & 2	<b>Ch2 HW_Blac. due</b>
Sep. 14	Lecture 11		<b>Exam 1 day (it covers ch1 and ch2)</b>	
Sep. 16	Lecture 12	Ch 3	Molecular mass, mole, molar mass, atomic mass, formula mass and their relations	
Sep. 19	Lecture 13		Chemical equations and balancing chemical equations	
Sep. 21	Lecture 14		Calculations of product/reactant amounts using balanced chemical equations, limiting reagents, and percent yields	
Sep. 23	Lecture 15		Discussion on selective questions and problems on chapter 3	<b>Ch3 HW_Blac. due</b>
Sep. 26	Lecture 16	Ch 4	Terminologies related to solutions, electrolytes, non-electrolytes, precipitation reactions, writing balanced ionic equations	<b>Ch3 Assign.Due</b>
Sep. 28	Lecture 17		Acid-base reactions and oxidation numbers; oxidation-reduction reactions – types with examples	
Sep. 30	Lecture 18		Solution stoichiometry, concentration units, and gravimetric analysis	
Oct. 3	Lecture 19		discussion on selective questions and problems on chapter 4	<b>Ch4 HW_Blac. due</b>
Oct. 5	Lecture 20	Ch 5	Physical properties of gases-relation between temperature, pressure, volume, and number of gases; Ideal gas law and its applications	<b>Ch4 Assign. Due</b>
Oct. 7	Lecture 21		Calculation of reactant/product amounts in gaseous reactions using ideal gas equation;	
Oct. 10	Lecture 22		Deviation of ideal gas properties, modification ideal gas law for real gases	

Oct. 12	Lecture 23		Discussion on selective questions and problems on chapter 5	
Oct. 14	Lecture 24	Review & Test	Exam Revision on chapter 3, 4, & 5	<b>Ch5 HW_Blac. due</b>
Oct. 17	Lecture 25		<b>Exam 2 Day (it covers ch3, ch4, and ch5)</b>	
Oct. 19	Lecture 26	Ch 7	Properties of light, black-body radiation and the photo-electric effect, Atomic spectra and Bohr atomic theory	
Oct. 21	Lecture 27		De Broglie equation, dual nature of particles, Schrodinger wave equation and orbital concept by 4 quantum numbers	
Oct. 24	Lecture 28		Electronic configuration-Aufbau principle, Hund's rule, Pauli exclusion principle	
Oct. 26	Lecture 29		Discussion on selective questions and problems on chapter 7	
Oct. 28	Lecture 30	Ch 8	Introductory discussion on periodic table, classification of elements and electronic configuration of ions	<b>Ch7 HW_Blac. due</b>
Oct. 31	Lecture 31		Periodic variation of properties of elements, Group properties of elements	
Nov. 2	Lecture 32		Discussion on selective questions and problems on chapter 8	
Nov. 4	Lecture 33	Review & Test	Exam Revision on chapters 7 & 8	<b>Ch8 HW_Blac. due</b>
Nov. 7	Lecture 34		<b>Exam 3 Day (it covers chapters 7 &amp; 8)</b>	
Nov. 9	Lecture 35	Ch 9	Basic concepts of chemical bonding, ionic bonds, lattice energy, covalent bonds, polar covalent bonds, and polarity	
Nov. 11	Lecture 36		Veterans' day, Holiday	
Nov. 14	Lecture 37		Lewis structures of molecules, formal charge calculation, resonance structures and bond energy	
Nov. 16	Lecture 38		Discussion on selective questions and problems on chapter 9	

Nov. 18	Lecture 39	Ch 10	Molecular geometry – Valence shell electron repulsion theory	<b>Ch9 HW_Blac. due</b>
Nov. 21	Lecture 40		Prediction of molecular geometry and polarity	
Nov. 23	Lecture 41		Thanksgiving day: Holiday starts	
Nov. 28	Lecture 42	Review & Test	Review on final exam_1	
Nov. 30	Lecture 43		Review on final exam_2	
Dec. 2	Lecture 44		<b>Final Exam Day, Friday, 10:15AM to 12:15PM, WSB101</b>	