

SUL ROSS STATE UNIVERSITY
Syllabus for General Chemistry I-21437
CHEM 1311- 002 (Spring 2021)

General Chemistry 1: Lecture (3 credits)
Room: WSB 307
Time: MWF: 11:00-11:50 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 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: 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 and 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 I:

Chapter 1: Basic Concepts: Classification 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 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 face to face.*

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.

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: Wednesday February 3rd as face-to-face

Midterm Exam II: Wednesday March 3rd as face-to-face

Midterm Exam III: Monday April 5th as face-to-face

Final Exam: Monday, May 3rd at 11:00 am as face-to-face in WSB 307

Course Calendar

Lecture 1 (Jan. 11): Discussion on Syllabus, importance of chemistry

Lecture 2 (Jan. 13): Classifications of matter, overview of states and properties of matter, physicals and chemical changes, units of measurements (length, volume, density, and temperature etc.)

Lecture 3 (Jan. 15): Scientific notation and significant figures, precision and accuracy

No Class: Martin Luther Jr. Day

Lecture 4 (Jan. 20): Discussion on selective questions and problems on chapter 1

Lecture 5 (Jan. 22): Dalton's atomic theory, discoveries of subatomic particles (electron, proton, and neutron), Rutherford's atomic model (*Short Answer Homework Chapter 1 due*)

Lecture 6 (Jan. 25): Atomic number, mass number, isotopes, molecules, compounds, ions, molecular formula, empirical formula

Lecture 7 (Jan. 27): Chemical nomenclature, naming of compounds, acids, bases, oxides, and oxoacids

Lecture 8 (Jan. 29): Discussion on selective questions and problems on chapter 2

Lecture 9 (Feb. 1): Exam Revision on chapter 1 & 2 (*Short Answer Homework Chapter 2 due*)

Lecture 10 (Feb. 3): **Exam I (Chapter 1 & 2)**

Lecture 11 (Feb. 5): Molecular mass, mole, molar mass, atomic mass, formula mass and their relations

Lecture 12 (Feb. 8): Chemical equations and balancing chemical equations

Lecture 13 (Feb. 10): Calculations of product/reactant amounts using balanced chemical equations, limiting reagents, and percent yields

Lecture 14 (Feb. 12): Discussion on selective questions and problems on chapter 3

Lecture 15 (Feb. 15): Terminologies related to solutions, electrolytes, non-electrolytes, precipitation reactions, writing balanced ionic equations (*Short Answer Homework Chapter 3 due*)

Lecture 16 (Feb. 17): Acid-base reactions and oxidation numbers; oxidation-reduction reactions – types with examples

Lecture 17 (Feb. 19): Solution stoichiometry, concentration units, and gravimetric analysis; discussion on selective questions and problems on chapter 4

Lecture 18 (Feb. 22): Physical properties of gases-relation between temperature, pressure, volume and amount of gases; Ideal gas law and its applications (*Short Answer Homework Chapter 4 due*)

Lecture 19 (Feb. 24): Gas stoichiometry – calculation of reactant/product amounts in gaseous reactions using ideal gas equation; Kinetic theory of ideal gases, deviation of ideal gas properties, modification ideal gas law for real gases

Lecture 20 (Feb. 26): Discussion on selective questions and problems on chapter 5

Lecture 21 (Mar. 1): Exam Revision on chapter 3, 4, & 5 (*Short Answer Homework Chapter 5 due*)

Lecture 22 (Mar. 3): **Exam II (Chapter 3, 4, & 5)**

Lecture 23 (Mar. 5): Properties of light, black-body radiation and photo-electric effect

No Class: Spring Break (Mar. 8 to Mar. 12)

Lecture 24 (Mar. 15): Atomic spectra and Bohr atomic theory

Lecture 25 (Mar. 17): De Broglie equation, dual nature of particles, Schrodinger wave equation and orbital concept

Lecture 26 (Mar. 19): Electronic configuration-Aufbau principle, Hund's rule, para-magnetism

Lecture 27 (Mar. 22): Discussion on selective questions and problems on chapter 7

Lecture 28 (Mar. 24): Introductory discussion on periodic table, classification of elements and electronic configuration of ions (*Short Answer Homework Chapter 7 due*)

Lecture 29 (Mar. 26): Periodic variation of properties of elements, Group properties of elements

Lecture 30 (Mar. 29): Discussion on selective questions and problems on chapter 8

Lecture 31 (Mar. 31): Exam Revision on chapters 7 & 8 (*Short Answer Homework Chapter 8 due*)

NO CLASS: Good Friday, Apr. 2

Lecture 32 (Apr. 5): Exam III (Chapter 7 & 8)

Lecture 33 (Apr. 7): Basic concepts of chemical bonding, ionic bonds, lattice energy, and calculation of lattice energy, covalent bonds, polar covalent bonds and polarity

Lecture 34 (Apr. 9): Lewis structures of molecules, formal charge calculation, Resonance structures and bond energy, and discussion on selective questions and problems on chapter 9

Lecture 35 (Apr. 12): Molecular geometry – Valence shell electron repulsion theory (*Short Answer Homework Chapter 9 due*)

Lecture 36 (Apr. 14): Prediction of molecular geometry and polarity

Lecture 37 (Apr. 16): Molecular geometry – Valence bond and molecular orbital theories

Lecture 38 (Apr. 19): Discussion on selective questions and problems on chapter 10

Lecture 39 (Apr. 21): Review on chapters 9 and 10 (*Short Answer Homework Chapter 10 due*)

Lecture 40 (Apr. 23): Final Exam Revision (Chapter 1, 2 & 3)

Lecture 41 (Apr. 26): Final Exam Revision (Chapter 4, 5, & 7)

Lecture 42 (Apr. 28): Final Exam Revision (Chapter 8, 9, & 10)

Final Exam (mandatory & comprehensive): Monday, May 3rd, at 11:00 am

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.*