

Sul Ross State University
Syllabus for CHEM 1311 (Spring 2015)

Class: General Chemistry I	Instructor: Dr. David Leaver
Room: WSB 301	Office: WSB 318
Time: TR 8:00-9:15am	Office Hours: TR 3:00-5:00pm
Lab: Monday 1:00-2:50pm (Section 1)	Email: djl14jh@sulross.edu
Monday 3:00-4:50pm (Section 2)	Office Phone: (432) 837-8115

Program Learning Objectives (PLO):

A student graduating with the chemistry major is expected to demonstrate that s(he) is able to:

1. Explain atomic and molecular structures, bonding, thermodynamics, chemical equilibria and kinetics, stoichiometry, and electrochemical processes;
2. Write and explain organic reactions, stereochemistry, and reactions in biological systems;
3. Use essential modern instruments to perform chemistry experiments in the laboratory;
4. Summarize basic principles of research design and analyze experimental data using appropriate computer programs (e.g. Excell, Sigma-plot, etc.) in regards to the chemistry discipline.

Student Learning Objectives (SLO):

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.

Lecture sessions are designed to fulfill PLO 1, CO – 1, 2, and 3, and lab sessions are designed to fulfill PLO 3, CO 1-4.

Text: General Chemistry by Raymond Chang (5th Edition or newer); Lab Manual: Freshman Chemistry by Rangra and Houston

The following chapters will be covered:

Chapter 1: Basic Concepts: Classification of Matter; Physical and Chemical Properties of Matter; Measurement; Handling Numbers; Dimensional Analysis in Solving Problems (SLO 1)

Chapter 2: Atoms, Molecules, and Ions (SLO2)

Chapter 3: Stoichiometry (SLO 1)

Chapter 4: Reactions in Aqueous Solutions (SLO 2)

Chapter 5: The Ideal Gas Equation (SLO 5)

Chapter 7: The Electronic Structure of Atoms (SLO 2)

Chapter 8: The Periodic Table (SLO 2)

Chapter 9 and 10: Chemical Bonding (SLO 3)

Homework: There will be problems assigned for each chapter. **NO LATE HOMEWORK WILL BE ACCEPTED.**

Examinations: There will be *three midterm* examinations and *a final* examination. The final is mandatory and will be comprehensive. **NO MAKE-UP EXAMS WILL BE GIVEN.**

ATTENDANCE PRERESQUITE: BEING ABSENT FROM MORE THAN 6 LECTURES WILL RESULT IN FAILING THE COURSE.

PERCENTAGE BREAKDOWN OF MARKS:

Homework: 15%

Each Midterm Exam (15%): 45%

Final Exam: 40%

Midterm Exam I: Tuesday, February 24th

Midterm Exam II: Thursday, March 26th

Midterm Exam III: Tuesday, April 21st

Final Exam: Thursday, May 14th

Course Calendar (Section 2)

Lecture 1 (January 20): Discussion on Syllabus, importance of chemistry

Lecture 2 (January 22): Classifications of matter, overview of states and properties of matter, physical and chemical changes, units of measurements (length, volume, density, temperature etc.), and Scientific notation and significant figures

Lecture 3 (January 27): Precision and accuracy, Revision on Chapter 1

Lecture 4 (January 29): Dalton's atomic theory, discoveries of subatomic particles (electron, proton, and neutron), Rutherford's atomic model, atomic number, mass number, and isotopes; **(Homework 1 due)**

Lecture 5 (February 3): Molecules, compounds, ions, molecular formula and empirical formulas

Lecture 6 (February 5): Chemical nomenclature, naming of compounds, acids, bases, oxides, and oxoacids, Review on Chapter 2

Lecture 7 (February 10): Molecular mass, mole, molar mass, atomic mass, formula mass and their relations **(Homework 2 due)**

Lecture 8 (February 12): Chemical equations and balancing chemical equations, calculations of product/reactant amounts using balanced chemical equations, limiting reagents, and percent yields

Lecture 9 (February 17): Revision on Chapter 3, terminologies related to solutions, electrolytes, non-electrolytes, precipitation reactions (**Homework 3 due**)

Lecture 10 (February 19): Exam Revision on Chapters 1,2, and 3

Lecture 11 (February 24): Exam I, Chapters 1,2 & 3

Lecture 12 (February 26): Writing balanced ionic equations, acid-base reactions; oxidation numbers; oxidation-reduction reactions- types with examples; solution stoichiometry, concentration units, and gravimetric analysis

Lecture 13 (March 3): Revision on Chapter 4, physical properties of gases-relation between temperature, pressure, volume and amount of gases

Lecture 14 (March 5): Ideal gas law and its applications, gas stoichiometry- calculation of reactant/product amounts in gaseous reactions using ideal gas equation (**Homework 4 due**)

Lecture 15 (March 10): Kinetic theory of ideal gases, deviation of ideal gas, properties, modification of ideal gas law for real gases

Lecture 16 (March 12): Revision on Chapter 5, Properties of light, black-body radiation and photo-electric effect (**Homework 5 due**)

March 16-20th is Spring Break (No classes)

Lecture 17 (March 24): Exam Revision on Chapters 4 and 5

Lecture 18 (March 26): Exam II, Chapters 4 and 5

Lecture 19 (March 31): 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, paramagnetism

Lecture 20 (April 2): Review on Chapter 7, Introductory discussion on periodic table (**Homework 6 Due**)

Lecture 21 (April 7): Classification of elements, and electronic configuration of ions, periodic variation of properties of elements, group properties of elements

Lecture 22 (April 9): Review on chapter 8; Basic concepts of chemical bonding, ionic bonds, lattice energy (**Homework 7 due**)

Lecture 23 (April 14): Calculation of lattice energy, covalent bonds, polar covalent bonds and polarity, Lewis structures of molecules, formal charge calculation, resonance structures and bond energy

Lecture 24 (April 16):, Exam Revision on Chapters 7, 8 and 9 (Homework 8 due)

Lecture 25 (April 21): Exam III, Chapters 7, 8 & 9

Lecture 26 (April 23): Molecular geometry-Valence shell electron repulsion theory; prediction of molecular geometry and polarity

Lecture 27 (April 28): Molecular geometry- Valence bond and molecular orbital theories, Revision on Chapter 10

Lecture 28 (April 30) Exam Revision, Chapters 1-4 (Homework 9 due)

Lecture 29 (May 5): Exam Revision, Chapters 5, 7-10

Final Exam (May 14): At 8:00am, Chapters 1-5, 7-10

Students with Special Needs: *Sul Ross State University is committed to equal access in compliance with the Americans With Disabilities Act of 1973. It is the student's responsibility to initiate a request for accessibility services. Students seeking accessibility services must contact Mary Schwartz, M. Ed., L.P.C., in Counseling and Accessibility Services, Ferguson Hall, Room 112. The mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas 79832. Telephone: 432-837-8203. E-mail: mschwartz@sulross.edu .*

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.