Sul Ross State University
Syllabus for General Chemistry I (CHEM 1311) Summer I 2018

Class: General Chemistry I
Room: WSB 307
Time: M-F 9:50-11:25am

Instructor: Dr. David Leaver
Office: WSB 318
Office Hours: M-R 2:00-5:00pm
Email: david.leaver@sulross.edu
Office Phone: (432) 837-8115

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:** “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 are 6th editions are ok to use)

**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:

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

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

**Chapter 3:** Stoichiometry

**Chapter 4:** Reactions in Aqueous Solutions

**Chapter 5:** Gases

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

**Chapter 8:** The Periodic Table

**Chapters 9 and 10:** Chemical Bonding I & II

**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 PREREQUISITE:** BEING ABSENT FROM MORE THAN 5 LECTURES WILL RESULT IN FAILING THE COURSE.

**PERCENTAGE BREAKDOWN OF MARKS:**

Homework: 23%
Midterm Exams (15% each): 45%
Final Exam: 25%
Lecture Attendance: 7%

**Midterm Exam I:** Tuesday. June 12th
**Midterm Exam II:** Tuesday, June 19th
**Midterm Exam III:** Tuesday, June 26th
**Final Exam:** Thursday, July 5th
Course Calendar

Lecture 1 (May 30): 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.), scientific notation and significant figures

Lecture 2 (May 31): Precision and accuracy, Revision on Chapter 1; Dalton’s atomic theory, discoveries of subatomic particles (electron, proton, and neutron), Rutherford’s atomic model, atomic number, mass number, and isotopes

Lecture 3 (June 1): Molecules, compounds, ions, molecular formula and empirical formulas

Lecture 4 (June 4): Chemical nomenclature, naming of compounds, acids, bases, oxides, and oxoacids, review on Chapter 2 (Homework 1 due)

Lecture 5 (June 5): Molecular mass, mole, molar mass, atomic mass, and formula mass

Lecture 6 (June 6): Chemical equations and balancing chemical equations, calculations of product/reactant amounts using balanced chemical equations, limiting reagents, and percent yields (Homework 2 due)

Lecture 7 (June 7): Terminologies related to solutions, electrolytes, non-electrolytes, precipitation reactions, writing balanced ionic equations, acid-base reactions; oxidation numbers; oxidation-reduction reactions- types with examples

Lecture 8 (June 8): Solution stoichiometry, concentration units, and gravimetric analysis; revision on Chapter 4, physical properties of gases-relation between temperature, pressure, volume and amount of gases (Homework 3 due)

Lecture 9 (June 11): Ideal gas law and its applications, gas stoichiometry-calculation of reactant/product amounts in gaseous reactions using ideal gas equation

Exam Revision on Chapters 1, 2, and 3

Lecture 10 (June 12): Exam I, Chapters 1, 2 & 3
Lecture 11 (June 13): Kinetic theory of ideal gases, deviation of ideal gas properties, modification of ideal gas law for real gases; revision on Chapter 5, properties of light, black-body radiation and photo-electric effect (Homework 4 due)

Lecture 12 (June 14): 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 (Homework 5 due)

Lecture 13 (June 15): Review on Chapter 7; introductory discussion on periodic table, classification of elements, electronic configuration of ions and periodic variation of properties of elements

Lecture 14 (June 18): Group properties of elements, Exam Revision on Chapters 4 and 5 (Homework 6 Due)

Lecture 15 (June 19): Exam II, Chapters 4 and 5

Lecture 16 (June 20): Revision on chapter 8; basic concepts of chemical bonding, ionic bonds, lattice energy (Homework 7 due)

Lecture 17 (June 21): Calculation of lattice energy, covalent bonds, polar covalent bonds and polarity

Lecture 18 (June 22): Lewis structures of molecules, formal charge calculations, resonance structures and bond energy, revision on Chapter 9 (Homework 8 due)

Lecture 19 (June 25): Exam Revision on Chapters 7, 8 and 9

Lecture 20 (June 26): Exam III, Chapters 7, 8 & 9

Lecture 21 (June 27): Molecular geometry-Valence shell electron repulsion theory; prediction of molecular geometry and polarity

Lecture 22 (June 28): Molecular geometry and valence bond theory

Lecture 23 (June 29): Molecular orbital theory, Revision on Chapter 10 (Homework 9 due)

Lecture 24 (July 2): Exam Revision, Chapters 1-4

Lecture 25 (July 3): General Exam Revision
NO CLASS ON Wednesday JULY 4th (INDEPENDENCE DAY HOLIDAY)

Final Exam (Thursday July 5): At 9:50-11:25 am

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 Schwartze, 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: mschwartze@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. All assignments (including homework) need to be individually completed and not copied from another student’s work. Electronic submission of homework is accepted after hours (not recommended), but must be hand written and scanned (either with a scanner or a smart phone) and emailed to Dr. Leaver at: david.leaver@sulross.edu. Homework electronically completed in Microsoft Word or other similar programs will NOT be accepted.