Sul Ross State University
Syllabus for General Chemistry II (CHEM 1312) Summer II 2018

Class: General Chemistry II
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
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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 II Learning Objectives:**

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

A. The basic concepts of intermolecular forces  
B. Physical properties of solutions  
C. The basic concepts of chemical kinetics and equilibrium  
D. The concepts of acid and bases  
E. Laws of thermodynamics  
F. Redox reactions

**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 6:** Energy Relationships in Chemical Reaction  
**Chapter 12:** Intermolecular Forces and Liquids and Solids  
**Chapter 13:** Physical Properties of Solutions  
**Chapter 14:** Chemical Kinetics  
**Chapter 15:** Chemical Equilibrium  
**Chapter 16:** Acids and Bases  
**Chapter 17:** Acid-Base Equilibria  
**Chapter 18:** Laws of Thermodynamics  
**Chapter 19:** Redox Reactions

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

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

**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.**

**PERCENTAGE BREAKDOWN OF MARKS:**

- Homework: 23%  
- Each Midterm Exam (15%): 45%  
- Final Exam: 25%  
- Lecture Attendance: 7%

**Midterm Exam I:** Friday, July 20th  
**Midterm Exam II:** Monday, July 30th  
**Midterm Exam III:** Wednesday, August 8th  
**Final Exam:** Thursday, August 16th
Course Calendar

**Lecture 1 (July 10):** Discussion on Syllabus, exams and grade distributions. Importance of chemical energy. Types of energy, energy changes in chemical reactions and first law of thermodynamics

**Lecture 2 (July 11):** Enthalpy of chemical reactions and calorimetry: Discussion on selective questions and problems on chapter 6

**Lecture 3 (July 12):** Kinetic Molecular Theory of liquids and solids, types of intermolecular forces, and properties of liquids; **Homework 1 due**

**Lecture 4 (July 13):** Crystal structure and bonding in solids, liquid-vapor equilibrium, and liquid-solid equilibrium. Phase diagram and discussion on selective questions and problems on chapter 12

**Lecture 5 (July 16):** Types of solutions, concentration units, factors affecting solubility colligative properties; discussion on selective questions and problems on chapter 13; **Homework 2 due**

**Lecture 6 (July 17):** Terminologies related to rate laws, first order, second order reactions, and experimental determinations of rate laws; **Homework 3 due**

**Lecture 7 (July 18):** Activation energy and temperature dependence of rate constants, elementary reactions, and catalysis

**Lecture 8 (July 19):** Exam Revision on Chapters 6, 12 and 13

**Lecture 9 (July 20):** Midterm Exam I; Chapters 6, 12 and 13

**Lecture 10 (July 23):** Discussion on selective questions and problems on chapter 14; The concepts of chemical equilibrium and equilibrium constants.

**Lecture 11 (July 24):** Reaction quotients, calculation of equilibrium concentrations; factors affecting chemical equilibrium; **Homework 4 due**

**Lecture 12 (July 25):** Discussion on selective questions and problems on chapter 15

**Lecture 13 (July 26):** Concepts of acids and bases, acid-base properties of water, pH, strength of acids and bases; Ionization constants of weak acids and bases. **Homework 5 due**

**Lecture 14 (July 27):** Exam Revision on Chapters 14 and 15; percent ionization; ionization constants of conjugate acid-base

**Lecture 15 (July 30):** Midterm Exam II Chapters 14 & 15
Lecture 16 (July 31): Acid-base properties of salts, Lewis acids and bases, discussion on selective questions and problems on chapter 16; Concept of buffer solution

Lecture 17 (August 1): Preparing buffer with a specific pH, strong acid-strong base titrations; Homework 6 due

Lecture 18 (August 2): Weak acid-strong base titrations, strong acid-weak base titrations, acid-base indicators

Lecture 19 (August 3): Solubility product, molar solubility, predicting precipitation reactions

Lecture 20 (August 6): Common ion effect and solubility, complex ion equilibria and solubility; discussion on selective questions and problems on chapter 17, spontaneous processes and entropy

Lecture 21 (August 7): Exam Revision on Chapters 16 and 17, second law of thermodynamics, Gibbs free energy and chemical equilibrium, Homework 7 due

Lecture 22 (August 8): Midterm Exam III Chapters 16 and 17

Lecture 23 (August 9): Discussion on selective questions and problems on chapter 18; Redox reactions, balancing redox equations, Homework 8 due.

Lecture 24 (August 10): Galvanic cells and standard reduction potentials; electromotive force (emf) and Nernst equation.

Lecture 25 (August 13): Concepts of batteries, corrosion, and electrolysis; discussion on selective questions and problems on chapter 19; Homework 9 due.

Lecture 26 (August 14): General Exam Revision

Lecture 27 (August 15): General Exam Revision

Final Exam (Thursday August 16): Time: 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 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. 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.