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.
Organic Chemistry II Learning Objectives:

A. The language of aromatic based organic chemistry
B. Reactions and mechanisms of compounds with carbonyl and amino groups
C. In depth retrosynthetic analysis to design complex organic molecules
D. Basic organometallic reactions and catalytic cycles
E. How to write a chemical essay in the language of organic chemistry
F. SciFinder (Chemical Database)

Cell phones ARE NOT permitted for use in exams and should be turned off during class time.


The following chapters will be covered:

Chapter 12: Alcohols from Carbonyl compounds
Chapter 13: Conjugated Unsaturated Systems
Chapter 14: Aromatic Compounds
Chapter 15: Reactions of Aromatic Compounds
Chapter 16: Aldehydes and Ketones: Nucleophilic Addition to the Carbonyl Group
Chapter 17: Carboxylic Acids and their Derivatives
Chapter 18: Reactions at the $\alpha$ Carbon of Carbonyl Compounds: Enols and Enolates
Chapter 19: Condensation and Conjugate Addition Reactions of Carbonyl Compounds
Chapter 20: Amines
Chapter 21: Phenols and Aryl Halides: Nucleophilic Aromatic Substitution

Special Topic G: Carbon-Carbon Bond-Forming and Other Reactions of Transition Metal Organometallic Compound (if time permits).

Homework: There will be problems assigned for each chapter. NO LATE HOMEWORK WILL BE ACCEPTED. Homework must be completed in PEN!
ATTENDANCE PREREQUISITE: BEING ABSENT FROM MORE THAN 9 LECTURES WILL RESULT IN FAILING THE COURSE.

LABORATORY: Attendance to laboratories is required. NO MAKE-UP LABORATORIES WILL BE GIVEN. If you miss 3 labs or more you will receive an automatic F for this course (i.e. this means you will fail the entire Organic I 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: 15%
Each Midterm Exam (12%): 36%
Research Essay 14%
Final Exam: 15%
Laboratory: 20%

Midterm Exam I: Monday, February 25th
Midterm Exam II: Wednesday, March 13th
Research Essay: Friday, April 5th (Due @ 5:00 pm)
Midterm Exam III: Wednesday, April 17th
Final Exam: Tuesday, May 14th at 8:00-10:00 am

Course Calendar

Lecture 1 (January 23): Discussion on syllabus, quick revision on Chapter 11, Preparation of alcohols from carbonyl compounds
Lecture 2 (January 25): Oxidation of alcohols
Lecture 3 (January 28): Reaction of organolithium and organomagnesium compounds
Lecture 4 (January 30): Revision on Chapter 12
Lecture 5 (February 1): Allylic substitution reactions (Homework Chapter 12 due)
Lecture 6 (January 4): 1,3-butadiene and stability of conjugated dienes
Lecture 7 (January 6): 1,4 addition on conjugated dienes, Diels-Alder reaction
Lecture 8 (February 8): Revision on Chapter 13; Review on aromatic compounds. Nomenclature of benzene derivatives (Homework chapter 13 due)
Lecture 9 (February 11): Differences between alkenes and benzenes compounds in terms of general reactions
Lecture 10 (February 13): Stability of benzene; Revision on Chapter 14
Lecture 11 (February 15): Electrophilic aromatic substitution reactions (Homework chapter 14 due)

Lecture 12 (February 18): Friedel-Crafts alkylation/acylation

Lecture 13 (February 20): Effect of substituents on reactivity and orientation, synthetic applications, revision on Chapter 15

Lecture 14 (February 22): Exam revision

Lecture 15 (February 25): Exam I (Chapters 12-14, subject to change)

Lecture 16 (February 27): Nomenclature of aldehydes and ketones, synthesis of aldehydes and ketones, nucleophilic addition to the carbon-oxygen double bond (Homework chapter 15 due)

Lecture 17 (March 1): Synthesis of hemiacetals and acetals, addition of primary and secondary amines to carbonyl groups, Wittig reaction; Revision on Chapter 16

Lecture 18 (March 4): Nomenclature and physical properties of carboxylic acids and acid derivatives, preparation of carboxylic acids (Homework chapter 16 due)

Lecture 19 (March 6): Synthesis and reactions of esters and amides

Lecture 20 (March 8): Decarboxylation of carboxylic acids, summary of the reactions of carboxylic acids and their derivatives, review on Chapter 17 (Homework chapter 17 due)

Lecture 21 (March 11): Exam revision

Lecture 22 (March 13): Exam II (Chapters 15-17 subject to change)

Lecture 23 (March 15): Reactions via enols and enolate anions

March 18-22nd is Spring Break (No classes)

Lecture 24 (March 25): Acetoacetic and Malonic Ester syntheses; Enamine chemistry

Lecture 25 (March 27): Review on Chapter 18

Lecture 26 (March 29): Claisen & Dieckmann condensation reactions, (Homework chapter 18 due)

Lecture 27 (April 1): Aldol condensations continue

Lecture 28 (April 3): Addition to unsaturated aldehydes and ketones
Lecture 29 (April 5): Synthesis of substituted acetic acids, Michael additions, summary of important reaction of dicarbonyl compounds Revision on Chapter 19. Research Essay due @ 5:00 pm.

Lecture 30 (April 8): Nomenclature and physical properties of amines, basicity of amines, amines vs. amides, preparation of amines (Homework chapter 19 due)

Lecture 31 (April 10): Reactions of amines, revision on Chapter 20

Lecture 32 (April 12): Structure and nomenclature of phenols, physical properties and synthesis of phenols (Homework chapter 20 due)

Lecture 33 (April 15): Exam revision

Lecture 34 (April 17): Exam III: Chapters 18-20 (subject to change)

April 19th Good Friday Holiday—No Class

Lecture 35 (April 22): Reactions of phenols

Lecture 36 (April 24): Reactions of phenols continued

Lecture 37 (April 26): Revision on Chapter 21

Lecture 38 (April 29): Special Topic G (Homework chapter 21 due)

Lecture 39 (May 1): Revision on Special Topic G

Lecture 40 (May 3): Final Exam Revision (Homework Special Topic G due)

Lecture 41 (May 6): Final Exam Revision

Lecture 42 (May 8): Final Exam Revision

Final Exam (May 14): 8:00 am-10:00 am in WSB 307 (comprehensive)

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: mmschwartze@sulross.edu.

Please inform Dr. Leaver and Organic Chemistry TA if you are pregnant or get pregnant during this semester as chemicals used in the Organic Chemistry laboratory could have harmful effects on an unborn child and extra safety precautions and due diligence need to be taken into consideration during laboratory periods.
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 smartphone) and emailed to Dr. Leaver at: david.leaver@sulross.edu. [.pdf is the preferred format for electronically submitted homework.] Homework electronically completed in Microsoft Word or other similar programs will NOT be accepted.