

Sul Ross State University
Syllabus for Organic Chemistry II: (CRN: 21346)
CHEM 3408 (Spring 2024)

Class: Organic Chemistry II
Room: WSB 307
Time: MWF 9:00-9:50 am
Date: Jan. 17 to May 8

Instructor: Dr. Hong Young Chang
Office: WSB 219
Email: hxc19tv@sulross.edu
Office Phone: (432) 837-8113
Office Hours: M-R 2:00-6:30 pm
(In person or via Zoom)
(Appointments only)

Food & Drinks: There will be no eating or drinking in the classroom. If you need to take a sip of your drink during class time, you may leave the room to do so.

OBJECTIVES:

Student Learning Outcomes (SLO):

A student graduating with a *chemistry major* is expected to demonstrate that (s)he can 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 an 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.

BSc in Chemistry Marketable Skills

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

1. Students will become good at punctuality and time management.
2. Students will analyze &/or synthesize molecules and perform spectroscopic characterization and interpret their results scientifically.
3. Students will become proficient at writing scientific papers and identifying appropriate references for their papers.
4. Students will become proficient at orally presenting scientific topics including the use of visual aids.

Organic Chemistry II Learning Objectives:

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

- 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)

REQUIRED RESOURCES AND TEXTS:

TEXT BOOK:

“Organic Chemistry” by T. W. Solomons, C. B. Fryle and S.A. Snyder (11th ed.), 2014, John Wiley & Sons

The SRSU library has one copy of this textbook in the “Textbook Collection” section. Please ask the library front desk if you need help finding this textbook. Suggested reading: “Survival guide to organic chemistry: bridging the gap from general chemistry” by Patrick E. McMahon, Bohdan B. Khomtchouk, and Claes Wahlestedt, 2017, CRC Press, Taylor & Francis Group.

SRSU Library Services: The Sul Ross Library offers FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library’s website, library.sulross.edu. Off-campus access requires your LoboID and password. Check out materials using your photo ID. Librarians are a tremendous resource for your coursework and can be reached in person, by email (srsulibrary@sulross.edu), or phone (432-837-8123).

Electronic Tool to Draw Chemical Structures:

ACD/ChemSketch is a computer program that you can use to draw organic structures, organic reactions, etc. You can download ACD/ChemSketch) onto your own personal computer (PC or Mac): [ChemSketch Download for Academic and Personal Use | ACD/Labs \(acdlabs.com\)](http://www.acdlabs.com)

Make sure you follow the requirements for the password and use your SRSU email address to register.

The following chapters will be covered:

Chapter 10: Radical Reactions

Chapter 11: Alcohols and Ethers: Synthesis & Reactions

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 α 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 is a **Handy Homework (HH)**. All homework will be assigned for each chapter. This HH has to be completed in pen. **NO LATE HOMEWORK WILL BE ACCEPTED.** HH has to be submitted into a paper using the given PDF. **It is not accepted by email.** The due date of HH is described on the following Course Calendar.

NOTE: HH (Handy Homework) and Exams MUST be completed in pen!

EXAMINATIONS:

There will be *three in-course* examinations and *a final* examination. **NO MAKE-UP EXAMS WILL BE GIVEN. All examinations will be completed by face-to-face.** The final exam is mandatory and comprehensive.

ATTENDANCE PRERESQUITE: BEING ABSENT FROM MORE THAN 9 LECTURES WILL RESULT IN FAILING THE COURSE.

PERCENTAGE BREAKDOWN OF MARKS:

HH (Handy Homework): 20%

Midterm Exam (each 20%): 60%

Final Exam: 20%

100% score of the organic chemistry II lecture class converts to 75% scores to combine the linked organic chemistry II lab class (it occupies 25%). Therefore, you will get a 100% score in Organic Chemistry II from the lecture (75%) and the lab (25%).

Midterm Exam I: Monday, February 19th

Midterm Exam II: Friday, March 8th

Midterm Exam III: Friday, April 19th

Final Exam: Tuesday, May 7th (8:00-10:00 am)

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.

1. All assignments and homework need to be individually completed and not copied from another student's work.

2. You need to keep the due day and time.

3. The homework must be handwritten and it has to be submitted to Dr. Chang directly. homework will not be accepted by my email [PDF format has to be used to submit homework]

SRSU Disability Services: ADA (Americans with Disabilities Act):

Sul Ross State University (SRSU) is committed to equal access in compliance with the 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 each semester for each class. Students seeking accessibility/accommodations services must contact Mrs. Mary Schwartz Grisham, LPC, SRSU's Accessibility Services Director at 432-837-8203 or

email mschwartz@sulross.edu. Our office is located on the first floor of Ferguson Hall, room 112, and our mailing address is P.O. Box C122, Sul Ross State University, Alpine, Texas, 79832.

CHEM3408 Organic Chemistry II Course Calendar

* This course calendar could be changeable. Before one week, your professor will let you know the changes.

Date	Lecture #	Chapter #	Topics	Due work
Jan.17	Lecture 1	Ch 10	Discussion on syllabus, free radical reactions of alkanes with halogens, understanding of chain reactions (initiation, propagation, termination)	
Jan.19	Lecture 2		Allylic /benzylic radicals, radical addition to alkenes, chain growth polymers	
Jan.22	Lecture 3		Revision of Chapter 10	
Jan.24	Lecture 4	Ch 11 & 12	Structure and nomenclature of alcohols, general physical and chemical properties of alcohols	Ch 10 HW due
Jan.26	Lecture 5		Reactions of alcohols, overview of reactions of carbonyl compounds with nucleophiles, Revision on Chapter 11	
Jan.29	Lecture 6		Preparation of alcohols from carbonyl compounds	
Jan.31	Lecture 7		Oxidation of alcohols, reactions of organolithium and organo-Magnesium compounds	Ch11 HW due
Feb.2	Lecture 8		Revision of Chapter 12	
Feb.5	Lecture 9	Ch 13	Allylic substitution reactions	
Feb.7	Lecture 10		1,3-butadiene and stability of conjugated dienes	
Feb.9	Lecture 11		1,4- addition Rx on conjugated dienes, Diels-Alder reaction	Ch 12 HW due
Feb.12	Lecture 12		Revision on Chapter 13; Review of aromatic compounds. Nomenclature of benzene derivatives	
Feb.14	Lecture 13	Ch 14	Differences between alkenes and benzenes compounds in terms of general reactions	

Feb.16	Lecture 14	Review & Test	Exam I revision	Ch 13 HW due
Feb.19	Lecture 15		Exam I (It covers chapters 10, 11, & 13)	
Feb.21	Lecture 16	Ch 14	Stability of benzene; Revision on Chapter 14	
Feb.23	Lecture 17	Ch 15	Electrophilic aromatic substitution reactions	
Feb.26	Lecture 18		Friedel-Crafts alkylation/acylation	Ch14 HW due
Feb.28	Lecture 19		Effect of substituents on reactivity and orientation, synthetic applications, revision on Chapter 15	
Mar.1	Lecture 20	Ch 16	Nomenclature of aldehydes and ketones, synthesis of aldehydes and ketones, nucleophilic addition to the carbon-oxygen double bond	Ch 15 HW due
Mar.4	Lecture 21		Synthesis of hemiacetals and acetals, addition of primary and secondary amines to carbonyl groups, Wittig reaction; Revision on Chapter 16	
Mar.6	Lecture 22	Review & Test	Exam II revision	
Mar.8	Lecture 23		Exam II (It covers chapters 14, 15, & 16)	Ch 16 HW due
Mar.18	Lecture 24	Ch 17	Nomenclature and physical properties of carboxylic acids and acid derivatives, preparation of carboxylic acids	
Mar.20	Lecture 25		Synthesis and reactions of esters and amides	
Mar.22	Lecture 26		Decarboxylation of carboxylic acids, Summary of the reactions of carboxylic acids and their derivatives, review on Chapter 17	
Mar.25	Lecture 27	Ch 18	Reactions via enols and enolate anions	Ch 17 HW due
Mar.27	Lecture 28		Acetoacetic and malonic ester syntheses, enamine chemistry	
Mar.29	Lecture 29		Review of Chapter 18	

Apr.1	Lecture 30	Ch 19	Claisen & Dieckmann condensation reactions	Ch 18 HW due
Apr.3	Lecture 31		Aldol condensations continued	
Apr.5	Lecture 32		Addition reactions to unsaturated aldehydes and ketones	
Apr.8	Lecture 33		Synthesis of substituted acetic acids, Michael additions, a summary of important reaction of Di-carbonyl compounds Revision of Chapter 19.	
Apr.10	Lecture 34	Ch 20	Nomenclature and physical properties of amines, basicity of amines, amines vs. amides, preparation of amines	Ch 19 HW due
Apr.12	Lecture 35		Reactions of amines, revision on Chapter 20	
Apr.15	Lecture 36	Ch 21	Structure and nomenclature of phenols, physical properties and synthesis of phenols	
Apr.17	Lecture 37	Review & Test	Exam III revision	
Apr.19	Lecture 38		Exam III (It covers chapters 17, 18, 19, & 20)	Ch 20 HW due
Apr.22	Lecture 39	Ch 21	Reactions of phenols	
Apr.24	Lecture 40		Reactions of phenols continued.	
Apr.26	Lecture 41		Revision of Chapter 21	
Apr.29	Lecture 42	Review & Test	Revision of Ch. 10, 11, & 13	
May 1	Lecture 43		Revision of Ch. 14, 15, & 16	Ch 21 HW due
May 7	Lecture 44		Tuesday, 8:00 - 10:00 AM, WSB 307	