

Sul Ross State University
Syllabus for Organic Chemistry I: CHEM 3407 001 (Fall 2021)
(CRN: 11244)

Class: Organic Chemistry I
Room: WSB 101
Time: MWF 9:00-9:50am

Instructor: Dr. Hong Young Chang
Office: WSB 219
Email: hxc19tv@sulross.edu
Office Phone: (432) 837-8113
Office Hour: M-R 2:00-4:30pm
(In person or zoom)
(Appointments only)

It is recommended to wear a suitable mask/face on campus (including lectures & laboratories) while you took COVID-19 Vaccine shots. There will be COVID-19 Tests in this semester. If you have tested positive for COVID-19 (or have been exposed to someone who has tested positive for COVID-19), please self-report: <https://srinfo.sulross.edu/covid-19/self-report/>. In order to self-report, you will need to be signed in with your SRSU credentials (yellow “log in” button on the bottom left-hand side of the above website). Other web-site of SRSU is also helpful for COVID-19.

[COVID Regulations - SUL ROSS](#)

[Free COVID-19 testing for all SRSU students, faculty and staff comes to Alpine, August 27-28 -](#)

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.

BSc in Chemistry Marketable Skills

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 to identify appropriate references for their paper.
4. Students will be become proficient at orally presenting scientific topics including the use of visual aids.

Organic Chemistry Learning Objectives:

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

1. The language of aliphatic based organic chemistry
2. The major functional groups in organic compounds
3. Retrosynthetic analysis to design simple and complex organic molecules
4. Applications of thermodynamic and kinetic principles to predict regiochemical and stereochemical outcomes of organic reactions
5. Infrared (IR), nuclear magnetic resonance (NMR) and mass spectroscopy

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:

ChemDraw (or ACD/ChemSketch) is a computer program that you can use to draw organic structures, organic reactions, etc. You can download ChemDraw (or ACD/ChemSketch) onto your own personal computer (PC or Mac):

<http://sitelicense.cambridgesoft.com/sitelicense.cfm?sid=3000>

[ChemSketch Download for Academic and Personal Use | ACD/Labs \(acdlabs.com\)](#)

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

Alternatively, you can access ChemDraw in the GIS lab (computer room next to the chem TA room) by searching for “ChemDraw” whenever there is no class in that room (open computer lab when no classes are being taught).

The following chapters will be covered:

Chapter 1: The Basics: Bonding and Molecular Structure

Chapter 2: Families of Carbon Compounds: Functional Groups and Intermolecular Forces

Chapter 3: Acids and Bases: Introduction to Organic Reactions and Their Mechanisms

Chapter 4: Nomenclature and Conformations of Alkanes and Cycloalkanes

Chapter 5: Stereochemistry: Chiral Molecules

Chapter 2.15: Infrared Spectroscopy & Chapter 9: Nuclear Magnetic

**Resonance and Mass Spectrometry: Tools for Structure
Determination**

**Chapter 6: Ionic Reactions: Nucleophilic Substitution and Elimination Reactions
of Alkyl Halides**

Chapter 7: Alkenes and Alkynes I: Properties & Synthesis

Chapter 8: Alkenes and Alkynes II Addition Reactions

Chapter 10: Radical Reactions

Chapter 11: Alcohols and Ethers: Synthesis & Reactions (*If time permits*)

HOMEWORK:

There are two kinds of homework, Multiple Choice Homework (MCH) and Handy Homework (HH). All homework will be assigned for each chapter covered. MCH has to be done via the Blackboard of SRSU and HH has to be completed in pen. **NO LATE HOMEWORK WILL BE ACCEPTED.** HH homework has to be submitted into a paper using the given PDF. It is not accepted by email.

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): 15%

MCH (Multiple Choice Homework): 15%

Each Midterm Exam (16.7%): 50%

Final Exam: 20%

Midterm Exam I: Monday September 20th

Midterm Exam II: Wednesday October 20th

Midterm Exam III: Monday November 15th

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

Course Calendar

Lecture 1 (August 23): Discussion on Syllabus, background of organic chemistry, overview of chemical bonding

Lecture 2 (August 25): Lewis structures and formal charges, resonance structure, basics of hybridization, bond lengths, geometric isomerism and three-dimensional formulas

Lecture 3 (August 27): Structural basics of hydrocarbons; revision on Chapter 1

Lecture 4 (August 30): Introduction to functional groups (*All homework Chapter 1 due*)

Lecture 5 (September 1): Physical properties and molecular structure

Lecture 6 (September 3): Intermolecular forces; revision on Chapter 2

September 6: NO CLASS: LABOR DAY HOLIDAY

Lecture 7 (September 8): Overview on acid base theories and reactions (*All homework Chapter 2 due*)

Lecture 8 (September 10): Factors affecting acidity of compounds

Lecture 9 (September 13): Introduction to organic acids and bases, acid base reactions involving organic molecules

Lecture 10 (September 15): Revision on Chapter 3 (*All homework Chapter 3 due*)

Lecture 11 (September 17): Exam Revision

Lecture 12 (September 20): Exam I (Chapters 1, 2 & 3)

Lecture 13 (September 22): Nomenclature and physical properties of alkanes and cycloalkanes and derivatives thereof

Lecture 14 (September 24): Conformational isomerism of alkanes and cycloalkanes

Lecture 15 (September 27): Synthesis of alkanes and index of hydrogen deficiency

Lecture 16 (September 29): Revision on Chapter 4

Lecture 17 (October 1): Isomerism, constitutional and stereoisomers, chiral molecules (*All homework Chapter 4 due*)

Lecture 18 (October 4): Nomenclature and physical properties of enantiomers

Lecture 19 (October 6): Introduction to synthesis of chiral molecules, molecules with more than one stereo-genic center.

Lecture 20 (October 8): Revision on Chapter 5, Introduction to IR Spectroscopy

Lecture 21 (October 11): IR Spectroscopy & NMR Spectroscopy (*All homework Chapter 5 due*),

Lecture 22 (October 13): NMR Spectroscopy and Mass Spectroscopy (MS)

Lecture 23 (October 15): Revision on IR, NMR and MS, Nucleophilic substitution reactions, basic mechanism, kinetics and examples of S_N2 , (*All homework for Chapter 9 due*).

Lecture 24 (October 18): Exam revision

Lecture 25 (October 20): Exam II (Chapters 4, 5 & 9)

Lecture 26 (October 22): S_N1 reaction mechanism and stereochemistry of nucleophilic, factors affecting the rate of S_N1 and S_N2 reactions substitution reactions

Lecture 27 (October 25): Functional group transformation using S_N2 reactions; Revision on Chapter 6

Lecture 28 (October 28): Introduction to elimination reactions, E2 and E1 mechanisms and examples, and substitution vs elimination (*All homework Chapter 6 due*)

Lecture 29 (October 29): Synthesis of alkenes and alkynes by elimination reactions and acidity of terminal hydrogen of alkynes, hydrogenation of alkenes and alkynes

Lecture 30 (November 1): Introduction to retrosynthetic analysis & addition reactions to alkenes; Chapter 7 Revision

Lecture 31 (November 3): Addition of hydrogen halides to alkenes & synthesis of alcohol from alkenes via addition reactions (*All homework Chapter 7 due*)

Lecture 32 (November 5): Addition of halogens to alkenes and alkynes, oxidation of alkenes and alkynes

Lecture 33 (November 9): Revision on Chapter 8, free radical reactions of alkanes (*All homework Chapter 8 due*)

Lecture 34 (November 12): Exam Revision

Lecture 35 (November 15): Exam III (Chapters 6, 7 & 8)

Lecture 36 (November 17): Free radical reactions of alkenes, revision on Chapter 10

Lecture 37 (November 19): Structure and nomenclature of alcohols, general physical and chemical properties of alcohols (*All homework Chapter 10 due*)

Lecture 38 (November 22): Reactions of alcohols, overview of reactions of carbonyl compounds with nucleophiles (*online recording*)

November 24-26: NO CLASS: THANKSGIVING HOLIDAY

Lecture 39 (November 29): Revision on Chapter 11 (*All homework Chapter 11 due*), final exam revision (*online recording*)

Lecture 40 (December 2): Final exam revision (*online recording*)

Final Exam (Comprehensive) (Tuesday December 7): 8:00-10:00 am (*face-to-face exam*)

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

Sul Ross State University (SRSU) is committed to equal access in compliance with 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 Rebecca Greathouse Wren, LPC-S, SRSU's Accessibility Services Coordinator at 432-837-8203 (please leave a message and we'll get back to you as soon as we can during working hours), or email rebecca.wren@sulross.edu. Their office is located on the first floor of Ferguson Hall (Room 112), and our mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas, 79832.

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 (including the multiple-choice homework (MCH)) need to be individually completed and not copied from another student's work.

2. The multiple-choice homework (MCH) will disappear after each due time in the Blackboard of SRSU. Therefore, you need to keep the due day and time.

3. The handy homework must be hand written and submitted to Dr. Chang directly. This handy homework will not be accepted by my email [.pdf format has to be used to submit]