

CHEM 232/234: Organic Chemistry II

CHEM 232 Fall 2022

Lecture: MWF 9:30am–10:30am Guion 12

Laboratory: M 12:50pm–4:00pm Guion 216

Instructor

David Morris

e-mail: dmorris@sbc.edu

Course Resources

Text: *Organic Chemistry: Fundamentals and Concepts*, John M. McIntosh

<https://www.degruyter.com/document/doi/10.1515/9783110565140/html?lang=en>

ISBN: 9783110565126

Canvas: <https://sweetbriar.instructure.com/courses/3934>

E-mail: Please check your inbox daily as updates may be sent frequently throughout the term.

Office Hours: tbd

Course description: In this course you will learn many new reactions that are useful for synthesis or otherwise relevant toward biochemical processes that occur in living systems. You will apply previously learned concepts from 1st semester organic chemistry to understanding how and why compounds react the way they do, and to being able to predict the outcome of a given reaction. By the end of the course, you will hopefully gain an appreciation for how organic chemistry plays an important role in many modern sciences such as medicine, biology, agriculture and materials.

Course Policies

Attendance: It is crucial that you show up to class everyday so that you get to see the concepts explained, have a chance to ask questions and interact with the course material within the context of the classroom environment. If you miss a class, it will be your responsibility to ensure that you obtain information pertinent to the missed class date, which includes lecture notes, assigned quizzes, handouts or other information. Unexcused absences during tests will result in a 0 for that test.

Honour: All students are expected to abide by the SBC Honor Code and accepted standards of academic integrity. Any suspected act of plagiarism or academic dishonesty will be reported to the Chair of the Judicial Committee. Refer to the Student Handbook for more information.

Learning Needs: Sweet Briar College is committed to upholding and maintaining all aspects of the federal Americans with Disabilities Act of 1990 (ADA), as amended in 2008, and Section 504 of the Rehabilitation Act of 1973. If you are a student with a disability and wish to request reasonable accommodations, please contact the Office of Accessibility Services accessibility@sbcc.edu for an appointment. Because many accommodations require early planning, requests for accommodations should be made as soon as possible.

Readings: Students are expected to follow along with the textbook before and after class as a supplement to the material presented in lecture. The course material is difficult, and the more times you engage with it, the better you will learn it. The reading/lecture schedule is subject to adjustment based on our pace and unexpected schedule changes.

Grading:

The traditional 10 point grading table (>90% = A+/A/A-, 80-90 = B+/B/B-) serves as a baseline for the class. The contributions to the final grade are as follows

In class assignments	15%
Homework assignments on Canvas	15%
Four mid-term exams	40%
Final comprehensive exam	30%

Examinations:

Four mid-term exams will be held over the course of the semester. There will be an opportunity to write corrections for the mid-term exams to recover up to half of the missed points on these mid-terms. A comprehensive final exam will be taken during the final exam period (December 16-18).

Lecture Outline and Suggested Reading (Chapter # in Text)

Date	Topics	Reading	Notes
Wednesday, September 14	Course introduction		
Friday, September 16	Reactions of Alkenes Addition of HBr, HCl Markovnikov orientation	5.3-5.9, 15 (on alkenes)	
Monday, September 19	Hydration & oxymercuration Hydroboration of alkenes Addition of Br ₂ and Cl ₂ Formation of halohydrins	5.10.1	
Wednesday, September 21	Catalytic hydrogenation Addition of carbenes to alkenes Epoxidation and acid catalyzed ring- opening Syn dihydroxylation Oxidative cleavage of alkenes Polymerization	5.10.2-5.10.3	
Friday, September 23	Wrap up reactions of alkenes Synthesis practice		
Monday, September 26	Exam 1 in class		DROP DEADLINE
Wednesday, September 28	Polymers	See Canvas	
Friday, September 30	Alkynes Naming, acidity and acetylide ions; synthesis of alkynols	5.11, 5.12, 15 (on alkynes)	
Monday, October 3	Addition reactions of alkynes Tautomerization Synthesis of ketones/aldehydes		
Wednesday, October 5	Alcohols Naming, properties, acidity	7.1-7.4	
Friday, October 7	Grignard Reagents Reduction of C=O group Thiol chemistry	7.13-7.14	
Monday, October 10	Reactions of Alcohols: oxidation (synthetic and biological); use of tosylates	7.12, 7.15	

Wednesday, October 12	Reactions of alcohols with HX, phosphorus halides, and SOCl ₂	7.6	
Friday, October 14	Fall break – no classes		
Monday, October 17	Fall break – no classes		
Wednesday, October 19	Dehydration of Alcohols Esterification Use of alkoxides	12	
Friday, October 21	Mass Spectrometry Molecular ion, isotopes and fragmentation	See Canvas	
Monday, October 24	More mass spectrometry practice Identification of structure and molecular formulas	See Canvas	
Wednesday, October 26	Exam 2 in class		
Friday, October 28	Conjugated Systems Dienes, stability, molecular orbitals and allylic cations	5.9	
Monday, October 31	1,2- and 1,4-addition Kinetic vs. Thermodynamic Control Diels-Alder Reaction	See Canvas	
Wednesday, November 2	Diels-Alder reaction continued Pericyclic reactions and orbital symmetry	See Canvas	
Friday, November 4	Aromatic Compounds Stability of benzene Aromatic, nonaromatic and anti- aromatic	9.1-9.3	
Monday, November 7	Hückel's rule Aromatic and anti-aromatic ions Heterocyclic compounds	9.3	
Wednesday, November 9	Reactions of Aromatic Compounds: electrophilic aromatic substitution	9.4, 9.6	
Friday, November 11	Exam 3 in class		
Monday, November 14	More electrophilic aromatic substitution Friedel-Crafts alkylation and acylation	9.7, 9.8, 9.4.4, 9.4.5	
Wednesday, November 16	Ketones and Aldehydes nomenclature, synthesis (review)	7.8-7.11	

Friday, November 18	Nucleophilic addition, hydration formation of cyanohydrins and imines	7.12	WITHDRAW DEADLINE
Monday, November 21	Thanksgiving – no classes		
Wednesday, November 23	Thanksgiving – no classes		
Friday, November 25	Thanksgiving – no classes		
Monday, November 28	Condensation reactions acetals, use of protecting groups	7.12.3, 7.12.4	
Wednesday, November 30	Wittig reaction Reduction and deoxygenation of ketones	7.15	
Friday, December 1	Wrap up/summarize ketones and aldehydes Synthesis practice	7.16	
Monday, December 5	Exam 4 in class		
Wednesday, December 7	Carboxylic Acid Derivatives esters, acid chlorides, nitriles and their chemistry	8	
Friday, December 9	Organic Nitrogen Compounds preparation, chemistry and reactions of amines	10.1-10.2	
Monday, December 12	Reactions of amides and additional related topics	10.3	
Tuesday, December 13	Review (n.b. today is on a Friday schedule)		
Wednesday, December 14	Last class period (review)		
12/16 – 12/18	Final exam period		