

Chemistry 2320

Organic Chemistry II, Spring 2018

Instructor: Dr. Tom Chang
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Meeting Time/Place: MWF 10:30 - 11:20 am, Eccles Business Building 215
Thurs 3:00 - 3:50 pm, Eccles Science Learning Center 130

Office Hour: MWF 12-1 pm or email me to setup an appointment

Texts: "Organic Chemistry," Paula Yurkanis Bruice, Prentice Hall, 6th (2011) or 5th (2007) Ed. (required). Earlier edition or other version of Organic Chemistry textbook should work.

Molecular Model Kit: Available in Chem Stores (1st Floor of Widtsoe). (Recommended)

Course Outline and Exam Schedule:

Week	Dates	Chapter(s)
1	1/8 – 1/12	Introduction, Chapter 13
2	1/17 – 1/19 (1/15 No class)	Chapters 13, 14
3	1/22 – 1/26	Chapter 14, Exam 1 (1/26, Friday),
4	1/29 – 2/2	Chapter 15
5	2/5 – 2/9	Chapters 15 and 16
6	2/12 – 2/16	Chapter 16, Exam 2 (2/16, Friday)
7	2/20 – 2/23 (2/19 No class, 2/20 Monday schedule)	Chapter 17
8	2/26 – 3/2	Chapters 17 and 18
9	3/5 – 3/9 (No class, spring break)	
10	3/12 – 3/16	Chapter 18
11	3/19 – 3/23	Chapters 18 and 19
12	3/26 – 3/30	Chapter 19, Exam 3 (3/30, Friday)
13	4/2 – 4/6	Chapter 20
14	4/9 – 4/13	Chapter 20
15	4/16 – 4/20	Chapters 20 and 21*
16	4/23 – 4/27	Chapter 21*, (4/27 Assessment Quiz)
17	5/2, Wednesday	Final Exam (5/2, Wednesday, 11:30 am – 1:20 pm)

* Chapter 21 contains material adopted from chapters 24, 25, 26 and 27 of the textbook.

Lecture Delivery:

A combination of handout (will be provided by instructor), PowerPoint slide and projector.

Available from Canvas:

- Class notes, reviewing slides and lecture videos
Click “Modules” and select the chapter you wish to view or download.
- Previous exams
Click “Modules” and select the exam you wish to view or download.
- NMR practice problem
Click “Modules” and select Chapter 14. Click “NMR practice problem”
- Reaction animation
Click “Modules” and select the chapter you wish to view or download
- Online OChem videos
Click “Modules” and select Supplemental Material. Click “Online OChem Videos”
- Summary reaction mechanism
Click “Modules” and select Supplemental Material. Click “Reaction mechanism-2320”

More practice problems:

You are highly encouraged to complete the practice problems available for each exam. These will help you immensely in preparing for the quizzes so that you can score well. The practice exams can be found at the site below:

- Go to: http://ion.chem.usu.edu/~tchang/chem2320/previous_exams_2320.htm
Click "Exam, Quiz and Answer"
- Go to: http://ion.chem.usu.edu/~tchang/chem2320/previous_exams_2320.htm
Click “Project 1 (honorary)” from 2006 or 2007

Online links to chemistry materials:

- Links from the online course material of Chem2320:
http://ion.chem.usu.edu/~tchang/links_of_organic_chemistry.htm

General Learning Objectives for 2320

Know what molecular events give rise to mass spectrometry and infrared spectroscopy, and be able to use such spectra to identify the structures of organic molecules.

Know the origin of nuclear magnetic resonance in terms of interaction between nuclei, magnetic fields and radiofrequency radiation; be able to use proton and carbon NMR spectra to identify the structures of organic molecules.

Be able to identify aromatic and antiaromatic compounds, and know the chemical consequences of aromaticity; be able to write the mechanism for and predict the products of electrophilic aromatic substitution.

Be able to explain and to predict the effect of substituents on the reactivity and regiochemistry of electrophilic aromatic substitution.

Know the structures and chemical properties of carboxylic acid derivatives; be able to write the mechanisms for nucleophilic substitution and hydrolysis reactions of such compounds, and to predict the products of such reactions.

Be able to write mechanisms for nucleophilic addition reactions and for addition-elimination reactions of aldehydes and ketones, and be able to predict the products of such reactions.

Be able to describe the general structure of a carbohydrate, and the major reactions of carbohydrates.

Be able to write the structure of an amino acid, and explain how amino acids form proteins and their overall chemical structure and reactivity.

Be able to identify the various forms of catalysis (including nucleophilic, general acid/base, specific acid/base, anchimeric assistance, metal-ion catalysis) and be able to write mechanisms for such processes.

Know the general structures of lipids and fatty acids and their chemical and physical properties.

Know the structures of nucleosides, nucleotides and nucleic acids, and the physical and chemical properties of related biological molecules.

Broad Objectives (for IDEA evaluation):

1. Gaining factual knowledge (terminology, classifications, methods, trends)

- a. Apply electronegativity and hybridization concept to draw the Lewis structure and predict chemical properties for various functional groups.
- b. Use electronegativity, octet rule, and electron(s)-moving to write the resonance structures and judge the order of stability for these structures.
- c. Use the pK_a values to explain or define the roles of a molecule with lone-pair electron ($:Z$) as base, nucleophile, or leaving group in a chemical reaction.

2. Learning fundamental principles, generalizations, or theories

- a. Apply the concepts of acid/base and nucleophile/electrophile to predict a chemical reaction.
- b. Recognize constitution (structural) isomers, configuration isomers, conformation isomers, and stereoisomers, and explain the difference in chemical and physical properties among these compounds.
- c. Apply the concepts of resonance and inductive effects to predict the chemical and physical properties for different functional groups and the molecule to which these functional groups are attached.

- d. Explain the reaction mechanisms by using the concepts of steric hindrance, stability of carbocation, and leaving group capability.
- e. Explain aromaticity and recognize aromatic compounds.

3. Learning to apply course material (to improve thinking, problem solving, and decisions)

- a. Write correct electron-pushing mechanisms for the topic reactions in each chapter.
- b. Perform all of the detailed learning objectives for every chapter posted online or distributed as hard copy.

Academic Integrity Violation

1. Any form of extra assistance or media are not allowed for all the exams and bonus quiz. These include, but not limited to, books, class notes, handouts, information sheets or cards, and electronic devices, such as cell phone, computer, ipad, and calculator.
2. Any violation during the exams and bonus quiz is subjected to disciplinary actions.
3. More information can be found at: <http://www.usu.edu/studentconduct/aiv/index.cfm>

Grading Scheme:

- Point Distribution:
- (1) Three one-hour exams (100 pts each). No exam can be dropped. No makeup exam will be given unless with prior arrangement.
 - (2) Final (200 pts). Every one needs to take the final. The final cannot be partially dropped and substituted with scores from other exams.
 - (3) Eight homework (10 pts each). Each homework be posted on canvas and the hardcopy will be distributed in the class. It is essential to return the homework by the due date.
 - (4) Assessment quiz (20 pts). There will be **10** multiple choice questions for the bonus quiz with a total of twenty points. **Nine** of these questions will come from previous exams. One question comes from the new material. The date for assessment is April 27.
 - (5) Extra Points (5 points maximum): will only be awarded to those who are less than 1% from a better grade **and** have shown steady progress on their scores.

Total Points: 600 pts

Grade Correction:

- Any grading mistake or dispute need to be discussed with me within **one week** after the return of the exam.
- Email me (tom.chang@usu.edu) for the changes.
- Receive acknowledge email.

Grade Breakdown:

Your total points from three exams, final and bonus quiz will be divided by **600** to calculate your score percentage. Your final grades are determined according to your score percentage as shown in the table below.

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
% Scores	≥90%	≥85%	≥80%	≥76%	≥72%	≥68%	≥64%	≥60%	≥56%	≥50%	<50%

However, the final grade may be normalized if more than 20% of the students receive F. Except for the final exam, any grading error needs to be corrected **within a week** after the exams or quiz are returned.

Tips for Preparing the Exam:

- Be able to understand and answer correctly for the questions from "Learning Check".
- Be able to understand and answer correctly for the questions from previous exams.
- Attend the reviewing sections held by Undergraduate Teaching Fellow (UTF) or SI.
- Email or come to me for question.

Advice for Learning Organic Chemistry

- Understand the material.
- Do not hesitate to ask question.
- Work on problems with your hand.
- Study daily.