CHEM 2430
Recitation for Organic Chemistry I
The University of Toledo
College of Natural Sciences and Mathematics
Department of Chemistry and Biochemistry

41943 - CHEM 2430 - 001, 41946 - CHEM 2430 - 003, 41949 - CHEM 2430 - 006
43128 - CHEM 2430 - 007, 41950 - CHEM 2430 - 008

TA/Instructor: Md-Istiak Hossain
TA Email: md-istiak.hossain@rockets.utoledo.edu
Faculty Instructor: Dr. Claire Cohen
Faculty Email: claire.cohen@utoledo.edu
Instructor Phone: 419-530-4071
Offered: Fall, 2020
Course Website: Blackboard Learn or https://blackboard.utdl.edu/webapps/login/
Class Day/Time:
001 8:00-8:55pm Thursdays,
Health Sci and Human Services 3202
003 11:30am-12:25pm Thursdays,
Health Sci and Human Services 1600
006 3:00-3:55pm Thursdays,
Rocket Hall 1554
007 4:10-5:05pm Thursdays, Remote
008 4:10-5:05pm Thursdays, Remote
Credit Hours: 1

SPECIAL UNIVERSITY WIDE COURSE EXPECTATIONS DURING COVID-19

RECITATION ATTENDANCE The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course (see COURSE EXPECTATIONS section below). Students must perform a daily health assessment, based on based on CDC guidelines, before coming to campus each day, which included taking their temperature. Students who are symptomatic/sick should not come to class and should contact the Main Campus Health Center at 419-530-3451. Absences due to COVID-19 quarantine or isolation requirements are considered excused absences from face-to-face recitation. Students should notify their instructors and these absences may not require written notice.

FACE COVERINGS All students must wear face coverings while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. NO students will be permitted in class without a face covering. If you have a medical reason that prevents you from wearing a face covering due to a health condition deemed high-risk for COVID-19 by the Centers for Disease Control and Prevention (CDC), you should submit a request for an accommodation through the Student Disability Services Office (SDS) by completing the online application. Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. If a student is already affiliated with SDS and would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility specialist to discuss their specific needs.

SOCIAL DISTANCING Students should practice social distancing inside and outside the classroom please follow signage and pay attention to the seating arrangements. Do not remove stickers or tape from seats and/or tables, this is there to provide guidance on the appropriate classroom capacity based on the recommended 6 feet of social distancing between individuals. Please be conscious of your personal space and respectful of others. Also be cognizant of how you enter and exit the room; always try to maintain at least 6 feet of distance between yourself and others.
DESKS AND WORK SPACES Students will need to sanitize their desks and/or work space before class with the University provided sanitizing spray and paper towels their desks.

OTHER SPECIAL NOTES It’s important to note that based on the unpredictability of the COVID-19 virus things can change at any time so please be patience and understanding as we move through the semester. I also ask that you keep me informed of concerns you may have about class, completing course work/assignments timely and/or health concerns related to COVID.

CATALOG/COURSE DESCRIPTION Recitation sections that discuss concepts and solve practice questions in CHEM2410.

COURSE OVERVIEW In Organic Chemistry I Recitation, you will be improving your understanding of organic chemistry through practice problems and group discussion. This course is designed as a supplement to your lecture course to help you further grasp the material through problem solving and interaction with your fellow students. Attendance and participation will be documented in order to decide your receiving credit for this course.

PREREQUISITES AND COREQUISITES Organic Chemistry I (CHEM 2410) is a Corequisite for this course.

Prerequisites: CHEM 1240 with a minimum grade of C-.

TEXTS AND ANCILLARY MATERIALS Required Materials: The same materials used in CHEM2410 will be used in this course. This includes:


TEACHING METHODOLOGY Students will work in groups on the assigned problems from the textbook. This face-to-face course is designed to stimulate students through active learning by participating in solving provided problems through a think, pair, share process. Discussion is highly encouraged.

TECHNOLOGY REQUIREMENTS Access to a properly functioning computer with internet access in order to login to Blackboard (https://blackboard.utdl.edu/webapps/login/).

Updated versions of plug-ins, recent software and the necessary tools to be kept free of viruses and spyware. Updated software is available from UToledo’s Online Learning Download center (https://www.utoledo.edu/dl/main/downloads.html).

COURSE EXPECTATIONS Attend and participate in all recitation sections.
OVERVIEW OF COURSE GRADE ASSIGNMENT
The attendance will be taken in all classes during the semester. You will receive credit for this course if you miss the class no more than 3 times. Otherwise, you will receive no credit. STUDENTS MUST ACTIVELY PARTICIPATE to receive credit for each session.

Drop, Withdrawal and Incomplete Grades Course drop and withdrawal procedures have been set by the University. Dropped courses do not appear on your transcript. The deadline for dropping is August 31st. You may withdraw from the course and receive a grade of W. The deadline for withdrawal is October 23rd. W's do not affect your GPA.

A course grade of Incomplete is given only to those who have completed all but a small percentage of course requirements for an acceptable reason. The Incomplete must be removed before you take organic chemistry.

Midterm Grading
Students will be notified of their up-to-date attendance record. Students with more than 3 absences will receive a grade of no credit.

Final Grading
Students who attend and participated in a minimum of 11 sessions will get credit for this course.

ACADEMIC POLICIES
Make-up sessions or work will not be given.

Undergraduate Policies: http://www.utoledo.edu/policies/academic/undergraduate/
Graduate Policies: http://www.utoledo.edu/policies/academic/graduate/

UNIVERSITY POLICIES
Policy Statement on Non-Discrimination on the Basis of Disability (ADA)
The University is an equal opportunity educational institution. Please read The University’s Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.
Students can find this policy along with other university policies listed by audience on the University Policy webpage (http://www.utoledo.edu/policies/audience.html/#students).

Academic Accommodations
The University of Toledo embraces the inclusion of students with disabilities. We are committed to ensuring equal opportunity and seamless access for full participation in all courses. For students who have an accommodations memo from Student Disability Services, I invite you to correspond with me as soon as possible so that we can communicate confidentially about implementing accommodations in this course. For students who have not established affiliation with Student Disability Services and are experiencing disability access barriers or are interested in a referral to healthcare resources for a potential disability or would like information regarding eligibility for academic accommodations, please contact the Student Disability Services Office (http://www.utoledo.edu/offices/student-disability-services/) by calling 419.530.4981 or sending an email to StudentDisability@utoledo.edu.

ACADEMIC AND SUPPORT SERVICES
Please follow this link to view a comprehensive list of Student Academic and Support Services (http://www.utoledo.edu/studentaffairs/departments.html) available to you as a student.

SAFETY AND HEALTH SERVICES FOR UT STUDENTS
Please use the following link to view a comprehensive list Campus Health and Safety Services available to you as a student.
INCLUSIVE CLASSROOM STATEMENT

In this class, we will work together to develop a learning community that is inclusive and respectful. Our diversity may be reflected by differences in race, culture, age, religion, sexual orientation, gender identity/expression, socioeconomic background, and a myriad of other social identities and life experiences. We will encourage and appreciate expressions of different ideas, opinions, and beliefs so that conversations and interactions that could potentially be divisive turn, instead, into opportunities for intellectual and personal development.

Course scheduling assistance: Chemistry Department Secretary, Ms. Samples, is in Room BO 2022, telephone 419-530-2698. If you have further questions or if you need assistance, please talk to her. She takes care of all scheduling changes.

Chemistry Help Center, Room BO 2043, is where the teaching assistants hold their office hours so it is a great place to receive assistance. It is generally open all day Monday through Friday & evenings Monday through Thursday. A schedule will be posted early in the term. No appointment is necessary. Tutoring support for all UT students is available through the Learning Enhancement Center located in the Carlson Library.

Instructor Office Hours are times when you can stop by my office (no appointment needed) with questions about the course material, grades, and any concerns with the course. My office hour times and location are listed at the top of the syllabus. I will do my best to respond to email within 24 to 48 hours.

SAFETY AND HEALTH SERVICES FOR UT STUDENTS

Please use the following link to view a comprehensive list Campus Health and Safety Services available to you as a student

### COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week/LOs (p. 7 – 9)</th>
<th>End of Chapter problems from the textbook to be covered in recitation (a selection of the following list will be covered on each date):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1 Thursday 8/20 LOs: 1.1 – 1.2</td>
<td>Chapter 1 – Structure and Bonding in Organic Molecules: 25-31, 33-34, 37, 39-46, 49, 52, 53, 58</td>
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<td></td>
<td>Chapter 3 – Reactions of Alkanes: 15-16, 22-23, 27-29, 48</td>
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<tr>
<td>Week 4 Thursday 9/10 LOs: 3.3 – 3.5, 4.1</td>
<td>Chapter 3 – Continued: 15-16, 22-23, 27-29, 48</td>
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<td>Chapter 4 – Cycloalkanes: 21-22, 25, 27, 31-32, 34, 37, 44, 58-59</td>
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<tr>
<td>Week 5 Thursday 9/17 LOs: 4.2, 5.1 – 5.3</td>
<td>Chapter 5 – Stereoisomers32-42, 44-47, 50-52, 54-56, 65, 68-71</td>
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<td>LOs: 5.4 – 5.7</td>
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<tr>
<th>Week 7</th>
<th>Thursday 10/1</th>
<th>Chapter 6 – Continued: 31-39, 41, 43-47, 49-50, 56, 61, 65</th>
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<tbody>
<tr>
<td></td>
<td>LOs: 6.1 – 6.6, 7.1 – 7.2</td>
<td>Chapter 7 – Further Reactions of Haloalkanes (S_N1 and E_X Reactivity): 25-28, 30, 32-36, 43-52, 61, 67-70</td>
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<tr>
<th>Week 8</th>
<th>Thursday 10/8</th>
<th>Chapter 6 – Continued: 25-28, 30, 32-36, 43-52, 61, 67-70</th>
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<tr>
<th>Week 9</th>
<th>Thursday 10/15</th>
<th>Chapter 8 – Continued: 24-25, 29-31, 34-36, 40, 42-46, 48, 53, 55-56, 64-65</th>
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<tr>
<th>Week 10</th>
<th>Thursday 10/22</th>
<th>Chapter 9 – Continued: 34-40, 42-44, 49-51, 56, 60, 65-66, 84-86</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>LOs: 9.3 – 9.5, 11.1 – 11.4</td>
<td>Chapter 11 – Alkenes: 33-35, 42-43, 45, 54, 74, 76</td>
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</tbody>
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<thead>
<tr>
<th>Week 11</th>
<th>Thursday 10/29</th>
<th>Chapter 12 – Reactions of Alkenes: 41-43, 46, 48-53, 55, 58, 61, 67-68, 70, 81, 83-85</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOs: 12.1 – 12.6</td>
<td>Chapter 12 – Reactions of Alkenes (Continued): 41-43, 46, 48-53, 55, 58, 61, 67-68, 70, 81, 83-85</td>
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<tr>
<td></td>
<td></td>
<td>Chapter 13 – Alkynes: 29-30, 38-52, 61-63</td>
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<tr>
<th>Week 12</th>
<th>Thursday 11/5</th>
<th>Chapter 13 – Continued: 29-30, 38-52, 61-63</th>
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<tr>
<th>Week 13</th>
<th>Thursday 11/12</th>
<th>Chapter 13 – Continued: 29-30, 38-52, 61-63</th>
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<tr>
<th>Week 14</th>
<th>Thursday 11/19</th>
<th>Chapter 13 – Continued: 29-30, 38-52, 61-63</th>
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<tr>
<td></td>
<td>LOs: 13.8, 14.1 – 14.3</td>
<td>Chapter 14 – Delocalized Pi Systems: 32-33, 39-42, 46, 49-52, 54, 58, 60, 63, 76, 79</td>
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**STUDENT LEARNING OUTCOMES**

Following the completion of this course (in conjunction with CHEM2410) students will be able to:

1.1 Interpret Valence Bond Theory, Lewis Structures, condensed structural formulas, bond-line (skeletal) notation, bolded wedge and hashed wedge notation, and resonance structures.

1.2 Recognize and assign formal charges to atoms in molecules and ions.

2.1 Interpret potential energy diagrams including enthalpy, activation energies, intermediates, the rate determining step, the number of reaction steps, and transition states.

2.2 Represent electron-pair movement with curved-arrow notation in reaction mechanisms and resonance structures.
2.3 Define and identify alkanes, functional groups, electrophiles, nucleophiles, acids, and bases
2.4 Predict the relative strengths of acids and bases
2.5 Name organic molecules using systematic nomenclature and common names
2.6 Interpret Newman projections and apply them to compare conformational mobility of different molecules
3.1 Distinguish heterolytic from homolytic bond dissociation and understand the reaction pathways available to non-functionalized molecules such as alkanes
3.2 Define and identify radicals and radical reactions
3.3 Define hyperconjugation and recognize its influence on radical stabilities and the relative ease of radical formation
3.4 Recognize the interrelationships between the three stages of radical chain reaction mechanisms: initiation, propagation, and termination
3.5 Predict results of alkane halogenation reactions on the basis of concepts of reactivity and selectivity
4.1 Name cyclic alkanes
4.2 Describe and identify the structural and thermodynamic differences between cis and trans isomers of substituted cycloalkanes
4.3 Interpret different constitutional isomers from stereoisomers
4.4 Differentiate constitutional isomers from stereoisomers
4.5 Apply optical rotation measurements to the determination of enantiomeric excess
4.6 Assign the absolute configurations of chiral structures
4.7 Model stereoisomers in the form of Fischer projections
4.8 Define and identify diastereoisomers, enantiomers, meso compounds, conformers, and identical structures in molecules with multiple chiral centers
4.9 Apply the principles of stereoisomerism to the stereochemical outcome of chemical reactions
6.1 Identify nucleophiles and the site of nucleophilic attack in a molecule
6.2 Use electron-pair arrows to draw the product of reaction between a nucleophile and a substrate
6.3 Deduce the transition state structure of nucleophilic substitution $S_{N}2$ by following the stereochemical changes during the course of the reaction
6.4 Summarize the relationship between basicity and leaving group ability
6.5 Define the factors that govern nucleophilicity and recognize steric hindrance as a controlling element in $S_{N}2$ reactivity
6.6 Distinguish protic from aprotic solvents
7.1 Define and identify solvolysis
7.2 Interpret the mechanism of the $S_{N}1$ reaction and its variables: solvent, leaving group, nucleophile, and alkyl substituents
7.3 Compare the $S_{N}1$ and $S_{N}2$ processes including stereochemistry
7.4 Summarize the factors that determine carbocation stabilization through hyperconjugation
7.5 Interpret elimination mechanisms and distinguish between $E1$ and $E2$ mechanisms
7.6 Predict the dominant course of the reaction of haloalkanes with nucleophiles/bases (elimination or substitution) and the underlying mechanism ($S_{N}1$, $S_{N}2$, $E1$, or $E2$)
8.1 Identify and name alcohols and the properties of alcohols, including acid and base properties
8.2 Apply nucleophilic substitution mechanism for the preparation of alcohols
8.3 Relate alcohols, aldehydes, and ketones and how to use oxidation-reduction chemistry to synthesize alcohols, aldehydes, ketones, and carboxylic acids.
8.4 Predict the products formed when hydride and organometallic reagents are added to aldehydes and ketones.
8.5 Apply retrosynthetic analysis to synthesis problems
9.1 Predict the products formed when alcohols are treated with base
9.2 Predict the products formed when alcohols undergo substitution and elimination reactions in acidic conditions
9.3 Predict carbocation rearrangements and determine what structural changes occur as a result of carbocation rearrangements
9.4 Apply inorganic reagents to effect substitution of the hydroxy group in alcohols and predict the products when inorganic reagents are reacted with alcohols
9.5 Name and synthesize ethers
11.1 Name alkenes including stereochemistry
11.2 Identify and interpret stereochemistry in alkenes
11.3 Relate stability of alkenes to structure
11.4 Apply basic energetic principles to predict isomeric products in elimination reactions
12.1 Describe why alkenes undergo addition reactions and correlate mechanisms of addition with predictions of stereochemical outcomes
12.2 Predict the products of hydrogenation and recognize what catalysts and reagents are required
12.3 Predict the products of electrophilic addition to the π bond and recognize what reagents are required
12.4 Relate carbocation stability to regiochemistry of addition: Markovnikov’s rule
12.5 Model and interpret mechanisms for HX addition and acid-catalyzed hydration
12.6 Predict the products of the hydration, oxymercuration-demercuration, and hydroboration-oxidation of alkenes and recognize what reagents are required to carry out these transformations.
12.7 Identify reagents for conversion of alkenes to cyclopropanes, oxacyclop propane s, and 1,2-diols and predict what products are formed.
12.8 Predict the products of alkene ozonolysis and recognize what reagents are required to carry out oxonolysis.
12.9 Recognize under what conditions radical addition may occur, and predict the products formed.
12.10 Describe and model alkene polymerization and predict the polymers formed.
13.1 Name alkynes according to the IUPAC rules and identify properties of alkynes based on structure
13.2 Identify starting molecules and reagents used to synthesize alkynes
13.3 Compare addition reactions of alkynes to those of alkenes and predict the products formed as a result of addition reactions.
13.4 Distinguish processes that lead to single versus double addition
13.5 Model and interpret mechanisms for electrophilic addition reactions to alkynes
13.6 Compare Markovnikov to anti-Markovnikov alkyne hydrations
13.7 Relate alkenols to their carbonyl tautomers
13.8 Predict the products of the organometallic chemistry of alkenyl halides and identify organometallic reagents
14.1 Model and interpret $\pi$ delocalization
14.2 Compare kinetic versus thermodynamic product formation in the electrophilic attack on conjugated dienes
14.3 Predict the products of the Diels-Alder cycloaddition and its stereochemistry