



Organic Synthesis

The University of Toledo

Department of Chemistry & Biochemistry, College of Natural Sciences and Mathematics

CHEM 8410/6410/4410

CRN: 14486/14485/17273

Instructor:	Peter R. Andreana, PhD	Class Location:	BO 2059
Email:	peter.andreana@utoledo.edu	Class Day/Time:	TR/10-11:50 am
Office Hours:	MWF: 10-11, TR 3-4	Lab Location:	N.A.
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Office Phone:	419-530-1930	Credit Hours:	4.0
Term:	Spring 2021		

COURSE/CATALOG DESCRIPTION

CHEM 8410/6410/4410 Organic Synthesis

COURSE OVERVIEW

The objective of CHEM 8410/6410/4410 is to introduce students to a series of reaction transformations in chemistry and discuss physical properties behind them. As such, both reactions and reactive intermediates will be discussed. Problem sets and homework assignments will be provided. Quizzes might be administered at the discretion of the professor. Organic reactions of functional groups such as alcohols, alkenes and radicals, amongst others will be discussed. Extensive discussion at the interface of organic/biochemistry and bioinorganic chemistry is surely to be expected.

STUDENT LEARNING OUTCOMES

Consider each of these outcomes in terms of your understanding and abilities in Organic Synthesis as they are now...at the start of this course. Consider these outcomes periodically throughout the semester. As a result of your studies in CHEM 8410/6410/4410, you will demonstrate:

- a positive attitude about studying/learning organic chemistry;
- an understanding of bonding of many types;
- an understanding of acid-base chemistry;
- an understanding of hydrocarbons, stereochemistry and resonance;
- confidence in your ability to analyze and solve chemical problems;
- an ability to recognize and complete substitution and elimination reactions;
- an understanding of aromatic compounds and their reactions;
- effective time management and skills in note taking.

TEACHING STRATEGIES

The instructor will provide a learning environment such that students can meet the above outcomes. The instructor will provide independent assignments for you to achieve the above noted goals. The instructor will provide materials through BlackBoard facilitating and reinforcing learning objectives. Furthermore, a variety of instruction techniques and assessment activities will be utilized to help you meet your potential in this class. The instructor intends for you to finish this class with a new skill level in which to succeed in



future chemistry endeavors. Finally, the instructor wants you to know that Organic Chemistry, and hence synthesis, is EVERYWHERE!

PREREQUISITES AND COREQUISITES

Examples include CHEM 2410 and 2420 Undergraduate Organic Chemistry I and II. As much Organic Chemistry as possible.

REQUIRED TEXTS AND ANCILLARY MATERIALS

Important to Have:

1. Carey, F. A. and Sundberg, R. J. Advanced Organic Chemistry, Parts A (Fifth Edition) and B. (Fifth Edition).
2. Grossman, B. The Art of Writing Reasonable Organic Reaction Mechanisms.

Ancillary:

- A. Fleming, I. Frontier Orbitals and Organic Chemical Reactions.
- B. Kirby, A. J. Stereoelectronic Effects.
- C. Deslongchamps, P. Stereoelectronic Effects in Organic Chemistry.
- D. Isaacs N. S. Physical Organic Chemistry. Second Edition

TECHNOLOGY REQUIREMENTS

Hardware: computer (Since many students will have access to “E-“versions of the texts required/recommended, laptops are not only permitted, they are encouraged! However, this privilege will be revoked pending wrongful decisions for their use in class (e-shopping, Facebooking, Tweeting, etc.). Laptops **WILL NOT** be allowed during exams.

Software: Adobe Acrobat, Microsoft Office, ChemDraw

Online learning tools: Blackboard and Blackboard-based Tools

UNIVERSITY POLICIES

Policy Statement on Non-Discrimination on the basis of Disability (ADA)

The University is an equal opportunity educational institution. Please read https://www.utoledo.edu/policies/administration/diversity/pdfs/3364_50_03_nondiscrimination_o.pdf

ACADEMIC ACCOMMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the <https://www.utoledo.edu/offices/student-disability-services/>

ACADEMIC POLICIES

For information on FERPA, Cheating and Plagiarism, Assessment of Student Learning outcomes and Student Code of Conduct, please refer the appropriate section of the current university of Toledo Catalog. Any act of academic dishonesty as defined by the University of Toledo policy on academic dishonesty (found at <https://www.utoledo.edu/dl/students/dishonesty.html>) will result in an F in the course or an F on the item in question, subject to the determination of the instructor.



WITHDRAWAL POLICY

Please read The University of Toledo's Policy on class Withdrawal. This can be found in the Office of the Registrar and is noted here: http://www.utoledo.edu/catalog/2000catalog/admissions/registration_policy.html. Students who decide not to attend or stop attending any or all classes for which they have registered must drop or withdrawal from the course(s). Drops and withdrawals can be processed online through the myUT portal (provided there are no holds), and can also be processed at Rocket Solution Central (RSC) located in Rocket Hall, Room 1200. Failure to drop or withdrawal from a course for which a student has stopped attending may result in a grade of "F". Specific drop and withdrawal dates for a term are listed on the University's academic calendar and here, or by contacting Rocket Solution Central (RSC) 419.530.8700.

WARNING:

Withdrawing from a course(s) will result in a grade of "W", which will appear on your official transcripts. Once a withdrawal is processed, it cannot be rescinded. Based on the date of withdrawal, fees may or may not be adjusted. Since withdrawn courses reduce your enrolled hours, withdrawing from courses may have an adverse effect on financial aid benefits, scholarships, loan deferments, athletic eligibility, health insurance, veterans' benefits, degree requirements, or other areas. If you are uncertain what effect withdrawing from the course(s) would have, it is recommended that you contact the appropriate department for guidance.

COURSE EXPECTATIONS

All students are requested but NOT obliged to attend all lectures. You are also expected to be punctual if you are to attend. If you are a few minutes late for a class, please sit in a seat that does not require you to climb over numerous other students. You are also expected to be on time for all exams and extra time will NOT be allocated to any student who arrives late. You are expected to be considerate toward your fellow students and it is requested that you do not hold conversations during class. Any student who persists in talking during the lectures will be asked to leave the room.

Please turn your cell phone off BEFORE entering the lecture room. Be respectful towards yourself and those trying to learn Organic Synthesis.

GRADING

No student will be excused from taking any exam, except for valid medical reasons. Any situation should be attested to by a medical practitioner or other suitably qualified professional. However, even with valid reasons, a) no student will be allowed to miss the final exam; b) no student will be allowed to miss any mid-term exams. In the event that you have valid reasons AND you have also got the permission from the Dean of undergraduate studies for missing the final exam or missing two (2) or more mid-term exams, you will get an "Incomplete" grade and you need to take the missed exams with another class next year to obtain your letter grade. If you do not have a valid reason to miss any exam, you will get 0 points for that exam. There are no make-up exams for this class.

Graded exam papers will be randomly photocopied. All requests for re-grading any part of an exam should be submitted in writing to Dr. Andreana, together with the unaltered exam paper, no later than one (1) week (7 days) after the exam paper has been returned to you. You should indicate, in writing, which question you believe has been incorrectly graded, and state why. You should note that the entire paper



will be re-graded by Dr. Andreana (not only the concerned problems), and that any other errors in grading will be corrected at that time.

Final Grading:

One Hour Exams (3):	300 pts
Final Exam:	200 pts
Problem Sets (5):	150 pts
*Quizzes (5):	50 pts
Homework Assignments (5):	<u>50 pts??</u>
Total:	700 pts or 750 pts

A = 87-100%

B = 74-86%

C = 61-73%

D = 48-60%

F = 48% and below

Delineating +'s and -'s will be at the discretion of the professor.

*At the discretion of the professor.

There will be three one-hour exams, one administered approximately every four weeks. These will focus on topics from previous week's discussions. There will also be a comprehensive final exam worth 200 pts.

Final Exam Date: Tuesday April 27th, 2021 from XX:XX am – XX:XX am (2 hrs). (Times will be announced on BB and in class)

Mechanism-based homework assignments will be graded only for completion (10, 5 or 0 PTS). The assignments **WILL NOT be** returned after the grade has been recorded.

Quizzes, if necessary, **WILL NOT be** announced in class. It is up to the student to keep up with the notes and materials discussed in class.

Problem sets will be available online on Fridays, and will be due in class in two weeks or as noted on the assignment sheet. Grades/question (3 questions/PS) will be available as follows: 10 (exceptional effort), 8 (complete), 5 (incomplete or inadequate effort), 2 (poor effort), 0 (nonexistent). **No late problem sets will be accepted!**

COMMUNICATION GUIDELINES

Email accounts are required for this class. Throughout the semester, communication will be handled by email. You **MUST** activate your UTAD email account (firstname.lastname@utoledo.edu) OR (firstname.lastname@rockets.utoledo.edu). For correspondence, please identify yourself as a student in CHEM 8410_6410_4410. Place "CHEM 8410_6410_44100" in the subject box when communicating electronically.

STUDENT SUPPORT SERVICES

Make friends with senior Organic Chemistry-based students! Get into group learning and when things go entirely wrong seek out help from your professor!

CHEM 8410/6410/4410 - COURSE SCHEDULE - 2021

¥	Day	Date	Topic	Lecture/Exam	PS/Hmwk
Week 1	Tuesday Thursday	01-19-21 01-21-21	Aldol Aldol-Stereochemistry	Lecture 1 Lecture 2	
Week 2	Tuesday Thursday	01-26-21 01-28-21	Aldol-Stereochemistry Aldol-Stereochemistry	Lecture 3 Lecture 4	Out-PS1 Out-Hmwrk1
Week 3	Tuesday Thursday	02-02-21 02-04-21	Mannich Synthetic Equivalents	Lecture 5 Lecture 6	
Week 4	Tuesday Thursday	02-09-21 02-11-21	Synthetic Equivalents Sulfenylation	Lecture 7 Lecture 8	Out-PS2 Out-Hmwrk2
Week 5	Tuesday Thursday	02-16-21 02-18-21	Sulfenylation Exam 1 Covers Lectures 1-9 (75 mins)	Lecture 9	In-PS1 In-Hmwrk1
Week 6	Tuesday Thursday	02-23-21 02-25-21	Allyl Metal Reagents Allyl Metal Reagents	Lecture 10 Lecture 11	Out-PS3 Out-Hmwrk3
Week 7	€Tuesday Thursday	03-02-21 03-04-21	Allyl Metal Reagents Conjugate Additions	Lecture 12 Lecture 13	In-PS2 In-Hmwrk2
Week 8	Tuesday Thursday	03-09-21 03-11-21	Conjugate Additions Conjugate Additions	Lecture 14 Lecture 15	
Week 9	Tuesday Thursday	03-16-21 03-18-21	Exam 2 Covers Lectures 10-15 (75 mins) Pericyclic Reactions	Lecture 16	In-PS3 In-Hmwrk3
Week 10	Tuesday Thursday	03-23-21 03-25-21	Pericyclic Reactions Pericyclic Reactions	Lecture 17 Lecture 18	Out-PS4 Out-Hmwrk4
Week 11	Tuesday Thursday	03-30-21 04-01-21	Pericyclic Reactions Mechanisms	Lecture 19 Lecture 20	
Week 12	€Tuesday €Thursday	04-06-21 04-08-21	Organometallic Reactions Organometallic Reactions	Lecture 21 Lecture 22	Out-Hmwrk5/Out-PS5 In-PS4
Week 13	€Tuesday €Thursday	04-13-21 04-15-21	Reduction Exam 3 Covers Lectures 16-24 (75 mins)	Lecture 24	In-Hmwrk4
Week 14	Tuesday Thursday	04-20-21 04-22-21	Reduction Oxidation	Lecture 25 Lecture 26	
§Week 15	Tuesday	04-27-21	Final Exam (Due April 27th)		In-Hmwrk5/ In-PS5

¥This Course Schedule is subject to change upon miscellaneous events.

€Prof. Andreana might not be available. Possible substitute.

§The Final Exam date, time and room number is subject to change.