

Syllabus

Synthetic Organic Chemistry – CHEM 1310/2370

Fall 2016

Schedule:	M W, 9:00-9:50am	Location:	Chevron 135
Instructor:	Alexander Deiters	Office Location:	Chevron 903 or 1305
Office Hours:	just come to my office or send me an email	Phone:	412-624-5515
		E-Mail:	deiters@pitt.edu

Course Description:

This advanced undergraduate/early graduate level course builds onto sophomore organic I and II courses by applying the learned principles to the synthesis of FDA-approved drug molecules. The emphasis of the course will be on analyzing the molecular structures of drugs in a retrosynthetic fashion, followed by developing suitable synthetic routes to these molecules. The reaction mechanisms of key steps of these syntheses will be discussed in detail. Further discussion will include fundamental functional group interconversions, chemoselectivity, and protecting group use, enantioselective synthesis, and organometallic chemistry. Students will learn about the complexities of modern drug molecules, how their structures can be analyzed, and how they are synthesized. The course will be partially “inverted / flipped” in order to free up time for detailed in-class discussions and in-class problem sets; thus, it is essential that you complete your homework assignments.

Texts:

Organic Synthesis: The Disconnection Approach, 2nd Ed. (2008) by Stuart Warren and Paul Wyatt (ISBN 978-0-470-71236-8). This book provides a very nice introduction to retrosynthesis and the course will very loosely follow its outline. However, a major amount of material will come from the primary literature.

In order to refresh your knowledge of basic organic chemistry, you should consult *Organic Chemistry, 7th Ed. (2014)* by Vollhardt & Schore. Older editions and other undergraduate organic textbooks will be equally suitable as well. Some of the homework assignments will reference chapters in this book, but other textbooks will present the material as well.

If you are not familiar with drawing reaction mechanisms, please take a look at *Pushing Electrons, 4th Ed. (2013)* by Weeks.

Homework:

Homework assignments will be given frequently and will involve the study and review of reactions and reaction mechanisms, and the answering of select questions. Please complete the reading assignments in a timely fashion, since they may guide in the in-class discussions of drug syntheses. In addition, not having to review these topics in class will free up time to discuss new reactions and to apply the reactions that you reviewed at home to the retrosynthetic analysis and synthesis of drug molecules in class.

A second homework assignment will be the development of fundamentally new routes to drug molecules. We will discuss these molecules during class; however, I would like you to develop new synthetic routes to them as well, in order to further improve your synthesis skills. Try to come up with better syntheses (less steps, better selectivity, cheaper starting materials, etc), different disconnections, and/or the use of different reactions to build these drugs. There are always multiple solutions to a synthesis problem and recognizing them will be essential in order to overcome roadblocks in your own lab work and future career as a synthetic chemist.

The homework will be graded, but it will not be returned since we will discuss select reaction mechanisms and forward syntheses in class. Feel free to see me anytime though, in order to get specific feedback on your homework.

Grading:

Exam 1	25%	(in-class, closed-book exam)	Wed, Oct 12, 9:00-9:50 am
Exam 2	25%	(in-class, closed-book exam)	Mon, Dec 12, 9:00-9:50 am
Homework	30%	(two parts: reaction review & forward syntheses)	
Class Participation	20%	(active participation in discussions and problem sets is essential and will be an important part of the final grade)	

Grades for the semester will be assigned based on the following *approximate* percentage scale: >95%: A+, 95-86%: A to A-, 85-70%: B to B-, <70%: C, D, F.

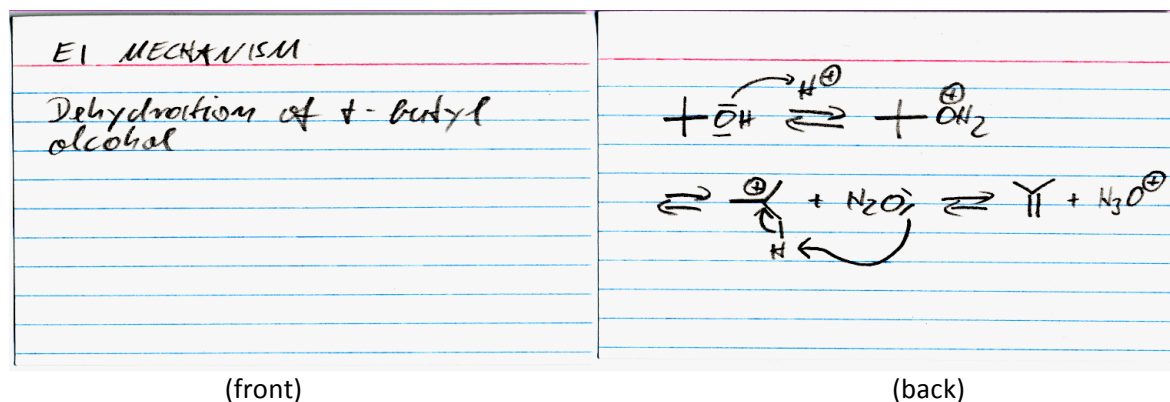
Missed Exams:

Provision for missed exams will be provided only for students with documented excused absences. Excused absences include: 1. A serious illness or injury. 2. The death of a partner, parent, sibling, child, or grandparent (within one week of the missed exam). 3. A mandatory collegiate event for which you officially represent the university. Please submit official documentation, e.g., a doctor's note, within one week of the missed exam. If the Pitt Adverse Weather Policy is in effect on an exam day, the exam will be postponed until the next class meeting, and a regular class will be held in its place, weather permitting.

There will be no make-up exams. Missed exams for documented legitimate excuses will be made-up for by replacing the missed exam with your score on the other exam. Missing both exams without a documented, legitimate excuse will result in an automatic failure of the course. Missing both exams with a documented, legitimate excuse may still result in failure of the course, or the issuance of a G (incomplete) grade, at the discretion of the instructor.

Key to Success:

Actively participate in class and ask questions often! In-class discussions and problem sets are a vital component of this course. In addition, develop more than one synthetic route to a homework assignment. Look-up and study the mechanism for each step that you are proposing as part of your syntheses. Review the material continuously and as often as possible, practice detailed reaction mechanisms (including charges, counter ions, electron-pushing arrows, etc), don't just read your notes or the book, design your own retrosynthetic analyses, questions, and problem-sets; study together with a friend, and – most importantly – make your own flash-cards, e.g.:



Attendance and Classroom Civility:

Attendance is mandatory – even if you are auditing the class. Tardiness to class is not acceptable and students who arrive late to class more than once should expect this to negatively impact their class participation grade. If you miss a non-exam class day, you are responsible for obtaining notes and other class information from one of your colleagues. Also note that anyone other than enrolled students is not allowed to attend without the permission of the instructor. Do not eat in the classroom and do not use laptops, tablets, cell phones, or other electronic devices during class. Open discussion is encouraged in class and please respect other students' opinions, comments, and questions. Let's all be nice, have a little fun, and learn about organic synthesis!

G Grades:

Students who wish to petition for a G Grade must submit to the instructor, in writing, a specific request for this grade change and you must document your reason(s). You will be required to make arrangements in person for the specific tasks you must complete to remove the G grade. You will be expected to sign documentation which will include the date by which work must be completed. Failure to complete work by the date specified could result in a zero recorded for the missed exam and your final grade will be calculated based on this score. Remember that G grades, according to University guidelines, are to be given only when students who have been attending a course and have been making regular progress are prevented by circumstances beyond their control from completing the course after it is too late to withdraw (UNIVERSITY OF PITTSBURGH POLICY \ 09-01-01).

Academic Integrity:

Students in this course will be expected to comply with the *University of Pittsburgh's Policy on Academic Integrity* (<http://www.provost.pitt.edu/info/acguidelinespdf.pdf>). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an examination, including dictionaries and programmable calculators.

Students with Disabilities:

If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and the Office of Disabled Student Services no later than the 2nd week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify DSS, call 648-7890 (Voice or TDD) to schedule an appointment. The Office is located in 216 William Pitt Union.

Statement On Classroom Recording:

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.