

Chemistry 328M

Organic Chemistry I
for
Chemistry/Biochemistry Majors

Primarily for chemistry and chemical engineering majors.
The course will focus on organic chemical structure, nomenclature, and reactivity.

Unique number: 52835
Fall 2013

M,W,F 9:00 am, Welch 2.312

Professor:

Office:

Office Hours (when in town):

Dr. Jonathan L. Sessler
NHB 5.354A (PH: 471 5009)
sessler@cm.utexas.edu
Wed 1:30-3:00 pm; Th 2:00-3:30 pm
Note: Depending on turnout, these may be held in the interactive space on the east side of the 5th floor of NHB

Teaching Assistants:

Ms. Soojung Leem
(PH: 471-6674)
Lab: NHB 5.340C (wear safety glasses when entering lab to find her)
soojungleem@utexas.edu

Mr. Aaron D. Lammer
(PH: 471-6674)
Lab: NHB 5.330C (wear safety glasses when entering lab to find him)
adlamme@utexas.edu

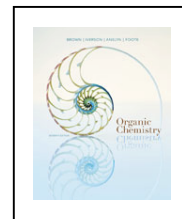
T.A. Office Hours (WEL 2.306 Suite A):

Thursday 3:30-4:30 pm (Ms. Leem)
Monday 10-11 am (Mr. Lammer)

Ms. Leem and Mr. Lammer will serve as the primary contacts for questions relating to this class, academic and otherwise. Please e-mail them with questions or concerns. They will do their best to answer any queries and will consult with Dr. Sessler for administrative issues in the event that they are unable to provide an immediate response. Answers to questions involving academic matters will be made available on the UT Blackboard as detailed below so that all students can access the information.

Required Text:

Brown, Foote, Iverson, & Anslyn Organic Chemistry, **7th Edition** (white and blue chambered nautilus on the cover). Brooks/Cole Cengage Learning. Please make sure you have the **7th Edition** book, as many homework and exam questions will come directly from the 7th Edition. Note: The loose-leaf version on sale at the UT Coop is fine.



Study guide for above text.

Recommended Materials:

Framework or Ball-and-Stick Molecular Models (these come in various varieties; any should work).

Weekly Recitation Sessions: These will be additional lectures given by the TA's. They will be designed to present the lecture material in a different context, from the point of view of the TA's, with the aim of helping you absorb the material and understand all of the key points. The recitation sections will also provide a forum for working problems assigned as homework or considered typical of what you will see on the exams. To the extent that we can, all recitation sections will be equal. Therefore, you need only plan on attending the one that best fits your schedule. **However, even though these recitation sections are officially "optional," it is recommended strongly that you attend; doing so will greatly increase your chance of earning a good grade. It is also recommended that you get in the habit of attending at least one office hour per week.** Getting to know the TAs and Dr. Sessler is very helpful if you will be asking for a letter of recommendation (see caveats below) at some point in the future.

Recitation Session Meeting Times and Rooms (Starting Second Week of Class):

Every Tuesday	3-4 pm	Room: NHB 5.202
Every Wednesday	5-6 pm	Room: NHB 5.202

Additional Sources:

Additional information for the course will be posted on the UT Blackboard. We will use this, rather than the course website, http://sessler.cm.utexas.edu/courses/ch320m/fall_2013/ as our primary means of electronic communication. BLACKBOARD IS THUS A CRITICAL RESOURCE FOR THIS CLASS AND YOU SHOULD GET IN THE HABIT OF CHECKING IT AT LEAST TWICE A WEEK. You may access this site by going to <http://courses.utexas.edu/> and logging in on the top of the resulting screen. Among the items you will find on Blackboard are:

- Homework assignments. These will be posted in the "Assignments" folder. As discussed below, the homework is an integral part of this class and could be the difference between getting the grade you want and one that is a cause for disappointment. **Homework will not be handed out in class; you must go to Blackboard and print it on your own!** Answer keys to the homework assignments will also be posted here.
- Answers to e-mail questions. These will be posted on the "Discussion Board" section.
- Electronic versions (where available) of any extra handouts given in class. These will be posted in the "Course Documents" folder. Old handouts may also be obtained (as per supply) from the Undergraduate Office in Welch 2.212; neither the TA's nor Dr. Sessler will keep a supply.
- Exam and quiz answer keys will also be posted in the "Course Documents" folder.

- Midterm grades: These will be posted on the “My Grades” section. Note that the posted grades will usually be preliminary and may be affected by subsequent regrades and curving.
- Old Exams from previous 310N, 330N, etc. and related classes taught by Dr. Sessler, Exam Keys for exams given this semester, Quiz Keys, and Lecture Notes for classes presented by Dr. Sessler. These will be posted in the “Course Documents” folder. An effort will be made to provide “preview” versions of the lectures prior to each class, but the archival version, posted after the lecture is given, is what should be used for study and reference.

IMPORTANT NOTE: YOUR OWN HANDWRITTEN NOTES ARE THE BEST STUDY TOOL FOR THIS CLASS. DO NOT FALL INTO THE TRAP OF USING DR. SESSLER’S ELECTRONIC NOTES AS A SUBSTITUTE FOR YOUR OWN!!

Weekly Planner

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00-10:00 am	Lecture WEL 2.312		Lecture WEL 2.312		Lecture WEL 2.312
10:00-11:00 am	Office Hours (Lammer) WEL 2.306 A				
11:00-12:00 pm					
12:00-1:00 pm					
1:00-2:00 pm					
2:00-3:00 pm			Office Hours (Dr. Sessler) NHB 5 th Floor East	Office Hours (Dr. Sessler) NHB 5 th Floor East	
3:00-4:00 pm		Recitation NHB 5.202		Office Hours (Leem) WEL 2.306 A	
4:00-5:00 pm					
5:00-6:00 pm			Recitation NHB 5.202		

Prerequisites for 328M:

Only one of the following may be counted: Chemistry 610A, 310M, 618A, 318M, 320M, 328M.

Credit or registration for Chemistry 118K or 128K; and the following coursework with a grade of at least C- in each: Chemistry 302 or 302H; and 204 or 317. You must also be registered for and take concurrently CH 128K.

If you register for CH 128K and then subsequently drop it, you must drop CH 328M. Conversely, if you drop CH 328M, you will be expected to drop CH 128K. Unless announced otherwise, the laboratory sections will begin as published on line in the UT course schedule. Unless instructed to the contrary, students are expected to bring the following to the first laboratory period:

a) Laboratory Manual and notebook; b) Laboratory apron or coat; c) Two "Chem-Locks"

Safety glasses will be provided for you in your locker and must be worn at all times in the laboratory. Failure to do so will result in an automatic "F" grade.

Section Changes, Adds, and Drops:

All such business (involving either lecture or laboratory) will be handled during the first and second weeks of class by the Undergraduate Office in Welch 2.212.

Drop dates:

Subject to the conditions below, an undergraduate may drop this course. The student must remain in conformity with the quantity of work rule and must obtain all required approvals. International students must obtain written permission from the International Office, in addition to other required approvals, to drop a course. On Prof. Sessler's recommendation and with the approval of the student's academic dean, a student may be required to drop a course at any time because of neglect or for lack of preparation. The following paraphrases the university regulations:

Dropping a course through the twelfth class day.

The following rules apply from the first class day through the twelfth class day of a long-session semester and from the first class day through the fourth class day of a summer term: To drop a course during this period, the student must have the approval of the chair of the department offering the course. In some colleges and schools, the student must also have the approval of his or her adviser and dean; each student must consult the regulations of his or her college or school. If the student is allowed to drop the course, the course is deleted from his or her academic record and applicable fees are refunded. Normally, the approval of the chair of the department during this period is routine, and the student may initiate the drop through the registration system. However, in some circumstances a department may disapprove requests to drop certain courses. If a drop request is not accepted by the registration system, the student should consult the department that offers the course for more information.

Dropping a course through the fourth week of classes.

The following rules apply from the thirteenth class day through the twentieth class day of a long-session semester and from the fifth class day through the tenth class day of a summer term: To drop a course during this period, the student must have the approval of his or her dean. In some colleges and schools, the approval of the student's adviser is also required; each student must consult the regulations of his or her college or school. If the student is allowed to drop the course, the symbol Q appears on his or her academic record to indicate a drop without academic penalty. No refund is given.

Dropping a course after the fourth week of classes.

The following rules apply from the twenty-first class day through the mid-semester deadline in a long-session semester and

from the eleventh class day through the last class day of a summer term: To drop a course during this period, the student must have the approval of the instructor, the student's adviser, and the student's dean. If the instructor approves the drop, he or she will assign the symbol Q or a grade of F. The symbol Q indicates that the student has a grade of at least C in the course, that no final grade has yet been assigned, or that no academic penalty is in order because of the student's performance and the nature of the course. In compelling circumstances, the student's dean may assign the symbol Q for nonacademic reasons.

Dropping a course after mid-semester.

After the mid-semester deadline for dropping courses in a long-session semester, an undergraduate may not drop a course except with the approval of his or her dean, and then only for urgent and substantiated, nonacademic reasons.

Homework (Critically Important):

There are mandatory homework assignments associated with this class. They will be **assigned on Fridays** (posted on Blackboard) and will be **due at the start of class the following Friday**. Be sure your name and UT ID number are on your homework! The homework will be graded, and account for 15% of the course grade. **You are allowed to get help from the TA's, work in teams, use the solutions manual, etc. in completing your homework assignments.** The objective here is NOT to use the homework as a grade-determining metric, but rather to help you learn!

Each homework assignment will be graded on a +, -, 0 scale. A grade of + means you made reasonable effort; a - means the performance is a bit weak, whereas a 0 means you did not turn in the homework or did not take the assignment seriously. If the homework is not turned in on time (i.e., start of class) you will not be able to earn a grade higher than - on that particular assignment. The tally of these +, -, and 0 will be used to determine the 15% of the grade allocated to homework. The first homework will be due on Sep. 6th.

In addition to the assigned homework, students are urged to work as many problems as they can in the Brown, Foote, Iverson, & Anslyn text. Nearly without exception, the problems on the exams will resemble the textbook problems; a few will actually be "lifted" from the text. As a result, there is generally a very high correlation between those that work extra textbook problems and those who earn high marks in the course. Certain highly recommended problems will be noted in class or on Blackboard.

Sometime during the semester there will also be individual in-class pop quizzes. These will not be announced in advance and are designed mostly to provide the instructor and T.A.s with feedback as to how students are doing and to provide a check on attendance. However, they will help your grade a bit if completed successfully. Given this, and the fact that it is essential for your learning, you should make every effort to come to attend every lecture; it is a *really good idea!*

The quizzes will be only lightly graded. The objective here is NOT to use the homework and quizzes as a grade-determining metric, but rather to help you learn! However, the points you earn will be added as extra credit T-score points to your final T-score prior to assigning the course grade. The total of the quizzes is expected to be roughly 1.0 T-score point. Thus, there will be a real grade benefit (as well as an intellectual one) for those that attend class regularly.

Please Note:

Although teamwork is encouraged for the homework, the exams/quizzes are to be an individual effort. No "borrowing" from others will be tolerated; see comments regarding academic dishonesty below.

Mid-term Exams:

Three mid-term examinations (one class period in length) will be given during the course of the semester. They will be held **in class** on **Monday, September 30th**; **Monday, October 28th**; and **Monday, November 25th**. If enrollment levels dictate and it becomes necessary to split the class in two for the purposes of giving the midterms, it will be announced well in advance. Otherwise, plan to be in class and taking the exams those days. Since it is scheduled class time, only medical or other recognized emergencies will be considered as a justification for absence. **Keep in mind that November 25th is the Monday before Thanksgiving. Plan your travel accordingly.**

First Exam - Monday, September 30th: 9 am and in our normal classroom

Second Exam – Monday, October 28th: 9 am and in our normal classroom

Third Exam – Monday, November 25th: 9 am and in our normal classroom

Taken together, the mid-term examinations will count 40% towards the final course grade. **No make-up exams will be given, so plan NOW to be present for these exams!** (*Reminder: Since these exams will be held during class time, it is expected that all students will be present.*) During the semester, however, **one** mid-term exam may be missed for **any** reason whatsoever without penalty. In this case, a scaled average of the scores on the other two examinations will be assigned for the missed examination. Failure to take **two** mid-term exams, however, will result in an automatic F (or, in the case of justifiable excuse, an X) being assigned in 328M.

Students that take all three mid-term examinations will have their two highest grades (only) counted towards their grade. Their lowest mid-term score will automatically be dropped so that each of their two highest mid-term scores will count for 20%, respectively, of their final grade. Students that miss an exam will not, of course, have the benefit of this procedure.

The average on the midterm exams is often between 45 and 60%. This allows a large distribution of grades, and more clearly delineates boundaries between A, B, C, D, and F. It also allows us to “recycle” tough mid-term problems and use them on the final; this will indeed be done! So, expect the midterm exams to be very challenging but fair.

Policy on Exam Coverage:

You will be responsible for all material covered through the lecture prior to each midterm unless otherwise specified. We will aim to give you at least a day to think about the material before you are tested on it. Since the pace of the class may vary, do not be alarmed if we go faster or slower than the outline of expected coverage given in this syllabus. The bottom line is that we will cover all the material by the end of the semester and at a level that will leave you well prepared for further studies and/or national exams, such as the MCAT.

Final Exam:

The final exam, accounting for 45% of the course grade, will be comprehensive in its coverage of the material presented in Chemistry 328M. It is scheduled by the University to take place on **Monday, December 16, 9:00-12:00 noon**, with the exact location to be announced later. There will be no make-up exam for the final and no possibility of taking the exam early or late. You must take the final at the scheduled time. **Specifically, failure to take the final exam at the scheduled time and place will automatically result in a failing grade being assigned for 328M. In the event of a documented medical excuse, an incomplete (X) may be assigned.** An incomplete must be made up, as per UT

Regulations; this must be done by the end of the ensuing Long Semester or the “X” automatically becomes an “F”. It is the student’s responsibility to see to it that this is done.

****Note that the quiz points will be added as extra credit to your grade after the final exam has been graded and the T-scores for the mid-terms, homework, and final have been summed.****

PLEASE KEEP IN MIND THAT YOUR FINAL GRADES WILL BE BASED ON YOUR EXAM SCORES AND HOMEWORKS ONLY. HOWEVER, UPWARD ADJUSTMENTS MAY BE APPLIED TO THOSE WHO ATTEND CLASS (*as reflected in being present and taking the snap quizzes!*), SINCE THIS WILL BE TAKEN AS A SIGN YOU ARE TRYING YOUR BEST.

Class Conduct:

Please turn off cell phones, pagers, PDA’s, etc. Please be respectful of your fellow classmates and **refrain from talking**, net surfing, reading the paper, or (perish the thought!) sleeping. Ours is a relatively early class and some of you may not have had time for breakfast. Nevertheless, it is asked that you not eat in class since this can be very disruptive to others. **Drinking coffee is permitted!**

Examination Rules:

You must bring your UT I.D. card to the exam. You may not leave early nor late from the exam room. You may use calculators but no notes, books, PDAs, camera phones, or molecular models will be permitted. Blue books will not be required. A periodic table will be provided. As noted above, no make-up exams will be given. Academic dishonesty will not be tolerated. “Regrades” must be submitted to a TA within 2 weeks of the exam date along with a written explanation of the problem. Under these conditions, the entire exam will be scrutinized and, as appropriate, either a lower or higher grade may result. No change in the recorded T-score will be made unless a change of 3 or more points in the raw score accrues during regrading. **Also, to receive credit for a regrade, the exam must have been written in blue or black ink.** Specifically, exams written in pencil or red ink will not be eligible for a regrade. So, use a blue or black pen!

No complaints regarding Final Exam scores or Final Grades will be entertained. Every final exam will be individually checked by the course instructor. All borderline cases will be given full consideration before the Final Grades are assigned. **What you get, therefore, is what you get!**

The University of Texas at Austin provides, upon request, appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6252, 471-4241 TDD or the College of Engineering Director of Students with Disabilities at 471-4321.

Letters of Recommendation:

After completion of the course, requests for letters of recommendation will be entertained from those students who have earned an “A” grade in the course. These requests should be addressed directly to Dr. Sessler. Please use the standard UT Recommendation Form where appropriate. Also, please provide a summary statement outlining what you are applying for and why. Needless to say, better letters can be written for those students who *i)* do well in the course and *ii)* take the time to make themselves known to the instructor and the TA’s!

Grading Policy:

The raw scores earned on each of the exams in this course will be converted to Standard T-Scores. An average of your T-Scores will then be used to determine your letter grade at the end of the course. The following conversion table will be used:

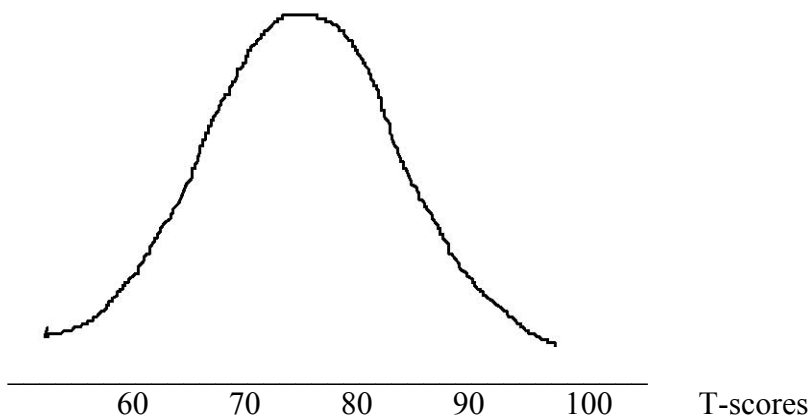
<u>T-Score</u>	<u>Letter Grade</u>
$91.0 \leq T$	A
$90.0 \leq T < 90.9$	A ⁻
$88.0 \leq T < 89.9$	B ⁺
$81.0 \leq T < 87.9$	B
$80.0 \leq T < 80.9$	B ⁻
$78.0 \leq T < 79.9$	C ⁺
$71.0 \leq T < 77.9$	C
$70.0 \leq T < 70.9$	C ⁻
$60.0 \leq T < 70.0$	D
$T < 60.0$	F

Using Standard T-Scores allows an effective averaging of grades without introducing a bias in favor of tests with the greatest standard deviations. Since it is based on a normal (Gaussian or bell-shaped) distribution, it generally represents the fairest way of grading on a “curve”. (The SAT uses a similar Standard Scoring.) The figure at the bottom shows the normal distribution based on the categories given in the conversion table. The Standard T-Score is computed as follows:

$$T = \left[\left(\frac{x - \bar{x}}{s} \right) \cdot 10 \right] + 75$$

where: x = raw percentage on test $\bar{x}$ = mean = $\frac{\sum x}{N}$ N = number of test scores

$$s = \text{standard deviation} = \frac{1}{N} \sqrt{N \sum x^2 - (\sum x)^2}$$



NOTE: WE DO NOT ROUND SCORES. AN 89.92 IS ENTERED AS 89.92, NOT 90.00. When the instructor assigns the final grades in the class, there will also be no rounding of grades. Missing a grade cut off by any amount is a miss!

In general, using T-scores increases everyone's grades compared to using absolute percentages. Nevertheless, we will keep track of your percentage scores on every test. If the percentage scores are ever higher than your T-score, we will use the percentage score for your course grade calculation. Thus, if everyone does extremely well in this course, no grade will be lowered as the result of the curving system!

How to Master Organic Chemistry:

The purpose of this course is to provide a solid introduction to organic chemistry. Organic chemistry is a fascinating and important subject and the basis for many other disciplines including polymer science, medicinal chemistry, biochemistry, etc. The success of the global chemical and pharmaceutical industry depends upon knowledge of organic chemistry. Most modern medical treatments rely on some aspect of organic chemistry. Upon completion of this course, you will be able to design new materials and propose methods for synthesizing these materials from simple starting materials. You will also understand what you are doing and why you should care.

Organic chemistry is a demanding course. **DO NOT GET BEHIND!** It is necessary to devote sufficient time to the course to ensure that you do not fall behind. Attend all of the classes, do all of the assignments and make certain that when you do not understand something, you get help from the instructor or from the teaching assistant immediately. It is a truism that every student we help does better than he or she otherwise would, whereas the ones we don't get to see often fall hopelessly behind. Remember, we can't change your grade after the final. So, don't delay in seeking help as soon as you think you need it!

There is an aspect of organic chemistry that demands memorization. There is, for example, no logical way to derive the name for benzene, sucrose, or acetone from knowledge of the structure alone. You must simply memorize some aspects of nomenclature. This is true of all fields. Words like mitochondrion, inductance, tangent, three-part harmony, and riparian rights mean something only to those who have studied the fields in which these esoteric terms are used to facilitate communication. The same is true for organic chemistry, which has its own special nomenclature and symbolism. You have likely developed efficient ways to store this kind of information in memory and access it or you would not have reached this stage in your education. However, there are additional tricks, including cross-referencing concepts, creating "mail boxes" for information in your brain, and counting the number of facts within a generalized set of ideas that you need to know, which can facilitate this process. Skills picked up in language classes are also useful, and it may be helpful to think about learning nomenclature as analogous to memorizing vocabulary in a foreign language. This "vocabulary" exercise, you will see, will then be complemented by studies involving concepts that are the "grammar" of organic chemistry.

For most of us, repetition is the key to success in this endeavor. One of the most efficient techniques involves using self-made flash cards, but it is often helpful to write out lists, create mnemonic devices, and to think about what is to be learned, even when not actually studying. However, please recognize that the most important aspects of this course involve development of an understanding of some fundamental principles and the ability to use these principles to predict the properties of molecules and the results of reactions between molecules. It is dangerous to get caught in the trap of trying to simply memorize everything. The more you understand, the less you must memorize. Still, there will always

be a bit (maybe too much!) of both.

Organic Chemistry is a pretty “tough” subject for many students, and many enter the course with the preconceived notion that it is “hard” and “requires memorization.” It is our job to show you that organic chemistry is very interesting, unbelievably important, and above all “fun”. To maximize your enjoyment (and to get a good grade along the way), please consider adopting the following good habits:

Keep two notebooks. Each night after the lecture, recopy your lecture notes from the book in which you take notes in class into the book you keep at home. Outline the important points and principles from the lecture and make a list of any new words that need to be memorized.

Do “every” problem in the book. In addition to the mandatory homework assignments, try to work as many problems as you can. It is recommended that you try to do every problem in the book. Work each one first while consulting the study guide. Rework the problems that give you difficulty over and over until you not only understand them, but can answer them quickly and easily without reference to the study guide. That way you should be able to work related problems as needed, even under the high-pressure conditions of an exam. Immediately, seek help if things do not become clear.

Make a friend in the class and do some studying together. Make up practice tests for each other and grade them together. However, it is important that you work many of the book problems on your own, especially close to exam time. Only then can you be certain that you have the tools necessary to solve such problems under a more pressured environment, such as during an exam.

Attend every lecture. The text is a guide not a course outline. We will study things that are not in this text and there are things in this text that we will not have time to study. This is a lecture course. The information that the instructor wants you to learn will be presented in the lecture and reinforced by the text and recitation sections.

Think like a “molecule”. Almost all of organic chemistry boils down to understanding where electrons go and why. Most mechanisms involve the attack of an electron rich species (nucleophile) on an electron deficient site (electrophile), followed by re- or deprotonation. Understanding that opposing charges attract and that separating charge is hard gets you a long way towards figuring out mechanisms. Once you have a specific mechanism understood, try to generalize it by substituting impossible new nucleophiles or electrophiles. Subtle changes in, e.g., protonation states may be required but you will be surprised how well this works. In fact, most amazingly, many new reactions were actually discovered this way!

Top Ten Ways to Fail Organic Chemistry:

10. Cram for the exam, rather than studying diligently
9. Work on your own, with full confidence you know what you are doing
8. Don't buy the book or study guide
7. Buy the book and study guide but don't use them.
6. Forget to attend recitation sections or office hours.
5. Do the homework but “forget” to turn it in (who are you kidding?).
4. Don't come to class.
3. Fail to take all the mid-terms
2. Miss the final
1. Act like an Aggie!

Chemistry 328M
Professor Jonathan Sessler
Fall 2013

Expected Course Outline

- Chapter 1: Covalent Bonding and Shapes of Molecules
- Chapter 2: Alkanes and Cycloalkanes
- Chapter 3: Stereochemistry and Chirality
- Chapter 4: Acids and Bases
- Chapter 5: Alkenes
- Chapter 6: Reactions of Alkenes
- Chapter 7: Alkynes
- Chapter 8: Haloalkanes, Halogenation, and Radical Reactions
- Chapter 9: Nucleophilic Substitution and β -Elimination
- Chapter 10: Alcohols
- Chapter 11: Ethers, Sulfides, and Epoxides
- Chapter 13: Nuclear Magnetic Resonance Spectroscopy

Notes:

It is expected that the first mid-term examination will cover Chapters 1-3; the second mid-term, Chapters 4-7; the third mid-term, Chapters 8-11, and the final all of the course plus Chapter 13. We may also cover Chapter 12 (Infrared Spectroscopy) if time permits. Please keep in mind that this plan is a plan, not a binding agreement, and is subject to change. So, once again, be sure to come to class to stay current and know what is expected for each exam!

Important Dates for Fall 2013

Every FRIDAY (unless noted otherwise)	Homework	Due at BEGINNING of class
Every TUESDAY (unless noted otherwise)	Recitation	3:00 – 4:00 pm, NHB 5.202
Every WEDNESDAY (unless noted otherwise)	Recitation	5:00 - 6:00 pm, NHB 5.202
Monday, September 30 th	EXAM 1	in class
Monday, October 28 th	EXAM 2	in class
Monday, November 25 th	EXAM 3	in class
Monday, December 16 th	FINAL EXAM	9:00 am, Location TBD

ORGANIZING ORGANIC CHEMISTRY

You need to take a hodge-podge of facts and put them into a category to achieve understanding, and you must relate between categories. It helps to always ask, "What have I learned?"

Organic Chemistry is made hard by the fact that it is taught primarily by functional groups but organized conceptually by structure, reactivity, and mechanism.

Structure and Bonding

1. Ionic and covalent bonding
2. Hybridized atomic orbitals
3. Isomerism
4. Geometry/Stereochemistry

Chemical Properties

1. Physicochemical (mp, bp, color, etc.)
2. Physiological (smell, taste, pharmacological, etc.)
3. Acid/base
4. Spectroscopic

Reactions

Functional
Groups

1. General types
 - a. Acid/base
 - b. Rearrangement
 - c. Substitution
 - d. Elimination
 - e. Reduction/Oxidation
 - f. Explosions
 - :
2. Mechanisms
 - a. How/why
 - b. Selectivity
 - c. Stereochemistry
3. Kinetics vs. Thermodynamics
 - a. Qualitative understanding
 - b. Quantative analysis

Communication

1. Terminology
2. Nomenclature
3. Representations
 - a. Structural
 - b. Mechanistic