Instructors: Professors Ronald L. Halterman and Daniel T. Glatzhofer

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Course Web Page: http://learn.ou.edu/ under Chemistry 3053 Sec 025

Office Hours:
By arrangement prior to or following lecture. Problem Solving Sessions M-Th Afternoons at 16:00


Other Materials:
1) Access to web-posted material is necessary. A three-ring binder to organize if you are printing.
2) A molecular model kit will be available at OUArezzo.
3) A spiral bound notebook is needed for writing out answers to assigned problems.
4) Handouts will be posted for each chapter summarizing the important concepts you will be responsible for learning and indicate appropriate problems for you to work.
5) Selected prior exams will be available on the web page.

Email. You have the responsibility to read and respond to any email messages sent by the instructor to your OU email account within 24 hours. Messages will only be sent to OU accounts. Please use direct email to the instructor (good permanent record of message and response). Use CH3053 in the subject line of your emails to enable proper filtering. The instructors will attempt to respond to emails with specific questions by the following weekday. More general questions will be addressed the following lecture. Grade-related matters should be handled in-person will not be discussed by phone or email.

Course Goals. The purpose of this course is to complete the first half of a one year problem-solving coverage of the underlying theory, basic reaction mechanisms, spectroscopy and fundamental synthetic transformations of organic chemistry. We will cover in order chapters 1-14, in Klein’s Organic Chemistry text book. A list of learning objectives and content topics is given at the end of this syllabus.

Course Schedule. See attached sheet for planned lecture, quizzes and exam schedule. The exams are scheduled on Fridays June, 6, 13, 20, and the final on Sat, June 28 (plan your travel schedules appropriately for these EXAMS).

Lectures. Lectures will begin promptly at 11:00. Lectures typically will be based on provided “complete” lecture notes. You are expected to download or print and preview the posted lecture notes before each lecture. Various iPad annotation apps are superb for note taking over the provided pdf notes (Notability, Notetaker HD and iAnnotate are suitable apps). During lecture the instructors will highlight only selected topics and spend as much time as possible addressing questions and working problems interactively with the class. You will be responsible for topics in the notes and text even though they will not be covered in lecture. Periodically organic chemistry topics of more general interest will be covered in short “Society and Chemistry” discussions.

Problem Sessions will be held each non-exam day during the afternoon lecture block. Students are expected to review the class notes and assigned chapter reading prior to this session. These sessions will emphasize group work for processing information, reviewing how/why problems were successfully addressed and firmly setting usable information in memory. Students should then work remaining assigned problems at home based on the skills learned.
**Assigned Problems**— The instructors will include assigned textbook problems along with each lecture (and summarized in the chapter handouts). You are responsible for working all of the assigned problems and checking their accuracy using the study guide/solutions manual. Questions remaining after checking the solutions manual should be discussed with the instructor. These problems will NOT be graded by the instructor.

**Quizzes** – Several chapter quizzes will be given during lecture throughout the term. The low quiz will be dropped and the semester total quiz numerical score will be assigned a single letter grade. The quizzes will be open-ended and can provide feedback on your ability to integrate information.

**Exams** - You will be responsible for all material covered in class, on the provided notes or in the assigned chapters of the book unless specifically told by the instructor that the material will not be on the exam. The mid-term exams are all free response and will consist of several short response questions and some longer response questions. Exams can be re-graded on your request, but the right to recheck the entire exam is reserved. Addition and recording errors will be corrected without re-grading the exam. The exams must be turned in at start of lecture by the second class period following their return. No additional explanations—written or verbal—are allowed, although you may circle the problem numbers in question.

**Grading** - Grades will be determined by your results on the exams and problem sets as follows:

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<tr>
<th>Component</th>
<th>Weightage</th>
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<tr>
<td>3 in class 100 pt. exams</td>
<td>51%</td>
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<td>(lowest of 3 grades will be</td>
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<td>grades)</td>
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<td>Quizzes*</td>
<td>15%</td>
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<td>Final exam**</td>
<td>34%</td>
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*Adverse class participation may result in a lowered quiz grade.

**A course F will be assigned unless the final exam is taken or a petition for an Incomplete is completed.

Each in-class, the final exam, and the semester quiz total will be graded approximately according to the following absolute scale: 85-89% A-, 90-94% A, 95-100% A+, 70-84% B-/B/B+, 55-69% C-/C/C+, 40-54% D-/D/D+, below 40% F. Since all quiz and exam questions require free response answers, a larger portion of the scoring scale is used. The weighted average of the letter grades will determine the course grade (similar to calculating your GPA). No final curve or additional grade adjustments will be made; any needed adjustments to grade cutoffs will be made on the individual exams or total quiz score. Grades are not rationed or limited by a curve; as many students who do A-level work will receive an A-grade, etc.

No accommodation (beyond averaging out the lowest exam grade) will be made for non-excused absences. For excusable absences you must provide the instructor with timely (within 48 h of missed exam) documentation and see the instructor in person to make individual accommodations.

Grades are confidential information and grade issues will not be discussed by email or phone. Grades will be posted to the course d2l site. Grade discussions should be carried out in person during office hours.

**Academic Misconduct.** For the purposes of this course, any instance of a student receiving any type of help on an exam, problem set or quiz from another person or any source (notes, etc) not authorized by the instructor shall be considered academic misconduct and as a result will be penalized to the fullest extent possible. Students are to refer to the Provost's pages on academic integrity (http://www.ou.edu/provost/pronew/content/integritymenu.html) for university policies and regulations related to your rights and obligations as students.

**Disruptive Behavior.** Please be considerate of your fellow students and the concentration of the lecturer—especially when arriving late or leaving early. Any student engaging in behavior deemed by the instructor to be disruptive will be asked to leave the classroom for the remainder of the lecture or exam. Disruptive behavior includes receiving phone calls or texting during class—please turn your phones off before entering the class or exam and do not have them out during lecture. No computers should be open during lecture without prior permission from the instructor. Use of iPads to take notes is encouraged. Students are to visit the Provost's website on classroom behavior: http://www.ou.edu/judicial/index.htm
**Special Accommodations:** The University of Oklahoma and the instructor are committed to providing reasonable accommodation for all students with disabilities. Students with disabilities must be registered with the Disability Resource Center prior to receiving their recommended accommodations in this course. **For this study abroad course, students should meet with the DRC prior to leaving Norman.** Students with disabilities who require accommodations in this course are requested to speak with the instructor as early in the semester as possible. The Disability Resource Center is located in Goddard Health Center, Suite 166, phone 405/325-3852 or TDD only 405/325-4173.

Students are encouraged to refer to the Class schedule for university policies and regulations related to your rights and obligations as students.

**Changes.** The instructors reserve the right to change by addition and/or subtraction any and/or all materials contained in this syllabus. This includes, but is not limited to, course content, assignments, due dates, and portion(s) of the grade assigned to individual items within the course. Written notification of any such changes will be posted to the course web site and announced to the class in the most timely manner possible.

**Copyright.** All handouts, quizzes, exams and lecture material are ©2014 by RL Halterman or DT Glatzhofer. Free (no-cost) copying and distribution of these materials among OU students is allowed. Any other distribution, including distribution for a fee (e.g., commercial note services) is not allowed without written consent.

**Learning Objectives.**
Mastery of organic chemistry requires that students not only learn the content and logic of how that content is connected, but also an ability to critically analyze the quality of answers and to apply creativity when extrapolations are required.

**Knowledge Competency**
Key features of electron stability on atoms or in bonds, molecular geometry and representation of structures will be established to enable understanding molecular properties and reactivity. The properties and reactivity of alkanes, acids and bases, alkyl halides, alkenes, alkynes, alcohols, ethers and thiols will be established this semester. Substitution, addition and elimination reactions will be understood based on the identification and reactivity of electrophiles and nucleophiles. Knowledge of reagents to promote these reactions will be established.

**Process Competency**
A key challenge in organic chemistry is how to fit the wide range of information into a useable context and thereby strengthen the persistence of the knowledge. This course will emphasize the use of mechanistic details, the comparison of starting material, transitional state, intermediate state and final product stability to justify reactivity. The representation of mechanistic details and energy relations on reaction coordinate energy diagrams will be used to justify preferred processes and to identify points of divergence in reactions that lead to multiple products. When examining reaction transformations, the ability to readily identify the new or lost bonds/lone pairs of electrons, to analyze their relative stabilities, and to predict the mechanistic details of where electrons in new bonds originated (nucleophilic site) and how the bonded atom could accommodate them (electrophilic site) will be used to understand and predict substrate and reagent reactivity.

**Application Competency**
Analysis of electron stability will be used to predict/justify molecular properties and reactivity. As new reactions are studied, additional insight into electron stability will be gained and students will learn to apply those insights to better understand following sets of information.
**Group Problem Solving Competency**

Group discussions and problem solving promote a wider, more networked view of how to apply information to solving problems and give good opportunities to reflect upon the validity of answers. Through the development of superior group competency, a stronger individual competency should result.

**Topics/Schedule:**

See D. Klein Organic Chemistry 1st Ed for more details on Chapters 1-14.

1. Electronic Structure and Bonding; (Tues June 3)
2. Molecular structures and resonance (Tues-Wed, June 3-4)
3. Acidity, determining acid strength (Wed-Thur, June 4-5)
4. Alkanes and cycloalkanes. structure and conformations (Thur June 5, Mon June 9)
5. Stereochemistry—nomenclature; energetic consequences (Mon-Tue June 9-10)
7. Haloalkanes and substitution reactions; elimination reactions (Wed-Thur June 11-12)
8. Alkenes, structure and preparation by elimination reactions (Mon-Tues June 16-17)
9. Addition reactions to alkenes (Tue-Wed June 17-18)
10. Alkynes: preparation and reactivity (Thur June 19)
11. Radical Reactions (Mon June 23)
12. Synthesis: multiple steps and retrosynthetic analysis (Tues June 24)
13. Alcohols and phenols: preparation and reactivity (Tues-Wed June 24-25)
14. Ethers, epoxides, thiols and sulfides. (Thurs, June 26)

Final Exam—50% Chpts 11, 12, 13, 14, 50% comprehensive. (Sat, June 28)
What is expected of you to enjoy success in this course:

• You need to work effectively and with traction to learn the material rather than just trying to remember the material. Passive learning—listening to lecture/watching someone explain problems/reading material or listening to podcasts—is not going to do it no matter how often it is repeated. Active/Reflective learning—will enable you to immerse yourself into the material and learn it. Organic Chemistry is very much a Problem/Process-based course. You must write out the details of your work and list key tags to provide strong scaffolding for your answers. Since the mind very much wants to purge what it may consider unimportant details encountered along the way to a goal, you MUST take time to review your answers and reflect on the details of what the question was asking, how the details of your answer address the question and whether your final conclusion supported strongly enough. It is during this reflection time that the long-term synapses are best formed and you will have stable, persisting change in your knowledge. Allocate 20% of your study time for reflecting/reviewing your work.

• It is strongly encouraged that you correct or otherwise mark up your original answers in a different color ink rather than erasing and rewriting. In this way, you can review your work later and notice the insufficient answer as well as the better one. If you erase and rewrite just the better answer, you will not notice your original wrong path and you will be more likely to fall back to the less sufficient answer later.

• Key concepts and connections are covered in lecture. To maximize your ability to focus on these, you should be familiar with the material prior to the lecture time. All of the class notes and the text reading assignments are posted in advance of lecture. You should “preview” the material so as to recognize terminology and to have particular questions about the material in mind as you enter lecture.

• Work the problems systematically. Frame the question in terms you can address (this helps you notice where to bite into the problem—much of the challenge is to identify one key feature in a complex structure or to identify just the changed bonds). Identify and evaluate the factors needed to address your framed question. Reach a conclusion and review your answer. Iterate the process as needed. Exercises are not a race to get through, but rather an opportunity to build those synapses. Take your time and reflect on the path taken.

• When in doubt always be able to address the question, “What would an electron do?” (what factors contribute to its (in)stability in its environment or as it changes environments?)

• Attend and participate in the group problem solving sessions. Again, problems are not a race to get through. Working in groups allows time to discuss, elaborate and reflect on the responses. The process of working through these exercises with timely feedback is long term more useful than just seeing the “correct” answer. The problems have been developed to encourage discussion and many do not have clear up/down yes/no answer. The purpose of working such “gray” problems is for you to build up an ability to quickly recognize the ragged edge of your knowledge and evaluate the factors to make the best assessment possible, even if it only narrows the possibilities supported by the evidence. Posting “correct” answers will thus not be done.

Reread the chapter in light of the connections made in lecture. Work the assigned problems in your homework notebook. If you don’t write the answers down first, or if you always "check your thinking" in the guide as you look at the problems—you will deceive yourself and will not know whether there is still any confusion. Correct your answers in your notebook using a different color of ink. For troublesome areas, reread the appropriate sections of the text and review the lecture notes then recheck your comprehension by reworking the problems on a new page of your notebook.

• You are not encouraged to "memorize" all of the material. There are underlying reasons for the effects, structures, reactions etc. If you understand the reasons behind the evidence, you will do much better in this course.

• Much of organic chemistry requires visualization in 3D. To aid you in this visualization, you are expected to use a molecular model kit. You must also be able to clearly draw the chemical structures. Remember that "precision in drawing leads to precision in thinking" (and this often requires that you include the hydrogen atoms and show non-bonded electron lone pairs when needed for clarity).

• And finally, most importantly—You must keep up. This material is hard and you are not expected to master every bit without difficulty. Please get help when you are confused. It is easier to patch small gaps. If you wait it will often only result in a deep hole.