CHEM 2453, SECTION 2

ORGANIC CHEMISTRY 2

FALL QUARTER, 2013

Instructor Contact	Dr. Olga A. Mukhina Seeley G Mudd Building Room 240 olga.mukhina@du.edu; (303)-871-2987 (office)
Textbook	"Organic Chemistry", Fifth Edition, by Marc Loudon
Lectures	T/R 8:00 a.m. – 9:30 a.m., Boettcher Center Auditorium 101
Recitations	W 8:00 a.m. – 8:50 a.m., Boettcher Center Auditorium 101
Exams	There will be two 80 min. exams during the quarter, each worth 200 points. The final exam is cumulative and is worth 200 points. If your final exam score is higher than one of your other exam scores, that exam score will be dropped and your final will count for 400 points. **There will be no make-up exams.** If you miss an exam, for *any reason*, it will have to count as the dropped exam. The final exam is not optional. All questions are short answer -- no multiple choice questions.
Grades	Your final grade will be based on a maximum of 700 points, distributed as follows: midterm exams and final exam, 600 points; homework, 100 points. All homework assignments contribute equally to the 100 point total.

Extra credit

Extra credit is given for

- completion of web-based problems (Sapling, see addendum). 0.35 point per problem Maximum of 35 points.
- active participation in recitation sessions. Maximum of 21 points

Letter Grade Assignment

Grades will be curved as appropriate, but never downward. The assignment of a letter grade to a given numerical grade will depend on the overall class performance.

Homework

Assigned problems are a vital exercise that will help you to consolidate your understanding of the material and they will help you to be ready for the exams. Homework assignments will be given weekly in class. **These problem assignments must be submitted for grading. For many assigned problems, full points will be given merely for completing the assignment and showing your work, but *any number of problems may be graded for correctness at the instructor's discretion*.** It's ok for you to work in groups on these problems, but your submitted work must be your own. It is strongly recommended that you at least attempt to solve each problem independently before comparing with others, because this will give you the best opportunity to develop your understanding of the material. Solutions will be posted. *Homework that is not stapled or that is late receives a minimum 50% deduction.*

Recitation

Recitation is optional, but strongly recommended. During this session, we will work on problem-solving skills, discuss any questions. Please do not skip this session without good reason.

Extra Help

Help is available in a variety of forms.

- Work with your classmates on difficult material.
- Attend office hours:
  T/R, 7:30-8:00 am, before the lecture, Boettcher Center Auditorium 101
  W, 7:30-8:00 am, before the recitation, Boettcher Center Auditorium 101
- Talk to your laboratory TA in the lab or during his or her office hours.

- Get a tutor. The Chemistry office has a tutor list, and I can also help you to find one.

Lecture Material Powerpoint slides will be posted after class. I also do problem work on the whiteboard, giving students time to try the problems first, and then discussing the solution. Solutions for the problems discussed during the lecture are not posted, so there is a clear advantage to attending the class.

Clickers Clickers will not be used in this section.

Tips for Success *Do not fall behind.* The knowledge that you will develop builds on itself. Consequently, material later in the course will be enormously more difficult if you haven't mastered the material that comes first, and we will never move on to a point where you will not need the earlier material. Students who have fallen behind in the past have often experienced much higher stress levels and received disappointing grades.

Exams will be designed to test your *comprehension*, although some memory work is unavoidable when learning science. Expect that some exam questions will include a small "twist" that will be very easy to handle if you have understood, but very hard if you have only memorized. This will be completely clear; I do not use trick questions.

Read the textbook and attend the class. You can check your preparation for the exams by redoing the homework problems without reference to your notes or the textbook.

Tentative lecture schedule, topics for recitation and help session

Date	Lecture date	Lecture topic	Recitation topic	Recommended reading	Recommended problems to check understanding of the material	Curved arrow notation checklist
Week 1	09/10/2013	Aldehydes and ketones nomenclature	Oxidation reactions in organic chemistry Oxidation of alcohols and ozonolysis of alkenes as methods to synthesize aldehydes and ketones	Loudon Nomenclature 19.1; 19.2; 20.1; 21.1; 23.1 Synthesis 19.4 +review 5.5, 10.6, 11.5, 14.5, 16.4, 17.5 Oxidation of alcohols 10.6, 17.5	Nomenclature: Loudon, 19.1, 19.2; 21.1; 21.2; 20.1; 20.1 Physical properties: 19.3, 19.4, 19.5, 19.8, 19.10, 19.11, 19.62, 19.67	Oxidation of alcohols to aldehydes and ketones using chromium-based reagents
	09/12/2013	Addition reactions of aldehydes and ketones: introduction, reaction with hydrogen cyanide, water, reduction with hydrides		Loudon 19.3, 19.4, 19.5, 19.6, 19.7, 19.8	Addition reactions: 19.15, 19.16, 19.17, 19.18, 19.19, 19.20, 19.21; 19.32; 19.33	Addition to carbonyl under acidic and under basic conditions
Week 2	09/17/2013 Homework 1 due	Addition reactions of aldehydes and ketones: reactions with Grignard reagents and other organometallic reagents. Wittig reaction	Nucleophilic addition to carbonyl. Wittig reaction and addition of Grignard reagents	Loudon 19.9; 19.13	19.22; 19.23; 19.34; 19.35; 19.41; 19.49a-f, k,m;	Addition of Grignard and other organometallic reagents Wittig reaction

	09/19/2013	Formation of acetals, thioacetals, reactions with amines, Wolff-Kishner reaction		Loudon 19.10A; 19.11; 19.12	19.24; 19.25; 19.26; 19.28; 19.29; 19.30; 19.31; 19.42; 19.43; 19.44;	Acetal formation Wolff-Kishner reaction Imine and enamine formation
Week 3	09/24/2013 Homework 2 due	Protective groups Conjugate addition Synthetic uses of carbonyl additions Review	Arrow pushing. Mechanisms of nucleophilic addition to carbonyl.	Loudon 19.10B; 22.8A; 22.8 B; 22.9, 22.10; 22.11	19.27; 19.38; 19.39; 19.40; 19.45; 19.52; 22.47; 22.48	
	09/26/2013	Substitution at carbonyl: general trends. Preparation of acid chlorides		Loudon 21.5; 21.6	20.15; 20.16; 20.17;	Nucleophilic substitution at carbonyl
Week 4	10/01/2013 Homework 3 due	Preparation of anhydrides, esters Hydrolysis of ester chlorides, anhydrides, esters	Protecting groups strategies. Synthetic problems	Loudon 20.8A; 20.9; 21.7	20.10; 20.11; 20.12; 21.26; 21.27; 21.34; 21,50; 21.55; 21.56; 21.61	Formation of carboxylic acid chlorides and anhydrides
	10/03/2013	Exam 1		Loudon Ch19; 20.1; 21.1; 23.1		
Week 5	10/08/2013	Hydrolysis of carboxylic acids derivatives (continuation) Reaction of carboxylic acids derivatives with nucleophiles	Substitution at carbonyl: mechanisms and synthetic examples	Loudon 21.7; 21.8; 21.9; 21.10;	21.10-21.18; 21.23-21.25; 21.31	Nucleophilic substitution at carbonyl
	10/10/2013 Homework 4 due	Keto-enol tautomerism.		Loudon 22.1-22.3	22.1-22.7; 22.10; 22.12-22.18; 22.60; 22.65; 22.66; 22.67;	Enolization Haloform

		Halogenation at α-carbon. Haloform reaction				reaction
Week 6	10/15/2013	Alkylation of carbonyl compounds Acetoacetic and malonic ester syntheses	Keto-enol tautomerization	Loudon 22.7	22.33-22.41; 22.50; 22.61; 22.73; 22.74;	
	10/17/2013 Homework 5 due	Aldol, Claisen and Dieckmann condensations		Loudon 22.4; 22.5	22.19-22.32; 22.62; 22.70; 22.72; 22.80; 22.81	Enolization: alkylation Aldol condensation under acidic and basic conditions
Week 7	10/22/2013 Homework 6 due	Dithianes and enamines as nucleophiles. Michael addition. Robinson annulation.	Condensations in synthesis	Loudon 22.8C	22.42-22.46; 22.75; 22.76; 22.84	
	10/24/2013	Amines: nomenclature, physical properties, synthesis		Loudon 23.3; 23.5; 23.11	23.7-23.11; 23.19-23.21; 23.29; 23.60; 23.70; 23.71; 23.73; 23.74	Gabriel synthesis Hofmann elimination
Week 8	10/29/2013 Homework 7 due	Exam 2	Amines	Loudon Ch19-21		
	10/31/2013	Properties of amines. Review of covered mechanisms		Loudon 23.6-23.10	23.26-23.28; 23.38-23.40; 23.49; 23.52; 23.59; 23.72	Diazotization
Week 9	11/05/2013 Homework 8 due	Pericyclic reactions: introduction Molecular orbitals revisited	Electrocyclic reactions	Loudon 21.1; 27.2	21.1-27.9; 27.31; 27.49	Electrocyclic reactions

		Electrocyclic reactions				
	11/07/2013	Cycloadditions: Diels-Alder reaction, [2+2] cycloadditions		Loudon 27.3;	27.10-27.13; 27.34; 27.35; 27.43; 27.50	Cycloadditions
Week 10	11/12/2013 Homework 9 due	Sigmatropic rearrangements: Cope and Claisen rearrangements Rearrangements to electron deficient centers	Pericyclic reactions. Rearrangements	Loudon 27.4; 23.11D	27.14-27.23; 27.29; 27.30; 27.32; 27.33; 27.37; 27.39; 27.47	Sigmatropic reactions
	11/14/2013	Biochem preview				
Final	11/19/2013 Homework 10 due	Final exam		Loudon Ch19-23; 27		

Honor Code of the University of Denver

To review your rights and responsibilities with respect to the Honor Code of the University of Denver, visit the website for the Office of Student Conduct at: www.du.edu/honorcode

Instructions for Using Sapling: Sapling's chemistry questions are delivered in a web browser to provide real-time grading, response-specific coaching, improvement of problem-solving skills, and detailed answer explanations. Dynamic answer modules enable one to interact with 3D models and figures, utilize drag-and-drop synthetic routes, and draw chemical structures - including stereochemistry and curved arrows. Altogether, Sapling is cheaper than a tutor, provides more value than a solutions manual, and goes beyond a mere assessment exercise to give a learning experience.

Students:

1. Go to http://saplinglearning.com

2a. If you already have a Sapling Learning account, log in then skip to step 3.

2b. If you have Facebook account, you can use it to quickly create a SaplingLearning account. Click the blue button with the Facebook symbol on it (just to the left of the username field). The form will auto-fill with information from your Facebook account (you may need to log into Facebook in the popup window first). Choose a password and timezone, accept the site policy agreement, and click "Create my new account". You can then skip to step 3.

2c. Otherwise, click "Register here". Supply the requested information and click "Create my new account". Check your email (and spam filter) for a message from Sapling Learning and click on the link provided in that email.

3. Find your course in the list (you may need to expand the subject and term categories) and click the link.

4. Select a payment option (or bookstore) and follow the remaining instructions.

Once you have registered and enrolled, you can log in at any time to complete or review your homework assignments. During sign up, and throughout the term, if you have any technical problems or grading issues, send an email to support@saplinglearning.com explaining the issue. The Sapling support team is almost always more able (and faster) to resolve issues than your instructor.