

## Chem 223, Organic Reactions, Winter Term, 2010, Course Information Sheet.

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Place/Time: Slot 14 – Tues. 11:30 (Chernoff 117) Wed. 1:30 (Chernoff 117); Fri. 12:30 (Chernoff Auditorium).

Office hours: Monday 10:00-12:00 and Thursdays 12:00 to 2:00. Otherwise make appointment in class or by email. Help sessions will be scheduled regularly. There will be review sessions before the midterm and the final examination at a time that is agreeable for most of the class.

Text: (Required) "Organic Chemistry" Marc Loudon, 5<sup>th</sup> Edition, Roberts and Co, Greenwood Village, Colorado.  
(Strongly recommended) Marc Loudon and Joseph G. Stowell "Study Guide and Solutions Manual to accompany Organic Chemistry" this is will be a big help in solving problems that are given in class

Exams: The midterm examinations are set for Thursday evenings February 11, and March 11 at 7:00 pm, in Chernoff Auditorium, two hours, 20 % each. The final examination will be scheduled by the exams office, some time between April 12-26, 2004, 35%, laboratory grade, 25%. **Note:** you must pass ( $\geq 50\%$ ) **both** the laboratory part and the lecture part in order to pass the course. A student who fails to get  $\geq 50\%$  on each part will be assigned a final grade of the lessor of 47% or their earned average.

Labs:

1. January 11-15, **CHECK-IN, SAFETY.**
2. January 18-22, Exp #1 **The Extraction of Green-Leaf Pigments and Their Chromatographic Separation**
3. January 25-29, Exp #2 **Isolation of Cinnamaldehyde from Cinnamon**
4. February 1-5, Exp #3 **Sodium Borohydride Reduction of a Ketone**
5. February 8-12, Exp #4 **Esterification of 4-Nitrobenzoic Acid**
6. February 15-19, NO LABS

February 22-26 **READING WEEK – NO LABS**

7. March 1-5, Exp #5 **A Wittig Reaction**
8. March 8 - 12, Exp #6 **Oxidative Cleavage of a Double Bond: Adipic Acid from Cyclohexanone**
9. March 15 –19, Exp #7 **Hypochlorite Oxidation of Methyl Ketones by the Haloform Reaction**
10. March 22-26, Exp #8 **Crossed Aldol Condensation**
11. March 29- April 1 Exp #9 **Bromination of Cholesterol**
12. April 5-9, Exp #10 **Lab Exam**

## **Lecture Topics Covered and tentative timeline.**

### Reading assignments and self-review without explicit lectures

It is expected that this course will build on material that you have covered in previous courses, most importantly, Chem 212. Please take a look at the Chem 212 website and make sure that you are familiar with the concepts outlined in:

1. Chapters 1.1-1.9 (bonding and related stuff ); 3.1-3.6 (Acids, bases and effects that influence these)
2. You should also be familiar with  $S_N2$  and  $S_N1$  substitution reactions, E1 and E2 elimination reactions and the concepts like resonance relevant to electrophilic aromatic substitution reactions.

### Weeks of Jan 11, 18

Aldehydes and ketones: preparation and nucleophilic addition to: chapter 19; 19.4-19.13 pg 903 to pg 936; Bear in mind that this chapter includes some spectroscopy, and you will be taking Chem 222. We will introduce the concepts as needed early in the course so that you can look for the specific topics in Chem 222 as needed for the Organic Course.

### Week of Jan 25, Feb 1

Carboxylic acids and their derivatives, preparation and reactions of: Entire chapter 20, pg 948-976; formation and hydrolysis of esters (see Chapter 21.6a-e) and amides, conversion of acids into acid halides and anhydrides, reduction to alcohols

### Week of Feb 8, 15

Reactions of carboxylic acid derivative particularly those proceeding through enols and enolates: Chapter 21. Read about the nomenclature and general types of derivatives 21.1-21.4 Chapter 21.8-21.10 nucleophilic and reduction reactions of. Chapter 22 Chemistry of enols and enolates: 22.1-22.3 Alkylation of enolates, Aldol type condensations, 22.4 Claisen condensations, malonic ester synthesis, acetoacetic ester synthesis 22.5-22.7.

## **Reading week, Feb 22-26**

### Weeks of March 1, 8

Addition reactions of alkenes (Chapter 5) and alkynes ( Chapter 14). Electrophilic addition, addition of  $H_2O$ , oxymercuration, catalytic hydrogenation, Oxidation of Alkenes, ozonolysis and diol formation, conversion to alcohols: oxymercuration, hydroboration Preparation of some ethers, epoxides.

- Week of March 15 Conjugated systems, Chapter 15, pg 676-690, addition reactions 15.4-15.6 kinetic vs. thermodynamic control. Radical reactions and addition polymers (Chapter 5.6-5.7); diene addition polymers Chapter 15.5 (pg 708); self-reading about resonance 709-716; condensation polymers page 1034.
- Week of March 22 Amines: preparation and reactions of Chapter 23: alkylation 23.7, conversion to and from carboxylic acid derivatives, aromatic anilines, formation and conversion to other aromatics 23.9-23.10
- Week of March 29, April 5 Molecules of life, Chapter 24, 26. Exact topics to be announced closer to the time of presentation.

**Friendly Advice:**

1. This is a course in organic chemistry that relies heavily on your second year, fall term courses. The actual text-book for the course will be the notes that you take during the lecture period; the Loudon book will be used for supplementary clarification reading and for assigned problems. I will not place course notes on the website with any regularity, but may supplement what is in the book with some additionally presented material. Problems from the book will be assigned, but answers not presented because there is an answer book for these. There will also be approximately 5-6 problem sets which will be placed on the Chem 223 website. These will not be graded, but answers will be provided about 1-2 weeks after assigned.
2. Some people find that organic chemistry courses provide a lot of information and that time management of the information is a challenge. Those who do best in this sort of course are those who attend all the lectures.....remember, the 'text' will be primarily the notes, so you will really be at a disadvantage if you miss class. Keeping up with the work in this course will be quite manageable if you do a little bit of self-study every day or two. Do not postpone doing the assigned problems that, nor fail to keep up with the course material as it is presented. Finally understand the topics as they are presented and get any problems you have in understanding the material cleared up as soon as possible, because subsequent topics will require that you be familiar with previously presented concepts.
3. According to current University policy, instructors are required to remind you about: Plagiarism: The Senate document on Academic Dishonesty states that "Plagiarism means presenting work done (in whole or in part) by someone else as if it were one's own." Plagiarized work could result in an automatic failure in any Chemistry course and a subsequent request to withdraw from the program. Students should consult the Senate document (<http://www.queensu.ca/secretariat/senate/policies/acaddish.html>) or talk to the course instructor when in doubt about how best to refer to the work of others.