

CH 242: Organic Chemistry

Syllabus and Course Information - Spring 2002

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Course web site: <http://www.colby.edu/chemistry/OChem/OChemHome.HTML>

- Materials:** (a) "Organic Chemistry" by Maitland Jones, Jr., 2nd Edition, Norton and Co., 2000. (Required)
(b) "Organic Chemistry Study Guide and Solutions Manual" by Henry L. Gingrich and Maitland Jones, Jr., Norton and Co., 2000. (Required)
(c) "ChemOffice Ltd." software from CambridgeSoft (www.camsoft.com). (Optional)
(d) "Molecular Model Set for General and Organic Chemistry" Prentice Hall, 1965. (Optional)
- Lectures:** (Arey 5) Three times a week (MWF 10:00 – 10:50 am). It is vital that you listen carefully to the lectures and write down notes. As was the case last semester, these notes, problem sets (see below), and the text will be important resources to learn the material and prepare for exams.
- Laboratory:** (Keyes 305) You have been assigned to one of four sections. Each section is approximately four hours long. Lab instruction will be provided by Jean McIntyre (three sections) and Das Thamattoor (one section). Your overall lab performance will be worth 20% of the course grade. Additional details are given in the accompanying handout. Questions concerning lab schedules, reports, grading, etc. should be directed to Ms. McIntyre.
- Office Hours:** As announced in class each week and by appointment. Please try to make an appointment if you are unable to attend the scheduled office hours.
- Help Sessions:** In addition to office hours, there will be help sessions scheduled about once every week. Time and venue will be announced in class.
- Problem Sets:** Problem sets will be posted each week on the web. The corresponding answer keys will be posted the following week. These problem sets will not be collected and graded. However, please resist the urge to look up answer keys without working out the problems first. Such an approach will hamper your ability to learn the material and do well in the course. The end-of-chapter problems are particularly important and it is in your interest to work out as many of them as possible.
- Resources:** Room 142 in the Olin science library has a number of organic chemistry texts, relevant to lecture and lab, available for your use. This room is well suited for group study and is equipped with a blackboard that you may use to work out problems. Old exams will be posted in this room and their answer keys will be placed on reserve at the circulation desk. Tutorial help is also available for students on a need basis. Requests for tutors should be directed to Ms. McIntyre.
- Grading:** There will be three fifty-minute "hour" exams during the regular class period and a cumulative two-hour final exam. *Make-up exams are not available.* All exams are closed-book. Exam dates and point values are given below.

Exam 1:	100 points	Wednesday, February 27	10:00 – 10:50 am
Exam 2:	100 points	Friday, March 22	10:00 – 10:50 am
Exam 3:	100 points	Monday, April 22	10:00 – 10:50 am
Final:	150 points	Wednesday, May 15	3:30 – 5:30 pm
Lab:	100 points		

Your total score in the course (out of 500 points) will be calculated using the two methods given below. The formula that gives you the higher score will determine your course grade.

Formula I: Two "best" hour exam scores + one half of remaining hour exam score + final exam score + lab score.

Formula II: All three hour exam scores + two-thirds of final exam score + lab score.

Topics of Study:

The approximate order of topics to be covered is given below.

- Chemistry of alkynes.
- Dienes and the allyl system, conjugation, introduction to the concept of aromaticity, UV spectroscopy.
- Substitution reactions of aromatic compounds- hydrogenation, electrophilic aromatic substitution, Friedel-Crafts alkylations and acylations, activation/deactivation of aromatic rings and directive effects of substituents, nucleophilic aromatic substitution, benzyne, chemistry of the benzyl group.
- Radicals- structure, stability, formation, and reactions. Mass spectrometry.
- Carbonyl chemistry I- nature of the carbon-oxygen double bond, nomenclature and spectroscopy of carbonyl compounds, reversible addition to the carbonyl group, formation of acetals, ketals, imines, and enamines, reaction of organometallic reagents with the carbonyl group, interconversion of alcohols and carbonyl compounds, Wittig reaction.
- Chemistry of alcohols- review of older concepts, spectroscopy, reactions, diols, the pinacol rearrangement, syntheses and reactions of ethers, thiols and sulfides, crown ethers and cryptands.
- Carbonyl chemistry II- enols and enolates, halogenation and alkylation at the α -position, the aldol condensation and related reactions, Michael reaction, benzoin condensation and Cannizzaro reaction.
- Carboxylic acids- nomenclature, structure and spectroscopy, acidity, conversion of carboxylic acids into derivatives such as esters, amides, acid chlorides, and anhydrides, reaction of carboxylic acids with organolithium reagents and metal hydrides, decarboxylation of β -keto acids, the Hunsdiecker reaction, reactivity at the α -position of carboxylic acids, synthetic methods.
- Acyl compounds- nomenclature and spectroscopy, reactions of acid halides, anhydrides, esters, amides, and nitriles, chemistry of ester enolates, Claisen condensation and related reactions, chemistry of α -keto esters.
- Reactions controlled by orbital symmetry- Woodward-Hoffmann rules, electrocyclic reactions, cycloaddition reactions, sigmatropic shifts.
- Amines- nomenclature, structure and spectroscopy, acid and base properties, reactions and syntheses of amines.
- Introduction to carbohydrates- nomenclature, structure, stereochemistry, Fischer projections, Haworth representations, anomers and mutarotation, isomerization of sugars in base, reduction and oxidation, ether and ester derivatives of sugars, Kiliani-Fischer synthesis, Ruff degradation, di- and polysaccharides.
- Introduction to amino acids, peptides, and proteins- nomenclature, structure, acid-base properties, syntheses, and reactions of amino acids, the peptide bond, nomenclature, structure, and syntheses of peptides, determination of protein structure.

**Some
Advice:**

CH 242 builds upon, and extends, the material covered in CH 241. Thus, a thorough knowledge of the concepts and reactions discussed last semester is vital to your success in CH 242. This semester we will continue to explore the relationships between structure and reactivity, and there will be a heavy emphasis on reaction mechanisms and syntheses. So the ability to draw flawless Lewis structures and push arrows, among other things, will be indispensable skills. Just as was the case with CH 241, sheer memorization will not get you very far in CH 242, but recognizing patterns, and applying them, will. Also, please go back and read the advice that was given in the Syllabus and Course Information at the beginning of last semester. Every one of them is valid this time around as well. In my experience, students who do well in this course are typically those who show a genuine interest in the material, enjoy trying to understand it, and keep a positive attitude. So take charge of the course, and give it your best! You can do well in it, if you really try.

Welcome to CH 242, and good luck!