

**4:122**

## **Organic Chemistry II**

**Fall, 2012**

**Instructor:** Professor Jim Gloer

Office: E515 CB

Phone: 335-1361

**Email:** james-gloer@uiowa.edu (please include "4:122" in the subject line)

**Teaching Assistants:** Jake Duncan (andrew-duncan@uiowa.edu), Michael Sinnwell (michael-sinnwell@uiowa.edu),

**Web Site:** Online content for the course will be managed using the ICON (Iowa Courses Online) system (<http://icon.uiowa.edu>). The site will be used to post copies of the slides used in class, as well as practice exams, exam keys, and occasional announcements.

**Textbook:** "Organic Chemistry", 3<sup>rd</sup> Edition, 2011, by J. G. Smith, (ISBN #978-0-07-337562-5; sometimes listed as 978-0-07-735472-5 or 978-0-07-740571-7).

**Optional Materials:** An optional study guide is available which contains answers to problems from the text (ISBN # 978-0-07-729665-0). Students are also advised to obtain a set of molecular models (e.g., ISBN #978-0-7167-4822-9 or 0-9648837-1-6) because they are useful in helping to visualize the 3D-structures of organic compounds. However, such models cannot be used during exams. No web-based homework tools will be used in the course this semester.

**Course Notes:** Copies of the Powerpoint slides used in class will be made available on the course web site as PDF files. These notes are intended to be helpful—not to alleviate the need for attending class. Efforts will be made to post these notes at least three days before each class, if not sooner. They will be most useful if you look them over before class, and add highlights or further notes to them during lecture.

**Lectures:** MWF, 9:30-10:20 AM in 100 PH

The 8:45-10:15 PM Wednesday slot is reserved in your schedule primarily for the three mid-term exam dates—no other class meetings are planned for that time period. However, if a class has to be cancelled due to some unexpected circumstance, a make-up lecture could be scheduled during one of these available time slots. Advance notice will be given in class if this becomes necessary. Also, please note that *lectures will not be held on mornings of exam dates.*

**Office Hours:** Monday 1:30-2:30, Tuesday 11:00-12:00, Wednesday, 10:30-11:30. Expanded office hours (times to be announced) will be offered during exam weeks.

Questions will be answered during class, immediately after class (as permitted by time between classes), during discussions, or during office hours. If a meeting is needed outside these times, *please make an appointment*. TAs will announce their office hours at your first discussion section meeting. Each TA will have two office hours per week, and these will be held in the chemistry resource room (E208 CB). You may attend any of these, even if it is not your own discussion TA. Please note that your instructor does not consider email to be appropriate for detailed explanation or clarification of course concepts—if you have conceptual questions, please talk to your instructor or to your TA

**Exams:** There will be three regular mid-term exams and a final. Each regular exam will be given on a Wednesday at 8:45 PM and will last 90 minutes. The dates of these exams are listed below. The final exam will be held during the UI-scheduled time (to be announced in mid-September) and will last two hours. The

first regular exam will be held in two rooms (100 PH and LR1 VAN), while exams 2 and 3 will be held in Macbride Auditorium. Room assignments and any room changes will be announced in class before the exams. Rooms for finals have not yet been assigned. *All exams will be comprehensive, since understanding of material encountered later in the course will require application of concepts learned previously.*

However, each *regular* exam will focus mainly on material covered since the previous exam.

Announcements will be made in class regarding the material to be covered on each exam. Generally, topics to be covered on a mid-term exam will conclude with the material presented on the Friday before the exam. The Monday class before the exam will then be used as a review session, focusing mainly on discussion of the practice exam. Coverage of new material will resume on the Friday after the exam.

All exams will be closed-book. Prior to the start of each exam, all extraneous materials (e.g., models, notebooks, papers, backpacks, etc.) should be left at home or brought to the front of the room. Calculators will rarely, if ever, be needed. *The use of any other electronic devices during exams is strictly prohibited.* The exams will include some short-answer type questions wherein you will need to write out answers and/or draw appropriate chemical structures in spaces provided on the exam itself. All exams must be written in ink, but not red ink. Exams written in pencil or in red or erasable ink cannot be regraded. Exams will be graded and returned (through the Chemistry Center, E225 CB) as soon as possible. Exam results and answer keys will be posted on the course web site via ICON.

#### **Exam Schedule:**

**Exam 1: Wednesday, Sept. 19 at 8:45 PM**

**Exam 3: Wednesday, Nov. 14 at 8:45 PM**

**Exam 2: Wednesday, Oct. 17 at 8:45 PM**

**Final Exam: Not yet assigned**

**Regrades:** Occasional grading mistakes are unavoidable in a class of this size. If you feel that a mistake has been made in grading your exam, you may turn it in at the Chemistry Center (E225 CB) for regrading. Write on the front of the exam the number of the question to be checked and an explanation (in one sentence or less) of what you believe was done incorrectly. *The entire exam will be reviewed by your instructor--if points were incorrectly awarded, the corresponding score change will also be made.* Regrade requests must be submitted within one week of the time the graded exams are made available to you (within 24 hours for the final exam). No regrades will be possible after that time. Please note that this procedure is intended to apply to situations where your answer matches the answer posted on the key, but was misgraded. If you disagree with an answer on the key, please discuss the issue with your instructor during office hours.

**Make-up Exams:** Permission to take a make-up exam will require a valid, written excuse. You must register for the make-up and provide an acceptable reason before the scheduled time of the regular exam that you miss. This process requires that you complete a standard Departmental makeup exam request form (posted on the course ICON site) and *submit it to the **Chemistry Center** (E225 CB).* All such requests must go through the Chemistry Center. *You do not need to contact your instructor about a makeup unless the Chemistry Center has rejected your request.* Each make-up exam will be given on the Friday nine days after the regular exam at 5:30-7:00 PM in room W290 CB. Under no circumstances will a makeup be given in place of a regular exam taken earlier.

**Drop-Add:** Please note that drop/add signatures for this course **must be obtained from staff in the Chemistry Center (E225 CB), not from your instructor.** If you are an undergraduate student, you may, if approved by your advisor, drop a course through the 10th week of the term. The deadline this semester for undergraduate students to drop a course is Monday, October 29. However, the last day to drop without receiving a "W" on your transcript is Friday, August 31.

**Course Grades:** Grades will be based on performance on the three regular exams (300 points) and the final exam (150 points). Total points possible = 450. No scores will be dropped in calculating the final grade for the course, and everyone must take the final exam. No letter grades (A, B, C grades) will be assigned for individual exams, but an *approximate* curve for each exam will be provided during class so that students will know where they stand grade-wise. At the end of the semester, each student's exam scores will be totaled, and the resulting sum will be fitted to a standard curve in order to assign final grades. The grading curve will be based strictly on *this semester's class performance*. College guidelines will be followed as closely as possible in establishing the final grade distribution, and +/- grading will be used for final grades.

**Discussion Sections:** There will be 8 discussion sections per week conducted by chemistry TAs. Times and places are listed on ISIS. Because 004:122 is only a three-credit course, attendance at these sessions is not required, however, they are intended for your benefit. These are essentially "help sessions" that provide opportunities to ask questions about lecture material, problems from the text, practice exam questions, etc. in a smaller group setting. **Discussion sessions will begin on Monday, August 27.**

**Other Course Information:** Inquiries about exam times and places, times and places of discussion sessions, TA office hours, etc. should be taken to the Chemistry Center (E225 CB; 335-1341).

This course is being offered by the College of Liberal Arts and Sciences. Thus, class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College. These policies are summarized on the last page of this syllabus and can be found at: <http://www.clas.uiowa.edu/faculty/teaching/policies.shtml>. Students wishing to add or drop this course after the official deadline must receive the approval of the Dean of the College of Liberal Arts and Sciences. Details of the University policy on cross-college enrollments may be found at: <http://www.uiowa.edu/~provost/deos/crossenroll.doc>.

**Public health** authorities recommend that people with flu-like illnesses stay home and not return to public spaces until 24 hours after they have no fever. In order to prevent the spread of disease, please do not come to class, meet with other groups of students, attend office hours, or contact offices in person while you are ill with a fever.

**Special Needs:** Your instructor needs to hear from anyone who has a disability that may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. The Student Disability Services (SDS) office is located in 3101 Burge Hall (335-1462). If any such special arrangements are needed for exams, please contact your instructor during office hours and inform the Chemistry Center as well (E225 CB; 335-1341).

**Course Description:** This course is a continuation of 004:121, Organic Chemistry I. It is organized around functional groups, but includes di- and polyfunctional molecules. Methods for determining the structures of organic compounds are introduced, with an emphasis on NMR and IR spectroscopy and mass spectrometry. The chemistry of various unsaturated organic compounds, carboxylic acids, carboxylic acid derivatives, other carbonyl compounds, amines, and heterocyclic compounds is discussed. Finally, some elements of the organic chemistry of carbohydrates and amino acids will be presented, as time permits. The course is intended for science majors, pre-medical, pre-dental, pre-pharmacy, or pre-veterinary students, or anyone planning to take two full years of chemistry.

**Course Objectives and Outline:** The material to be covered this semester is summarized in the table below. Any changes will be announced in class. Note that we will directly follow the sequence in the textbook, except for Chapter 15, which was already covered at the end of 4:121. Our main objectives are to cover the Chapters below. However, a few selected topics from Chapters 26-29 may be covered near the end of the semester if time permits.

Chapter	Pages	Title	Suggested Problems
13	463-493	Mass Spectrometry and Infrared Spectroscopy	1-8, 10-16, 18, 20-32, 35, 37-42, 44-48
14	494-537	Nuclear Magnetic Resonance Spectroscopy	1-3, 5-11, 13-37, 39-42, 44-48, 50-52, 54-67, 69, 73
16	571-606	Conjugation, Resonance, and Dienes	1-4, 6-27, 29, 31-45, 47, 51-56, 58, 59, 61-67
17	607-640	Benzene and Aromatic Compounds	1-11, 13-21, 23, 24, 27-30, 32-44, 47, 48, 50, 51, 54-60
18	641-687	Electrophilic Aromatic Substitution	1-48, 50-54, 58, 60-67, 70-73
19	688-721	Carboxylic Acids and the Acidity of the O-H Bond	1-41, 43, 45-50, 53-70
20	721-773	Introduction to Carbonyl Chemistry; Organometallic Reagents; Oxidation and Reduction	1-51, 53-69, 71-79
21	774-824	Aldehydes and Ketones – Nucleophilic Addition	1-17, 19-25, 27-39, 41-54, 57-69, 71, 73-81, 83-90
22	825-879	Carboxylic Acids and their Derivatives – Nucleophilic Acyl Substitution	1-16, 18-25, 28-55, 57-59, 62-77, 79, 80, 82-88
23	880-915	Substitution Reactions of Carbonyl Compounds at the $\alpha$ -Carbon	1-19, 21-27, 29-38, 40-42, 44-56, 58-61, 64-71
24	916-948	Carbonyl Condensation Reactions	1-19, 21-39, 41-48, 50, 53-56, 58-65
25	949-1001	Amines	1-9, 11-32, 34-39, 41-66, 68, 69, 71-75, 77-87

**Suggested Problems:** Working problems from the text is an essential step in learning the course material. However, we will not collect or grade these. They are intended for you to use independently as learning tools, and to help provide topics for coverage in discussion sections. You do not have to do *all* of the suggested problems in order to assimilate the material or perform well on exams. Generally, though, the more problems you can do, the better you will understand the material, and the better prepared you will be.

The few entries omitted in the lists above correspond to problems that are off-topic, or confusingly worded, or perhaps more advanced than necessary, etc. The remaining problems provide ample coverage of the course topics, and practice exams will also be made available. However, if you wish to have *additional* practice, you could try omitted problems, or seek out any other organic chemistry textbook.

## Some Study Suggestions for Organic Chemistry II

Organic II picks up where Organic I left off, and builds upon that framework. It is very important to make sure that you recall and understand the concepts from Organic I, because we must assume that you do in order to proceed. As in Organic I, you will be most successful if you strive to *understand the concepts* presented, how they relate to one another, and *how they can be applied to new situations* that you encounter. Work as many of the suggested problems as you can, and then check your answers in the study guide. Don't just go look at the answers without trying hard on the problems first.

*Take the practice exams* that will be provided. Of course, the questions on the real exams will be different, but the style will be similar, and one intention is to help relieve stress about what you will face at exam time. If you take them seriously and impose a time limit on yourself, you can get a feel for the time it will take you to finish the real exam. Check your answers with the key, and investigate the ones you get wrong. We will go over the practice exam in detail in class on the Monday before the exam.

*Keep up* with the reading and problems. If you fall behind, it will be *very* difficult to catch up. This is not the type of course in which you can cram the night before an exam and expect to do well. A standard suggestion is to study *at least* a couple of hours outside of class for every hour of lecture.

*Come to class.* The availability of downloadable course notes leads to a natural temptation to skip class. The notes are intended to help you learn, and to enable you to *listen* in class and make a few extra notes of your own, rather than focus on frantically copying everything. However, they are incomplete without the explanations, emphasis, highlighting, etc. that will be provided during class. Many organic chemistry concepts are new to most people, making it less likely that you can simply read the notes or the book and understand everything (or be sure what your instructor considers most important...). Most students find that *more* explanation of this material is needed—not less!

My Powerpoint notes are on the detailed side, but they are intended to provide concise summaries of each topic that you can review more efficiently than re-reading entire book chapters. Students often use the notes as a core resource, with the text serving as a supplement/reference that offers more detail and, of course, many relevant problems to work. As we cover these notes in class, focus will be placed on explaining the concepts and emphasizing the most important points, not on reading the slides to you.

*Take advantage of discussion sections.* Because this is a three-semester-hour course, the discussion sections are optional, and no graded materials will arise from them. These are weekly help sessions for you, but they cannot magically catch you up in one sitting right before an exam. For those who attend regularly, these sessions offer an opportunity for getting additional help and concept reinforcement in a smaller, less formal class setting. They may also facilitate formation of study groups with your peers.

*Take advantage of office hours* offered by your instructor and your TA offered *throughout the semester*. They sometimes get a bit crowded as exams loom, so extra office hours will be added during the days before exams in an effort to accommodate everyone. I prefer to do this rather than to hold formal help sessions outside of class time because 1) not everyone will be able to attend a help session outside of class, 2) we will already hold a mini-help session in class the Monday before the exam, 3) I can tailor answers to individual student needs, and 4) many students are just as reluctant to ask their questions in a large group help session as they are during class—this offers you a chance to do so in a much smaller setting, and at a time of your convenience.

## Collegiate Policies & Procedures

The following policy and procedural statements have been summarized from the web pages of the College of Liberal Arts and Sciences and The University of Iowa Operations Manual.

**Administrative Home.** The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Student Academic Handbook.

**Electronic Communication.** University policy specifies that students are responsible for all official correspondence sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondence. (Operations Manual, III.15.2. Scroll down to k.11.)

**Accommodations for Disabilities.** A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See [www.uiowa.edu/~sds/](http://www.uiowa.edu/~sds/) for more information.

**Academic Honesty.** All CLAS students have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct will be reported to the College and placed on disciplinary probation or may be suspended or expelled (Please see the CLAS Academic Policies Handbook).

**CLAS Final Examination Policies.** The final examination schedule for each class will be announced around the fifth week of the semester by the Registrar. Your instructor has no input into this schedule, and students should not ask their instructor to reschedule a final exam. Final exams are offered only during the official final examination period. No exams of any kind are allowed (or planned) during the last week of classes. All students should plan on being at the UI through the entire final examination period. Once the Registrar has announced the dates and times of each final exam, the complete schedule will be published on the Registrar's web site. Questions about these policies should be addressed to the Associate Dean for Undergraduate Programs and Curriculum.

**Suggestions or Complaints.** Students with a suggestion or complaint about this course should first visit the instructor, then the Departmental Executive Officer (DEO). The Chemistry DEO can be contacted by calling the Chemistry Department front office at 335-0200. Complaints must be made within six months of the incident—please refer to the CLAS Student Academic Handbook.

**Understanding Sexual Harassment.** Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

**Reacting Safely to Severe Weather.** In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue, if possible, when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety web site.