

CHEM-106. Organic Chemistry II: Sections C & D--Spring 2007

Course Description—CHEM-106. Organic Chemistry I

An introduction to the study of the physical and chemical properties of both aliphatic and aromatic hydrocarbons within the context of modern structural theory. Areas emphasized are bonding, acidity and basicity in organic systems, stereochemistry, and reaction mechanisms. This course must be taken concurrently with CHEM-106a. Prerequisite: CHEM-105. Three hours per week. *Three semester hours.*

Instructor: Dr. Ronald E. Hess
Office: Pfahler 313C; e-mail: rhess; telephone ext: 2345
Hours: by appointment; or whenever my office door is open, which is most of the time (and I am not involved in another task)

Class Meetings: Monday, Wednesday, and Friday mornings
Section C: 10:00 - 10:50 A.M.
Section D: 11:00 – 11:50 A.M.

Class Room: Pfahler 208

Textbook: L.G. Wade, Jr. *Organic Chemistry*, 6th Edition; Pearson Prentice Hall: Upper Saddle River, New Jersey, 2006 (ISBN 0-13-147871-0)

Optional Text: J. W. Simek. *Solutions Manual to Accompany Organic Chemistry*, 6th Edition; Pearson Prentice Hall: Upper Saddle River, New Jersey, 2006 (ISBN 0-13-147882-6)

Any good molecular model set is **highly recommended**. An excellent and inexpensive model set is Darling model Kit #1 (ISBN 0-9648837-1-6). As a service to Ursinus students, our Beardwood Chemical Society will be selling kit #1 at the discounted price of \$20.00 cash. They may offer an “early bird” special discount during the first week of classes. Details will be announced in class. I encourage you get a model set and use it to visualize three-dimensional structures. Most students find it very helpful, especially when studying stereochemistry, to use these models.

Blackboard:[®] A Blackboard site has been established for this course on Campus Web. Check the “*Announcements*” folder occasionally. The syllabus will be posted in the “*Course Information*” folder. “*Course Documents*” contains exams from the Spring 2006 course, handouts, and problem sets. Recommended end-of-chapter problems will be posted in the “*Assignments*” folder.

Grading: Three (3) examinations and a final exam that will consist of two parts: an examination #5 plus a cumulative section.

Examinations: Exams are scheduled for 90 minutes, commencing at 7:00 P.M. (except the final exam) in Olin Auditorium.

	<u>Approx. % of Final Grade</u>
Examination #1: Thursday, 15 February 2007	20 %
Examination #2: Thursday, 22 March 2007	20 %
Examination #3: Thursday, 19 April 2007	20%
Final Examination: Thursday, 03 May 2007	40%

Important: This evening time has been scheduled by the Registrar. If you should have a scheduled class that you are taking for credit that conflicts with any of these times, please notify me as soon as possible so that accommodations can be made.

The instructor may, at his discretion, assign required homework and/or administer announced or unannounced quizzes, and factor this work into the final grade, if he believes it to be in the best interest of his students. In this case, the weight given to this work would be the same as that for the exams: in other words, a point is a point.

COURSE POLICIES—CHEM. 106, Sec. C & D—SPRING 2007

Attendance. The following is the new attendance policy approved by faculty in 2004-05, as found in the Ursinus 2006-2007 Course Catalogue, page 42:

In keeping with a strong liberal arts tradition that encourages active learning and complete participation in the education process, the college expects students to attend class on a regular basis. Specific attendance policies are set by individual instructors and indicated on the course syllabus at the beginning of each term. Warning slips will be issued by instructors for all students failing to meet the stated course attendance policies. Excessive absences by first year students and students on academic probation will be reported to the Dean's office. Students may be dropped from a course with a grade of F for failing to meet the stated policy.

Please note the following policy related to class attendance, as established by the instructor of Sections C and D:

Every student is accountable for all work missed. The instructor, however, is under no obligation to make special arrangements for students who are absent.

Examination dates are indicated on the class schedule that is a part of this syllabus. ***These dates will not change.*** All exams, except the final, will start promptly at 7:00 P.M. in Olin Auditorium, and you will have 90 minutes to complete each exam. If you have a registered course conflict, please see the instructor as soon as possible to make arrangements for an earlier examination on the exam day.

Attendance at examinations is required. In general, make-up examinations will NOT be administered. Anyone who is absent from an examination will receive the grade “zero” for that exam, except in the case of an excused absence.

Please read carefully and understand the following course attendance policy as communicated to Faculty by the Office of the Dean of the College, in an e-mail message dated Thursday, 07 December 2006: *“Please be advised that the staff of the Wellness Center will not issue notes to students in order to excuse them from classes, tests, etc. If Dr. Doghramji or Jen D’Ottavio (our Physician’s Assistant) specifically instruct a student to miss class due to illness, the Deans’ Office will be notified. We will then contact the student’s professors to inform them of the situation.”*

If a death in the immediate family occurs, documentation must also be provided. In cases of excused absence, those sections of the final examination that pertain to material covered in the missed examination may be weighted more heavily. College-sponsored activities such as athletic events, musical or dance programs, and social functions, as well as employment, are ***NOT*** considered valid reasons for missing an exam. Illness before an exam is generally not considered to be a legitimate excuse as you are expected to keep up-to-date with the material and not allow the bulk of your studying to be done immediately before the exam. Only in extraordinary cases, at the discretion of the instructor, will a make-up exam be given.

Please note that I am not available for any extra help during the day of the exam.

Calculators and cell phones are prohibited during exams, unless explicitly permitted by the instructor.

Regarding Inclement Weather: Please see the communication from the Dean’s Office that is posted in the “Course Information” folder on Blackboard.[®]

Regrades for all exams will be handled by your instructor. Regrades will only be considered during the five days after the exam has been made available for distribution to the class.

Individual exams will not be curved. Because average grades on all quizzes and exams will be announced, a comparison of your scores with the class averages is the best way to determine how well you are doing throughout the semester. At mid-term, first-year students and students on academic probation are assigned an approximate grade based on their ***cumulative point total*** to that time. Before the final exam, you may request an approximate grade based on your work of the semester. Please feel free to discuss your grade with me at any time during the semester.

Recommended homework problems will be posted on the *Blackboard*[®] Campus Web site, in the “Assignments” folder. You are expected to do these problems, although, in general, they will not be collected and graded. It has been my experience that students who do not attempt homework problems, or who leave them until the night before an exam, will not do well in the course! Quite often, this instructor includes a homework problem, or one of a very similar type, on an exam. Solutions and answers to most of the problems may be found in the textbook and/or the student solutions manual that accompanies the textbook.

Introduction to Chem 106, Sec. C & D Spring 2007

WELCOME TO ORGANIC. In the belief that it is important to know the rules before the game starts. I want to make explicit the nature of my offering of Chemistry 106 at Ursinus College, including how it most likely differs from your high school chemistry course(s), what to expect and what not to expect.

WHAT SHOULD I EXPECT ON MONDAY, WEDNESDAY, and FRIDAY MORNINGS?

no movies, no videos, no war stories, no political discussions ... , just good, solid, fascinating science for about an hour. I expect you to behave in a courteous manner: be attentive, quiet, respectful of your fellow students, and receptive to learning. Remember: Attitude is very important; you will only learn if you want to learn. If you plan to sleep, please stay in your room. There is an additional rule of classroom etiquette I hope you will adhere to: if you arrive late, after the door has been closed and the lecture has begun, please enter the classroom **quietly**.

READING ASSIGNMENTS. Reading assignments are an important part of this course, maybe the most important. Reading should be done both before and after the lecture. Class work will NOT cover every topic in every assigned chapter; time simply does not allow for this.

Furthermore, to ask students to learn some things “on their own” represents sound pedagogy. Unless a specific topic has been excluded, all material in an assigned chapter is “fair game” for an examination. It is important for you to understand *that learning the subject matter is YOUR INDIVIDUAL RESPONSIBILITY*. It is not my job to beat facts into your head on Monday, Wednesday, and Friday mornings. Most of the learning of chemistry happens as you discover important concepts and relationships in class and when you sit down at your desk with notes, textbook, pencils, pads, calculator, and a receptive and inquiring mind. My comments in class will address high points and/or ideas that may be particularly difficult for you to grasp on your own. Since the principal difference between you and me is experience, certainly not intelligence, I believe that I can help you to appreciate what is important, how to approach problem-solving, and how to avoid pitfalls along the way to understanding. I can also help you decide what to memorize and what to truly learn through the logical application of chemical principles.

EXAMINATIONS. Examinations are primarily designed to test your ability to think rather than to regurgitate facts. Specific problems, examples, etc., covered in class will rarely be found on exams. Sometimes you WILL be tested on material that is not specifically covered in class. The best way to prepare for organic chemistry exams is to SOLVE PROBLEMS, as many as you possibly can, and to UNDERSTAND FUNDAMENTAL PRINCIPLES so well that you can explain them by both words and equations.

HELP SESSIONS/OFFICE HOURS. Take advantage of the many opportunities to get help outside the classroom, including the frequent tutoring sessions sponsored by the College’s Tutorial Program and the Department of Chemistry. Extra help is more beneficial, however, if you have given an honest effort to understand the material before you seek the help and if you bring specific questions with you. *I welcome your visits*.

GROUP STUDY OUTSIDE OF CLASS. Many students find that small group study outside the classroom is beneficial; I encourage you to consider getting involved in such an effort. Take the initiative to round up several of your classmates and meet on a regular basis to talk chemistry.

RECOMMENDED PROBLEMS. I strongly recommend that as you work through a chapter, you study the embedded problems, because, in general, that will be necessary if you are to understand the material that follows.

It is expected that you will solve all of the recommended problems (which will be announced in class and/or be posted on the *Blackboard*[®] computer site), but these solutions will, in general, NOT be collected. Grading the homework problems does not constitute the best use of the instructor's time. Frankly he would rather be available for one-on-one or small group discussions than to spend time putting check marks on homework that may have been copied from someone else. The desire to do well in this course must be the force that motivates you to do the recommended work, because doing the homework should prove to be extremely beneficial to your performance on examinations. I refuse to twist the arms of college students to do assignments by setting up deadlines for submission of homework; this only encourages sloppy work and outright dishonesty.

One commendable feature of your textbook is the large number of problems it contains, along with the answers to many of these problems. I recommend that you attempt to solve as many of the problems as your time allows, for herein lies an important key to success in this course; the assigned problems represent a bare minimum. I am frequently asked this question: how can I do better on your exams? My answer to that question is often simple and direct: solve more problems, and spend more time working at understanding the important theoretical principles. Practice, practice, practice is the best way to prepare for my examinations.

READING ASSIGNMENTS are found in this syllabus with the schedule of lecture topics.

RECOMMENDED HOMEWORK PROBLEMS, HANDOUTS, and PROBLEM SETS are posted on the Blackboard[®] website.

GRADING. Of course, grading is done on a curve; it is virtually impossible to do otherwise and be fair. My examinations are challenging, and I live by the philosophy that a lower average on a more difficult exam is preferable to a higher average on an easier test. If the average on an exam is 65 and you score 75, you are 10 points above the average (B level work). This means that it is easier for you to “make up ground” on the average.

The average grade in this course will likely be middle C (approximately 2.0 or 75%). Exams are graded exclusively by the instructor—every point of every exam—and returned with a number grade, not a letter. To estimate your standing in the course at any time, compare your average with the class average. If your average is 10 points above class average, you are doing approximately “B level” work; an average which is 10 points below class average indicates approximately “D level” work.

ATTITUDES. Attitude is very important! I expect you to be engaged in the class. It is OK for you to ask relevant questions during lectures. Also, I expect that occasionally you will respond to a question that I throw out to the class. Remember: you will only learn if you want to learn. I will be respectful of you, and I expect the same from you in return. I consider no question to be a “dumb” question, and I consider no answer to be a “dumb” answer. I will do my best never to embarrass you. I will be available for you when I am needed, but I do expect something in return—namely, courteous behavior from you: be attentive, quiet, respectful of everyone else in the room, and receptive to learning. If you plan to sleep, stay in bed. If you plan to put on make-up, sit in front of your vanity. If you are in desperate need of nourishment, go to Wismer or Wawa. If you want to talk to your neighbors, invite them to your room after class. And if you arrive late, please enter the room quietly, being careful not to knock me down as you walk past. Oh yes, please turn off your cell phone.

MORE ON ATTENDANCE. Although I do not formally take attendance on a regular basis, I do have a general sense as to who is coming to class and who is not. If your attendance is poor—and I believe that this is reflective of attitude—and your performance is likewise poor, I may move to exclude you from the class, according to the guidelines stated on page 2 of this syllabus (*Ursinus College 2006-2007 Course Catalogue*, page 42).

ACADEMIC HONESTY. The following statement appears on pp. 42-43 of the *Ursinus 2006-2007 Course Catalogue*:

“Ursinus College is a small community which functions by a social contract among students, faculty, administration and alumni. In order for the spirit of community to endure and thrive, this agreement, based upon shared values and responsibilities and a sense of mutual respect, trust and cooperation, must be preserved. Students have an obligation to act ethically concerning academic matters and the faculty has a responsibility to require academic honesty from students and to be vigilant in order to discourage dishonesty.

Lying, cheating, stealing, plagiarism and other forms of academic dishonesty violate this spirit of mutual respect and collaboration and corrode the atmosphere of openness and free inquiry upon which the educational process is based. Such activities are demeaning and potentially damaging to those who undertake them. Moreover, academic dishonesty is damaging to the student body as a whole, in that it cheapens the achievement of the honest majority of students and subverts the integrity and reputation of the institution with which they will be identified for the rest of their lives.

... The student body, the faculty, and the administration of Ursinus College therefore unanimously condemn academic dishonesty in all its forms and affirm that it is the responsibility of all members of the college community to prevent such activity.”

Your work must be written in your own words and comprise your own ideas. I hold you responsible for knowing the rules on academic honesty, including plagiarism, spelled out in the *Student Handbook*, some of which follow:

“ ... You are cheating if you:

1. Copy answers or use information from a fellow student's paper during a quiz, test, or examination.
2. Divulge answers or information, or otherwise give improper aid to another student during a quiz, test, or examination or accept such aid.
3. Relay or receive any improperly obtained or confidential information concerning a quiz, test, or examination. (Example: if one sees the test before it is to be given and transmits information concerning its contents or whereabouts to other students.
4. Use or refer to any unauthorized notes, books, calculators, problem solving aids such as “cheat sheets” during a quiz, test, or examination.
5. Collaborate improperly with another student on an open-book or take-home quiz, test, or examination; or obtain information from an unsuspecting fellow student during such an exercise.
7. Commit an act of plagiarism in any form.
13. Misrepresent yourself to an instructor or an administrator for the purpose of gaining special favors or extensions for academic work missed. Examples include but are not limited to lying about your health or the health of a relative, forging doctor's notes.
14. Forge signatures on forms, documents, or letters pertinent to College business. This may include but is not limited to course of study sheets, drop/add forms, or doctor's notes.

You are an accessory to cheating, and penalties may be applied, if you:

1. witness or have direct knowledge of any of the aforementioned forms of cheating and fail to inform an authorized person (faculty member, administrator, proctor, or student assistant).
2. You bring unauthorized materials into a testing area and fail or refuse to remove them when instructed to do so.
3. You fail to or refuse to comply with admonitions from a faculty member or authorized proctor to cease any activity, which might aid other students in cheating.”

CONCLUSION. While chemistry deserves its reputation as a difficult subject, it certainly is not an impossible one to learn. Chemistry is very logical, very systematic, and should **NOT** be approached as a collection of facts to be dutifully memorized without thought, then regurgitated on command. But you must make the commitment to spend an appropriate amount of time and effort (this differs from person to person) if you are to succeed. **Remember that the primary responsibility for learning, be it chemistry or any subject, lies with you—the individual student. You must care enough to be successful.**

Remember the two “golden rules” of organic chemistry (page xxiii):

1. ***Don't Get Behind!*** The course moves too fast, and it's hard to catch up.
2. ***Work Lots of Problems.*** Everyone needs the practice, and the problems show where you need more work.

“Taking organic chemistry without working the problems is like skydiving without a parachute. Initially there is a breezy sense of freedom and daring. But then, there is the inevitable jolt that comes at the end for those who went unprepared:” Wade

Review Topics: You should review as soon as possible the following topics from your study of General Chemistry: VSEPR/ED theory, atomic and molecular orbitals, chemical bonding, (nonpolar and polar covalent, ionic), resonance, formal charge, hybridization, acid-base theory, isomerism, electronegativity, and bond energy. These topics will be used frequently in our study of organic chemistry.

Chemistry 106, Sections C & D Spring 2007
Lecture Schedule/Recommended Reading

Reading is **IMPORTANT**; reading is recommended before and after the given lecture, as needed.

<u>Lecture</u>	<u>Date</u>	<u>Lecture Topic</u>	<u>Reading (Topics)</u>
1	Mon, 15 Jan	introduction to organic chemistry, atomic structure, bonding	1.1 – 1.5
2	Wed, 17 Jan	bonding, resonance, formal charge	1.6 – 1.11
3	Fri, 19 Jan	acids and bases	1.12 – 1.14
4	Mon, 22 Jan	molecular orbital theory, VSEPR, hybridization	2.1 – 2.6
5	Wed, 24 Jan	bond rotation, effects of polarity	2.7 – 2.11
6	Fri, 26 Jan	compound types, functionality	2.12 – 2.14
7	Mon, 29 Jan	alkanes—structure and properties	3.1 – 3.6
8	Wed, 31 Jan	conformational analysis, cycloalkanes	3.7 – 3.12
9	Fri, 02 Feb	cyclohexane and its derivatives	3.13 – 3.16
10	Mon, 05 Feb	organic mechanisms, free-radical halogenation of alkanes	4.1 – 4.5
11	Wed, 07 Feb	thermodynamics and kinetics of alkane halogenation	4.6 – 4.12

12	Fri, 09 Feb	selectivity in halogenations, Hammond postulate	4.13 – 4.16

13	Mon, 12 Feb	stereochemistry—chirality, stereoisomers	5.1 – 5.2
	Wed, 14 Feb	NO CLASS	
14	Thu, 15 Feb	Examination #1 (Lectures 1 – 12)	
15	Fri, 16 Feb	optical activity, racemic mixtures, (R) and (S)-nomenclature	5.3 – 5.6
16	Mon, 19 Feb	chiral compounds, Fischer projections	5.7 – 5.10
17	Wed, 21 Feb	diastereomers, meso compounds	5.11 – 5.13
18	Fri, 23 Feb	absolute configuration; resolution of racemates	5.14 – 5.16
19	Mon, 26 Feb	alkyl halides—structure, properties	6.1 – 6.5
20	Wed, 28 Feb	alkyl halides—preparations, reactions—substitution and elimination	6.6 – 6.8
21	Fri, 02 Mar	the S _N 2 reaction	6.8 – 6.12
22	Mon, 12 Mar	the S _N 1 reaction; S _N 1 versus S _N 2	6.13 – 6.16
23	Wed, 14 Mar	the E1 reaction	6.17 – 6.18
24	Fri, 16 Mar	the E2 reaction; E1 versus E2	6.19 – 6.21

25	Mon, 19 Mar	alkenes—structure, bonding, stability, (E) and (Z) nomenclature	7.1 – 7.7
	Wed, 21 Mar	NO CLASS	
26	Thu, 22 Mar	Examination #2 (Lectures 13 – 24)	
27	Fri, 23 Mar	alkenes—properties, preparations	7.8 – 7.11

28	Mon, 26 Mar	alkenes—electrophilic addition; HX, H ₂ O addition to alkenes	8.1 – 8.4
29	Wed, 28 Mar	more additions—hydroboration/oxidation, oxymercuration/demercuration	8.5 – 8.7
30	Fri, 30 Mar	still more addition reactions	8.8 – 8.12
31	Mon, 02 Apr	still more addition reactions	8.13 – 8.16
32	Wed, 04 Apr	alkynes—structure, preparations	9.1 – 9.8
33	Fri, 06 Apr	alkynes—reactions	9.9 – 9.10
34	Mon, 09 Apr	alcohols and phenols—structure, properties, acidity	10.1 – 10.6
35	Wed, 11 Apr	synthesis of alcohols—use of organometallic reagents	10.7 – 10.9
36	Fri, 13 Apr	synthesis of alcohols—Grignard reactions; metal hydride reductions; thiols	10.9 – 10.12

37	Mon, 16 Apr	reactions of alcohols—oxidation states; oxidations and reductions	11.1 – 11.6
	Wed, 18 Apr	<i>No Class: Student Achievement Day</i>	
38	Thu, 19 Apr	<i>Examination #3(Lectures 25 – 36)</i>	
	Fri, 20 Apr	<i>NO CLASS</i>	
39	Mon, 23 Apr	reactions of alcohols—halide formation, dehydration, diols, esterification	11.7 – 11.11
40	Wed, 25 Apr	electromagnetic spectrum; molecular vibrations, infrared spectroscopy	12.1 – 12.6

41 Fri, 27 Apr characteristic absorption frequencies, 12.7 – 12.12
interpretation of infrared spectra

42 Mon, 30 Apr review organic synthesis

This schedule is subject to change at the discretion of the instructor.

The common final examination time for Sections C & D of Chemistry 106 will be

Thursday, 03 May 2007; 1:00 – 4:00 P.M. The location will be announced later.

***The final exam will consist of three parts: Examination #4 (coverage: Lectures 35 - 42);
synthesis; and a cumulative section.***
