Chemistry 342
Organic Chemistry II
Spring 2007
Syllabus

Course Description: Chem 342 is a continuation of the study of organic chemistry at the sophomore-junior level. Chem 342 covers basics of organic spectroscopy, chemistry of carbonyl compounds, arenes, amines, and some other important types of organic compounds.

Objectives: The main goal is to learn the principles of organic chemistry, including preparation and use of organic compounds, their physical and chemical properties and identification methods.

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Required Textbook: *Organic Chemistry*, 4th edition, by Brown and Foote

Optional Material: (i) *Study Guide and Problems Book*, 4th edition, by Iversons and Brown; (ii) *ACS Organic Chemistry Exams—The Official Guide*, available at http://www4.uwm.edu/chemexams/ (price $18).

Lectures: MTWF, 8:00-8:50 a.m., Abbott Hall (AH) 101

Office Hours: MWF 9:05-10:30 a.m. and by **APPOINTMENT**

Weekly Help Session: Mondays, 1:00–1:50 PM, room AH 347 and Friday, 3:00–3:50 PM, room AH 138; if necessary, additional help sessions will be scheduled before exams/quizzes.

Number of credits: 4 credits

Prerequisite: Chem 341 and Chem 341L; a grade of C or higher in these classes are required.

Co-requisite: Chem 342L

Blackboard: Students can check their scores on Blackboard: http://online.und.edu/Bb6/. Weekly problem sets, practice exams, some handouts, announcements, syllabus and other pertinent documents and information will be available on Blackboard.

Attendance: In accord with the University policy, attendance is expected for all lectures. A student is responsible for learning the material and discovering if any announcements are made during lecture.

Reading assignments: Chapters listed below (pages 4–6) are to support and increase your understanding of the material covered in the lecture. You are supposed to read this material *prior* to coming to class.

Problem sets: *In addition* to assigned textbook problems, weekly problem sets will be posted on Blackboard. Problem sets are designed to increase understanding of the subject material. They are not to be turned in.

Midterm Examinations: All four midterm examinations will be 50 minutes in length. These exams will primarily emphasize material covered in the lectures. An absence from an examination may be excused only in the event of a ***verifiable*** illness, family emergency, or similar reason. Sending an e-mail message or leaving a voice mail about your illness is not sufficient. If you are sick and missed an exam or quiz, you *must* provide a note from your physician; otherwise, your score will be 0. *No make-up of missed exams.* Excused students will get his/her course average for the missed exam. Students cannot miss more than one midterm exam. Any conflict with the scheduled exams *must* be brought to the instructor's attention *at least 10 days prior* to the exam.

Quizzes: Twelve *unannounced* (closed-book, closed-notes, etc) quizzes will be given. Two lowest scores will be dropped. *No make-up of missed quizzes.*

During exams and quizzes:

(i) all personal items including backpacks and caps or hats must be placed on the floor;
(ii) no electronic devices including cell phones, headphones, calculators, etc may be used;
(iii) students are expected to keep their eyes on their own papers at all times;
(iv) all lecture notes, books and other printed materials must be placed in backpacks or on the floor printed side down;
(v) whenever possible, students must leave one empty seat between themselves and the next student.

Final exam: The *Standardized American Chemical Society Organic Chemistry Test* will be given as the final examination. *This is a multiple choice, comprehensive exam covering all topics from both Chem 341 and 342.* National averages are computed each year and thus this exam measures class performance relative to national standards. The exam will be given on Wednesday, May 9th, at 8:00 am in AH 101.

Grading: Your grade for the course will consist of the following parts:

Midterm exams: 4 x 100 pts	400 pts
Quizzes: 10 x 10 pts	100 pts
Final Exam	200 pts
Total:	700 pts

Grading Guidelines:	
87.0 - 100%	A
77.0 – 86.9%	B
67.0 – 76.9%	C
57.0 – 66.9%	D
56.9% and under	F

Extra points: The instructor may give extra points for work during lectures and special assignments giving to all students. Each student may get no more than 20 extra points. No individual assignments will be given.

Students with Disabilities: Individuals who have any disability, either permanent or temporary, which might affect their ability to perform in this class, are encouraged to inform their instructor at the beginning of the semester. Adaptation of the methods, materials or testing may be made as required for equitable participation.

Academic Dishonesty: Students being scholastically dishonest will be assigned a grade of F and dismissed from the course. Dishonesty will not be tolerated in this class. According to "Code of Student Life," "scholastic dishonesty includes, but not limited to, cheating on a test, plagiarism, and collusion" (page 15). "A. Cheating on a test includes, but is not restricted to: 1. copying from another student's test; 2. possessing or using material during a test not authorized by the person giving the test; 3. collaborating with or seeking aid from another student during a test without permission from the instructor; 4. knowingly using, buying, selling, stealing, transporting, or soliciting in whole or in part the contents of an administered test; 5. substituting for another student or permitting another student to substitute for oneself to take a test; 6. bribing another person to obtain an unadministered test or information about an unadministered test. If you are reading this document, do not forget a password for quiz 1: your initials and two last digits in your ID number. B. Plagiarism means the appropriation, buying, receiving as a gift, or obtaining by any means another person's work and the unacknowledged submission or incorporation of it in one's own work. C. Collusion means the unauthorized collaboration with another person in preparing any academic work offered for credit" (pp. 15, 16). Altering an exam and submitting it for regrade is an act of scholastic dishonesty.

Withdrawals: Students wishing to drop the course must do so by March 30. Students cannot drop either the lecture course (Chem 342) or laboratory (Chem 342L), they must withdraw from *both* courses. This is our *departmental* policy.

Classroom Courtesy: (i) I will try to begin and end lectures on time. Please come to the class a few minutes before the beginning of lecture. If you need to leave early for some reason, let me know before lecture. (ii) No food or drinks is permitted in AH 101. (iii) It is disrespectful to other students and me to talk or read the material not pertinent to the class during lecture. (iv) Please turn off all cell phones and pagers when you enter the room and keep them off.

Tentative Lecture Schedule

Date	Topic	Chapter	Suggested problem
01.09 Tuesday	Review: Functional groups	1–11, particularly 1.3	
01.10 Wednesday	Identification of organic compounds using spectroscopy. Infrared (IR) spectroscopy	12.1–12.3	12.1–12.3
01.12 Friday	**Lab lecture. Exp. 1. Polymerization** (also recommended for students not taken Chem 342L)	29 (Brown), 69 (Willamson)	
01.16 Tuesday	Infrared (IR) spectroscopy	12.4–12.5	12.4–12.11
01.17 Wednesday	Nuclear magnetic resonance (NMR). ^{1}H NMR	13.1–13.5	13.2; 13.3
01.19 Friday	Nuclear magnetic resonance (NMR). ^{1}H NMR	13.6–13.10	13.4–13.6
01.22 Monday	**Lab lecture. Exp. 2. IR and NMR** (also recommended for students not taken Chem 342L)		
01.23 Tuesday	Nuclear magnetic resonance (NMR). ^{13}C NMR	13.11, 13.13	13.8; 13.10; 13.13; 13.14; 13.16–13.22; 13.24–13.26
01.24 Wednesday	Mass spectrometry	14	14.1; 14.4, 14–6, 14.8; 14.12; 14.14; 14.16–14.19; 14.25
01.26 Friday	Organometallic compounds	15.1, 15.2 review 10.5 and 11.8–11.9	15.1–15.3; 15.7–15.11; 15.12a
01.29 Monday	**Lab lecture. Exp. 3. Grignard reaction**		
01.30 Tuesday	Aldehydes and ketones. Nomenclature. Physical and spectroscopic properties	16.1–16.4 review nomenclature of other types of organic compounds	16.1–16.3 16.16–16.18
01.31 Wednesday	Preparation of aldehydes and ketones (review). Their reactivity toward carbon nucleophiles	16.5; 16.6 review 6.5B; 7.7; 10.8	16.4; 16.18–16.21 6.39; 7.16; 7.20; 10.31; 10.35; 10.38; 10.40
02.02 Friday	Reactivity of carbonyl compounds. Reactions with carbon nucleophiles	16.5	9.41c–f
02.05 Monday	Addition of water, alcohols, and thiols. Acetals. Hemiacetals. Reversibility of acetal formation	16.7	16.6; 16.37
02.06 Tuesday	**Exam 1**	12–14; 15.1; 15.2; 16.1–16.5	
02.07 Wednesday	Addition of water, alcohols, and thiols. Acetals as protecting groups	16.7	16.29–16.33
02.09 Friday	Addition of ammonia derivatives	16.8	16.8; 16.38
02.12 Monday	Wittig reaction	16.6	16.5; 16.23–16.26
02.13 Tuesday	Acidity of carbonyl compounds. Keto-enol tautomerism	16.9	16.9; 16.42

02.14 Wednesday	**Lab lecture. Exp. 4. Aldehydes and ketones**		
02.16 Friday	Reactions via enols and enolates. Haloform reaction	16.12	16.46
02.20 Tuesday	Oxidation and reduction of carbonyl compounds	16.10	16.11
02.21 Wednesday	Reduction of carbonyl compounds	16.11	16.12; 16.13; 16.43; 16.44
02.23 Friday	**Lab lecture. Exp. 5. Reduction using borohydride.** ***Lab Quiz 1***	review stereochemistry	read p.1002 (Brown) about Fischer projections
02.26 Monday	Carboxylic acids and their derivatives. Nomenclature. Spectroscopic identification of carboxylic acids. Physical properties	17.1-17.3; ***18.1***	17.1; 17.7–17.8; 17.10; 17.15–17.17
02.27 Tuesday	Preparation of carboxylic acids. Acidity of carboxylic acids. Their reactions. Reduction	17.4–17.6	17.2; 17.3; 17.18–17.23; 17.25; 17.26; 17.28; 17.32–17.34; 17.37-17.38
02.28 Wednesday	Preparation of acyl halides. Esterification. Saponification. Decarboxylation	17.7–17.9	17.4; 17.5; 17.35; 17.37
03.02 Friday	**Lab lecture. Exp. 6 and 7. Esterification and nitration**		
03.05 Monday	Functional derivatives of carboxylic acids. Spectroscopic properties. Nucleophilic acyl substitution	18.1–18.3	18.1–18.3; 18.12; 18.13; 18.16; 18.18
03.06 Tuesday	**Exam 2**	16.7–16.14; 17, 18.1	
03.07 Wednesday	Reactions of carboxylic acid derivatives with water, alcohols, and amines. Reaction of acid chlorides with salts of carb. acids	18.4–18.7	18.4; 18.6; 18.19–18.27
03.09 Friday	Reactions of carboxylic acid derivatives with water, alcohols, and amines. Reaction of acid chlorides with salts of carb. acids. Interconversion of functional derivatives	18.4–18.8	18.7; 18.31–18.33
03.19 Monday	Reactions of carboxylic acid derivatives with organometallic derivatives. Reduction	18.9; 18.10	18.8–18.10; 18.43
03.20 Tuesday	Reduction. Aldol reaction	18.10; 19.1; 19.2	19.1–19.3; 19.17–19.21; 19.24
03.21 Wednesday	Crossed aldol reaction. Claisen and Dieckmann condensations	19.2; 19.3	19.4; 19.5
03.23 Friday	Claisen and Dieckmann condensations	19.3; 19.4	19.6; 19.7; 19.28–19.34
03.26 Monday	Decarboxylation. Acetoacetic and malonic ester synthesis.	17.9; 19.3D 19.6; 19.7	19.10–19.12; 19.45
03.27 Tuesday	Conjugate addition to α,β-unsaturated carbonyl compounds. Michael addition	19.8	19.13; 19.15; 19.48
03.28 Wednesday	Conjugated dienes. Addition reactions.	20.1, 20.2	20.1; 20.3; 20.7–20.9; 20.11–20.14

03.30 Friday	UV-Visible spectroscopy. Aromatic compounds.	20.3, 21.1	20.4; 20.15;
04.02 Monday	Aromatic compounds. Huckel's rule. Nomenclature of aromatic compounds	21.2, 21.3	21.2; 21.8–21.11; 21.15; 21.16
04.03 Tuesday	**Exam 3**	18–20 (exclud. 19.5)	
04.04 Wednesday	**Lab lecture. Exp. 8. Aspirin.** ***Lab Quiz 2***		
04.10 Tuesday	Spectroscopy of aromatic compounds. Phenols. Reactions at a benzylic position	21.4, 20.5	21.6; 21.7; 21.19–21.31; 21.35; 21.36; 21.38; 21.49; 21.50
04.11 Wednesday	Reactions of aromatic compounds. Electrophilic aromatic substitution. Halogenation, nitration, sulfonation	22.1A,B	
04.13 Friday	Friedel-Crafts alkylation and acylation	22.1C,D	22.2; 22.7
04.16 Monday	**Lab lecture. Exp. 9. Friedel-Crafts reaction**		
04.17 Tuesday	Effect of substituents on reactivity	22.2	22.3–22.5; 22.14–22.21; 22.27
04.18 Wednesday	Nucleophilic aromatic substitution	22.3	22.30–22.35
04.20 Friday	Structure, nomenclature of amines. Their preparation. Spectroscopy	23.1–23.5	23.1–23.5; 23.16–23.17; 23.23; 23.24
04.23 Monday	Preparation of amines. Hofmann *rearrangement*. Basicity of amines	23.6; 23.7	23.6–23.10; 23.25; 23.30; 23.32–23.24
04.24 Tuesday	Arenediazonium salts	23.8	23.12; 23.13; 23.43; 23.45–23.47
04.25 Wednesday	Hofmann *elimination*	23.9	23.14;
04.27 Friday	**Exam 4**	21–23	
04.30 Monday	Diels-Alder reaction	24.6	24.5–24.7; 24.25; 24.26
05.01 Tuesday	Carbohydrates. Fisher and Haworth Projections. Formation of glycosides.	25.1; 25.2	25.2; 25.3
05.02 Wednesday	Disaccharides and oligosaccharides. Amino acids and proteins	25.3A 25.4; 25.5	25.4
05.09 Wednesday	**Final Exam, Room AH 101 8:00–10:00 AM**		

05.08, Tuesday Chem 342Lab Final Exam, 8:00–10:00 AM