

Chem. 206: **Organic Chemistry II**

Spring 2009

Course information and syllabus

Instructor: lecture: Dr. John Griswold (Office: SC 127, phone ext: 3507;
email: jrgriswo@cedarcrest.edu)

This course is 3 credits

Prerequisite: Chemistry 205 (or equivalent)

Class meets: 10 MWF, OBC 1

Attendance: max. 3 unexcused class absences; attendance required at all scheduled exams. Makeups are only for valid, documented reasons.

Course materials: *text: McMurry, Organic Chemistry, 7th ed., Thomson, 2008, also study guide.*

Recitation session: (Mr. Moll): Wed 4-4:50, BHA 202

Instructional assistant sessions: will be announced during first week

Required protocols: Arrive *on time* for class ; no conversations during lecture, but feel free to ask questions; no active cell phones, pagers or other listening devices in class; no laptop computers in class. No food or drink in class. Overall, students are expected to show academic and social maturity and courtesy to fellow students and instructors. Anyone consistently arriving late to class will be dropped from the course.

Grading: 4 hourly exams, 15% each = net 60% of course grade
Best 3 of 4 quizzes: 5% each, net 15% of course grade
Final examination: 25% of course grade.

If the grade on the final examination exceeds that of the lowest hourly exam, it substitutes for the low exam grade in addition to counting its usual 25%. This benefits students who finish strongly in the course and erases the effect of a weak performance on one of the hourly exams.

Quiz dates: Jan 30, Feb 20, Mar 20, Apr 17 (all are Fridays)

Hourly exam dates: Feb 6 (Fri); Feb 27 (Fri); Mar 27 (Fri); Apr 27 (Mon)

Exam procedure: enter room ready to begin work. All exams are closed-book and the *Honor Code* is followed. Students are assigned numbered exams and seating. The instructor returns to the exam room periodically for questions; conversations are only with the instructor. See specific rules on exams, posted at the organic chemistry bulletin board. These include our regulations on any grading challenges. Exam solutions are posted when all exams are returned. No electronic devices of *any kind* are allowed at the test site.

Extra credit: There is no extra credit in this course.

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Special cases: students with verified learning or physical impairments should inform the instructor during the first week of classes. This applies to special testing environments for the hourly exams.

Course description: A continuation of Chem 205 with emphasis on aromatic systems, functional groups, and their reactions and applications, with implications in living systems. Also, the use of spectral methods for structure determination.

Course objectives: This course is designed to provide deeper insights into the chemistry of carbon compounds as a foundation for entry into biochemistry, drug discovery, environmental analysis, materials and forensic science.

Course outcomes: As related to College outcomes, the course will nurture the ability to engage in scientific reasoning and develop technical competencies and written communication skills.

Career-related outcomes: This course will provide the needed knowledge to engage studies in biochemistry-related subjects including pharmaceutical and medical fields, also materials science, environmental and forensics applications. There is no career pathway in the chemical or biological sciences which does not require an understanding of organic chemistry, particularly the chemical reactivity of various functional groups.

Assessment of outcomes: As stated earlier, this will be through examinations and quizzes, and the instructor's overall observation of your reasoning process as seen through performance trends on the testing exercises.

Letters of recommendation: The instructor will generally write favorable evaluation letters for students with A or B grades in the course and who show good laboratory skills, including ability to record and interpret results. Students with lower than "B" performances but who have shown progress and dedication to self-improvement may also get reasonably favorable recommendations. Recommendations will *not* be given for those individuals showing dishonesty, inattentiveness, or general non-professionalism.

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Instructor's comment:

In this continuation of Chem. 205 in the year-long basic sequence of organic chemistry, it is hoped that you will apply previously-learned concepts to this study of aromatic compounds and a variety of important functional groups. The importance of organic chemistry in all pharmaceutical, biological, environmental, and materials applications is obvious, and those going on to graduate work in chemistry or molecular biology will be using the fundamental concepts studied in this course. For those contemplating medical fields, the organic chemistry courses are an index of your ability to assemble, comprehend and apply complex information, and therefore a strong performance here is essential. Feel free to ask questions at any time: I wish you a powerful, successful academic experience.

SEQUENCE OF TOPICS, with text chapter references.

- 1. Spectral Methods for Organic Identifications: part 1: mass spectrometry (MS) and infrared spectrophotometry (IR)** Ch. 12
capabilities and theory; interpreting MS and IR spectra.
- 2. Spectral Methods: part 2: Nuclear Magnetic Resonance (NMR) 1-H (proton) and C-13:** theory, applications, interpretation of Ch. 13
spectra.
- 3. Conjugated systems:** UV-Vis. Spectra, resonance, Ch. 14
Reactions of conjugated systems; Diels-Alder Reaction.
- 4. Benzene and Aromaticity:** resonance energy, criteria for Ch. 15
aromaticity, ionic and heterocyclic aromatics, naming aromatic compounds.
- 5. Reactions of aromatic systems:** electrophilic aromatic Ch. 16
substitution, substituent effects, activators and deactivators, polysubstitution; nucleophilic substitution. side-chain reactions.
- 6. Alcohols and Phenols:** naming, synthesis, reactions, and Ch. 17
spectral characterization of alcohols and phenols.

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sequence of topics (cont.)

7. **Ethers, epoxides, thiols and thioethers:** an overview of their occurrence, synthesis, and major reactions. Ch. 18

8. **Aldehydes & Ketones:** naming, formation, addition reactions of the carbonyl group, amine derivatives, acetals, reactions at the alpha-carbon: condensations; the Wittig and Cannizzaro reactions. Ch. 19, 22, 23

9. **Carboxylic Acids and their derivatives:** acid strength, factors affecting acidity, acid chlorides, amides, esters, nitriles, interconversion of functional groups, di-acids; ester condensations Ch. 20, 21

10. **Amines:** naming and occurrence, base strength, synthesis & reactions of amines; natural products, alkaloids, drugs and pharmaceutical applications; spectra of amines. Ch. 24

Recommended homework problems: see separate sheet with suggested text problems for each unit. Also, an in-house problem set is provided with each unit, including answers. The *study guide* has detailed answers for the text problems. Homework is reviewed in the *recitation session*. Also, feel free to ask the instructor if you need further assistance with specific homework problems. Do as many homework examples at time permits: You should devote at least 90 minutes per day (*including weekends!*) to out-of-class study in this subject.

If your schedule permits: take advantage of the recitation and help sessions, which are available during the week. Meeting times of these sessions will be announced during the first week of classes.