

Chem 207 FGH: Organic Chemistry II

The most fun you can have with your goggles on!

Jan. 15 - May 9, 2013 TTh 8:30-12:10 pm Room 3170

- Instructor:** Charles Abrams, Room 3838, (773) 907-4073, cabrams@ccc.edu
- Websites:** ccc.blackboard.com – *Classnotes from previous semesters, grades*
faculty.ccc.edu/cabrams - *Information about Professor Abrams*
faculty.ccc.edu/cabrams/chem207 – *Practice quizzes, other info (model kits, etc.)*
- Office Hours:** MW 12:00-1:30; TTh 12:10-1:00pm and 3:40-4:40pm; also available by appointment
- Required*:** Organic Chemistry, Brown *et al*, 5th ed. ISBN 0-495-38857-2, **\$208**
Organic Laboratory Techniques, Pavia *et.al*, 4th ed., ISBN 0-495-01630-6, **\$212**
Laboratory notebook **\$15**
Earlier editions are acceptable. A custom lab manual containing only the required experiments is available from the bookstore; it is not available elsewhere. You may purchase individual chapters from cengagebrain.com for less than the cost of the custom lab manual. Search that site for the ISBN above and use the schedule in the syllabus to identify the experiments you need. A copy of the Study guide and Answer key for the textbook is on reserve in the library
- Optional*:** Colored pens or pencils for taking notes (three colors plus black) **\$5**
Molecular modeling kit (see link under “Syllabus” in Blackboard for details), **\$15-\$30**
- Catalog Description:** Continuation of the study of organic chemistry: alcohols, aldehydes and ketones, carboxylic acids, functional derivatives of carboxylic acids, O, N and S containing compounds, heterocyclic compounds, spectroscopy; laboratory emphasis on organic synthesis and spectroscopic analysis. Writing assignments, as appropriate to the discipline, are part of the course. *Prerequisite:* Grade of C or better in Chemistry 205 or consent of the department chairperson. 3 lecture hours and 4 lab hours per week. *5 credit hours.*
- Mission Statement:** Our mission dedicates us to deliver high-quality, innovative, affordable, and accessible educational opportunities and services that prepare students for a rapidly changing and diverse global community.
- Method of Instruction:** The course will consist of lectures, demonstrations, laboratory activities, in-class discussion, in-class worksheets, and molecular model building. This section will be taught in the chemistry studio classroom, which facilitates group work, data sharing, and immediate discussion of laboratory results, fostering a continuous cycle of observation, reasoning, and experimentation that is the hallmark of the scientific method.
- FERPA:** FERPA (Family Educational Rights and Privacy Act) is a federal law that protects the privacy of student educational records: www.ed.gov/policy/gen/guid/fpco/ferpa/index.html. Faculty cannot reveal information about students, or discuss student records over the phone or unsecure e-mail. CCC student e-mail meets FERPA requirements.
- Course Objectives (Goals):** This course completes the chemistry prerequisite for many health professional programs, including pharmacy, medicine, dentistry, and nutrition. It provides a thorough introduction to the language of organic chemistry and provides the basis for understanding organic synthesis, molecular design, and medicinal chemistry, and prepares the student for upper level biochemistry courses. The course addresses three of the general education goals of the College: Goal 2: Students demonstrate the ability to gather, interpret, and analyze data; Goal 4: Students demonstrate the ability to perform effectively in the workplace; and Goal 6: Students demonstrate the ability to learn independently.

* - Textbook costs are indicated here as required by the 2010 Higher Education Opportunity Act. However, these are the list prices; students may find bargains on-line or by purchasing older editions, used copies, renting, or electronic editions.

Student Learning Outcomes: Upon successful completion of this course, the student will be able to:

1. Identify, classify, organize, analyze, and draw **structures** of organic molecules.
2. Apply the basic rules of organic **nomenclature** to convert between structures and names.
3. Use **molecular orbital theory** to predict reaction stereochemistry and regiochemistry.
4. Recall reagents, predict products, and draw detailed **mechanisms** for organic reactions, including rearrangements and special cases.
5. Draw structures consistent with an analysis of **spectroscopic data** and chemical tests.
6. Predict the **physical properties** of organic chemicals based on their structures (e.g. relative boiling point, melting point, solubility, acidity.)
7. Accomplish a multistep **synthesis** of an organic molecule following a literature procedure.
8. Demonstrate proficiency in organic chemical laboratory **techniques**. (e.g. calculations, microscale reaction, purification, analysis.)

Evaluation: Your grade will be based on your performance in the following (subject to change):

7 Quizzes (20 pts each, drop lowest*)	120 points (16%)
6 Homework (20 pts each – no score dropped!)	120 (16%)
12 Labs (15 pts each, drop lowest*)	165 (22%)
2 Interim Exams (100 pts each – no score dropped!)	200 (26%)
1 Final Exam (150 pts)	<u>150 (20%)</u>
Total	755 points

Letter grades will be assigned according to the following scale:

A	90%
B	80%
C	70%
D	50%
F	< 50%

Active Pursuit: A student will be deemed not actively pursuing this course if they have missed more than 30% of the graded material through the midterm (for example, missing more than 4 quizzes or labs, or missing the first exam). Students not actively pursuing the course objectives will be marked as administratively withdrawn (ADW), and may lose financial aid or other negative consequences. It is the responsibility of the student to contact the professor regarding missed work. **There are no make-up quizzes or labs; a makeup exam is only available in case of emergency.**

Quizzes: Quizzes will be given at the beginning of class, and will have a time limit, usually 20 minutes. Answer keys will be available after the quiz. *If you miss a quiz, you will not have a chance to make it up.* Practice quizzes and exams from previous semesters are available on the course website, but you should be aware that the order of topics may change each semester and you should not use the online quizzes as the only guide.

Homework: Homework will be assigned in place of half of the quizzes, and will be due on the same day as the scheduled quiz. The homework will consist of several challenging problems. You are *encouraged* to work in a study group to solve these problems, and may turn in one set of answers with the names of your study group partners, **up to 5 people**. If you disagree with an answer from the group, you may turn in answers yourself for that question. **Late homework will not be accepted.**

Exams: There will be three exams; two interim exams and a cumulative the final exam. You must bring your own calculator (if you need one), pencil and eraser for exams. You are permitted to bring a molecular model kit, but it must be completely disassembled at the beginning of the exam. Cell phones may not be used at any time during the exam, *even as calculators*. Once the exam begins you may not leave the room unless you turn in the exam, so plan to take a bathroom break *before* class.

Labs:

Students will work in pairs for all experiments, and are expected to read the experiment and any background material before coming to class. Each student will maintain a laboratory notebook, with duplicate numbered pages. The duplicate (yellow) copies will be turned in with the data (IR, NMR spectra, etc.) and brief written discussion. In most experiments, students will also turn in a labeled vial containing the product of the reaction.

Unique to the organic studio, students will start an experiment in the ventilation hood, allow it to run while working on related questions or listening to lectures, then go back to the experiment when it is ready. For this reason, it should be possible to perform more experiments than in a traditional laboratory. This is the first semester in the organic studio, and the schedule will probably have to be adjusted. The calendar lists the maximum possible lab experiments this semester; the actual number performed is likely lower than what is shown. For some sessions, students may be assigned one of two or more concurrent experiments.

A crucial part of the learning process is the post-laboratory discussion. **During the post-labs, each student should be prepared to present their data and interpretation to the class, and share ideas about other students' data.**

The in-lab evaluation (15 pts per lab) will reflect the student's ability to:

- Prepare for the experiment by careful reading of the procedure
- Observe proper safety procedures, including wearing goggles and properly managing waste.
- Follow written and oral directions.
- Work productively with a lab partner
- Make careful observations in a properly maintained laboratory notebook.
- Demonstrate the dexterity and organization necessary to complete the experiment.
- Produce a sufficient quantity of pure material.
- Obtain and interpret experimental data to verify the identity and purity of your product.
- Participate in post-lab discussions

Students who come late to lab are an unfair burden on their lab partners. If a student is more than 5 minutes late for lab, they may have to work alone, may not complete the experiment, and may receive a poor grade on that assignment. No make-up lab periods or extra time after class will be available.

Students who are unprepared for lab, having not read the experiment, not prepared their laboratory notebook, or not in possession of the lab manual, are a hazard to themselves and other students, and may be excluded from the experiment entirely in spite of prompt attendance.

Academic Support:

Students are hereby made aware of services available outside the classroom for academic assistance:

Tutoring Center. For students who need help with their assignments: 773-907-4785, www.trumancollege.edu/student-services/tutoring.

Student Success and Leadership Institute (SSLI). For students who need various other support services to achieve their educational goals: 773-907-4714, www.trumancollege.edu/student-services/ssli.

TRIO Student Support Services. For low-income students, first generation college students, or students with disabilities who need academic support, 773-907-4797, www.trumancollege.edu/trio. Registration is required at the start of each semester.

Disability Access Center. The Center verifies needs pursuant to the American Disabilities Act (ADA), determines student academic accommodations, and issues accommodation letters. 773-907-4725, www.trumancollege.edu/student-services/dac. Registration is required at the start of each semester.

Academic Integrity:

"Academic dishonesty is a serious offense, which includes but is not limited to the following: cheating, complicity, fabrication and falsification, forgery, and plagiarism. Cheating involves copying another student's paper, exam, quiz or use of technology devices to exchange information during class time and/or testing. It also involves the unauthorized use of notes, calculators, and other devices or study aids. In addition, it also includes the unauthorized collaboration on academic work of any sort. Complicity, on the other hand, involves the attempt to assist another student to commit an act of academic dishonesty. Fabrication and falsification, respectively, involve the invention or alteration of any information (data, results, sources, identity, and so forth) in academic work. Another example of academic dishonesty is forgery, which involves the duplication of a signature in order to represent it as authentic. Lastly, plagiarism involves the failure to acknowledge sources (of ideas, facts, charges, illustrations and so forth) properly in academic work, thus falsely representing another's ideas as one's own" - p. 40, CCC Student Policy Manual (www.ccc.edu/departments/Documents/studentpolicymanual.pdf accessed 1/10/12)

In this course, violation of the academic integrity policy will result in a grade of "F" in the course, which cannot be deleted from the transcript.

GradesFirst:

I will be using GradesFirst to take attendance in this class. If you are absent, the GradesFirst system will generate an email to you and will also keep track of that. Your advisor should be listed in GradesFirst. If there is not an advisor listed, I recommend that you reach out to the Advising Office and ask that one be assigned. Advisors can be very helpful as you navigate your academic path at CCC. Log in to GradesFirst at ccc.gradesfirst.com using your CCC username and password. This is the same username and password you would use for Blackboard and email.

Extra Credit:

This semester, we have a unique opportunity to interview Dr. Derek Lowe, a pharmaceutical chemist who also writes a popular, outstanding blog about medicinal chemistry: InThePipeline (<http://pipeline.corante.com>). If you are interested in earning the extra credit, (maximum 30 points) you will prepare a 10 minute presentation on a medicinal chemistry topic to be chosen in consultation with the professor, from the posts in Dr. Lowe's blog. You will research the topic before the interview (April 11th) so you are prepared to ask a question. We will schedule presentations for the last three weeks of class. More details about the format and the rubric for grading the presentation will be available in Blackboard.

General Education Goals

The curriculum in Chemistry 207 addresses several of the general education goals of the College. Below are the rubrics for evaluating the goals addressed by the course.

Goal Two: Students demonstrate the ability to gather, interpret, and analyze data.

	Exceeds Expectations	Meets Expectations	Unsatisfactory
1. Uses appropriate research methodologies	<ul style="list-style-type: none"> Engages in independent research that utilizes ancillary scholarly resources Enlists additional protocols 	<ul style="list-style-type: none"> Establishes reason for gathering data Defines research methodologies Utilizes appropriate resources as required by the assignment Uses current and classic data Acknowledges and documents resources as required Follows stipulated protocols Verifies findings 	<ul style="list-style-type: none"> Does not clearly define research methodologies Uses few or inappropriate resources Uses outdated information Incorrectly acknowledges or documents resources Ignores stipulated protocols Fails to verify findings
2. Collects and records data	<ul style="list-style-type: none"> Integrates data from other disciplines or previous coursework or courses 	<ul style="list-style-type: none"> Selects and records appropriate data accurately and thoroughly Categorizes and organizes data clearly and logically Provides examples 	<ul style="list-style-type: none"> Provides inaccurate evidence Does not categorize data clearly
3. Interprets and analyzes data	<ul style="list-style-type: none"> Gives diverse perspectives on interpreting the evidence Observes multiple causes or effects of causes Suggests further implications of conclusions 	<ul style="list-style-type: none"> Interprets evidence and sources of evidence Evaluates sources of evidence Observes cause and effect relationships Distinguishes between fact and opinion, objectivity and subjectivity 	<ul style="list-style-type: none"> Provides little or no interpretation of evidence Does not evaluate sources or distinguish between fact and opinion, objectivity and subjectivity Draws inaccurate or irrelevant conclusions
4. Presents data clearly and accurately	<ul style="list-style-type: none"> Presents concisely, with explicit logical links among the parts of the presentation Provides interpretations of graphs and tables 	<ul style="list-style-type: none"> Organizes presentation clearly, as stipulated by the assignment (e.g. tables, graphs, presentations, reports, or care plans) Computes data without error 	<ul style="list-style-type: none"> Does not organize presentation clearly Grammatical, syntactical, or mechanical errors inhibit reader's comprehension of the presentation Makes errors in computation

Goal Four: Students demonstrate the ability to perform effectively in the workplace.

SLO	Exceeds Expectations	Meets Expectations	Does Not Meet Expectations
Follows instructions and completes assignments and required tasks on time	Requires no guidance; always prompt	Requires minimal guidance; late with submissions once or twice	Requires significant guidance; routinely late and/or missing assignments
Accepts responsibility	Consistent, dependable	Mostly consistent, usually dependable	Inconsistent, hardly dependable
Exhibits effective interpersonal skills	Always listens actively, expresses self clearly, and behaves professionally	Usually listens actively, expresses self clearly, and behaves professionally	Rarely listens actively, expresses self clearly, or behaves professionally
Works collaboratively	Always initiates teamwork to meet goals; always accepts & gives constructive feedback	Frequently initiates teamwork to meet goals; frequently accepts & gives constructive feedback	Occasionally initiates teamwork to meet goals; occasionally accepts & gives constructive feedback

Goal Six: Students demonstrate the ability to learn independently.

Criteria	Exceeds Expectations	Meets Expectations	Unsatisfactory
Students relate previous knowledge to new knowledge			
Students integrate knowledge from different disciplines			
Students use knowledge and skills efficiently and effectively to negotiate a complex task			
Students exhibit a reflection as a form of self-assessment			
Students restate/paraphrase concepts in their own terms			

January 2013			
Monday	Tuesday	Wednesday	Thursday
14	15 First Class Topic A	16	17 Topic A, B Lab 0
21 MARTIN LUTHER KING HOLIDAY	22 Quiz 1 (A, B) Topic C Lab 1	23	24 Topic C Lab 1
28	29 Quiz 2 (C) Topic D Post-lab 1 Lab 2	30	31 Topic D Lab 2

A- Review of Organic I (Ch. 1-9)
B- Review of Spectroscopy (IR, NMR, MS) (Ch. 12-14)
C- Alcohols (Ch. 10)
D- Ethers, Sulfides, and Epoxides (Ch. 11)
E- Introduction to Organometallic Compounds (Ch. 15)
 ----- Exam 1: A-E -----
F1- Aldehydes and Ketones (Ch. 16.1-16.6)
F2- Aldehydes and Ketones (Ch. 16.7-16.12)
G- Carboxylic Acids (Ch. 17)
H- Functional Derivatives of Carboxylic Acids (Ch. 18)
I- Enolate Anions and Enamines (Ch. 19)
 ----- Exam 2: F-I -----
J- Conjugated Systems (Ch. 20, 21, 22)
K- Amines (Ch. 23)
L - Synthesis (Ch. 24)
M - Carbohydrates (Ch. 25)
N - Proteins (Ch. 27)
 ----- Final Exam: J-N and all topics -----
Note: This schedule is subject to change.

February 2013			
Monday	Tuesday	Wednesday	Thursday
4	5 Quiz 3 (D) Topic E Post-lab 2 Lab 3	6	7 Topic E Lab 3
11	12 Quiz 4 (E) Exam review Post-lab 3	13	14 Exam 1 (A-E) Lab 4
18 PRESIDENT'S DAY HOLIDAY	19 Topic F1 Lab 4	20	21 Topic F1 Lab 4/5
25	26 Quiz 5 (F1) Topic F2 Post-lab 4 Lab 5	27	28 Topic F2 Post-lab 5

Lab 0 (A,B) Safety, Review of lab techniques
Lab 1 (C) Expt. 35: Oxidation-Reduction Scheme
Lab 2 (D) Expt. 26: Addition of Dichlorocarbene to Cyclohexene
Lab 3 (E) Expt. 38A: Triphenylmethanol
Lab 4 (F) Expt. 44A,B: Preparation of 1,4-Diphenyl-1,3-butadiene
Lab 5 (F) Expt. 36A,B: Preparation of Benzoin and Benzil
Lab 6 (G) Expt. 36C: Preparation of Benzoic Acid
Lab 7 (H) Expt. 45: Benzocaine
Lab 8 (I) Expt. 37: Tetraphenylcyclopentadienone
Lab 9 (I) Expt. 41: Preparation of Chalcones
Lab 10 (J) Expt. 34: Nitration of Aromatic Compounds
Lab 11 (J) Expt. 59: Friedl-Crafts Acylation
Lab 12 (K) Expt. 52: Luminol
Lab 13 (L) Expt. 50: Diels-Alder Reaction (and Hexaphenylbenzene)
Lab 14 (L) Expt. 48: Sulfanilamide

March 2013			
Monday	Tuesday	Wednesday	Thursday
4	5 Quiz 6 (F2) Topic G Lab 6	6	7 Topic G Lab 6
11	12 Quiz 7 (G) Topic H Post-lab 6 Lab 7	13 <i>Midterm grades due</i>	14 Topic H Lab 7
18	19 Quiz 8 (H) Exam Review Post-lab 7	20	21 Exam 2 (F-H) Lab 8
25 <i>Spring Break</i>	26 <i>Spring Break</i>	27 <i>Spring Break</i>	28 <i>Spring Break</i>

April/May 2013			
Monday	Tuesday	Wednesday	Thursday
1	2 Topic I Lab 8, 9	3	4 Topic I Lab 8, 9
8 <i>Drop deadline</i>	9 Quiz 9 (I) Topic J Post-lab 8,9 Lab 10	10	11 Topic J Lab 10 Derek Lowe interview
15	16 Quiz 10 (J) Topic K Post-lab 10 Lab 11	17	18 Topic K Post-lab 11
22	23 Quiz 11 (K) Topic L Lab 12 <i>XC presentations</i>	24	25 Topic L Lab 12 <i>XC presentations</i>
29	30 Quiz 12 (L) Topic M/N <i>XC presentations</i>	May 1	May 2 Topic M/N <i>XC presentations</i>
May 6	May 7 Quiz 13 (M,N) Course review <i>XC presentations</i>	May 8	May 9 Last Class Final Exam (comprehensive) <i>XC presentations</i>