

Organic Chemistry II (with lab)

The most fun you can have with your goggles on!

Chem 207 CDE: Aug. 26 – Dec. 11, 2013 MW 11:00 am – 2:50 pm Room 3170

- Instructor:** Charles Abrams, Room 3838, (773) 907-4073, cabrams@ccc.edu
- Websites:** ccc.blackboard.com – *Classnotes from previous semesters, grades*
ccc.gradesfirst.com – *Schedule tutoring and advising.*
faculty.ccc.edu/cabrams - *Information about Professor Abrams*
- Office Hours:** MW 8:30- 11:00 AM; Th 3:30-4:30 pm; (walk-in); F 8:30-12:30 (by appointment)
- Required:** Sapling Online Homework (One-Term): ISBN 978-0983385950 **\$25 (\$37 in bookstore)** OR
Sapling Online Homework (Full Year): ISBN 978-0983385967 **\$50 (\$60 in bookstore)**
See instructions below regarding the online homework
Organic Chemistry, 7th Ed., by Brown, Iverson, Anslyn & Foote ISBN 978-1133952848 **\$273**
Earlier editions of this textbook are OK – do not waste your money on a new one!
Laboratory notebook (with duplicate, numbered pages) ca. **\$20**
- Optional:** Molecular modeling kit (strongly recommended, will be discussed in class) **\$15**
ChemSketch software (strongly recommended, free from www.acdlabs.com) **Free**
Colored pens or pencils (3 colors are sufficient) **\$5**
- 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.
- Evaluation:** Your grade will be based on your performance in the following:
- | | |
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| Sapling Learning Homework | 20% |
| 12 Labs (15 pts each, drop lowest) | 20% |
| 2 Interim Exams (100 pts each; NO EXAM DROPPED!) | 40% |
| 1 Final Exam (150 pts) | 20% |

Letter grades will be assigned according to the following scale:

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

* - 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.

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.

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.)
9. Meet all of the above goals for all major functional groups.
10. Apply **organic chemical reasoning** to biochemical questions about carbohydrates, lipids, and proteins.

Exams: There will be two written exams and a comprehensive, multiple choice final exam developed by the American Chemical Society.

Labs: The lab procedures will be posted online in the Blackboard web site – there is no lab manual to purchase! 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, and a labeled vial containing the product of the reaction where appropriate.

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

The 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

Lab attendance: Students who come late to lab are an unfair burden on their lab partners. If a student is more than 10 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 procedure, are a hazard to themselves and other students, and may be excluded from the experiment entirely in spite of prompt attendance.

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 out of 14 homework and labs combined, 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 will be no make-up homework or lab assignments; a makeup exam is only available in case of emergency.**

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.

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.

Academic Support: Students are hereby made aware of services available outside the classroom for academic and other assistance:

Tutoring Center. Free help for all students! (773)-907-4785, McKeon 177.

TRIO Student Support Services. For low-income students, first generation college students, or students with disabilities who need academic support: (773) 907-4797, Room 1435. 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. Room 1435. Registration is required at the start of each semester.

The Wellness Center provides support services for students including counseling, support groups, stress and time management coaching, referrals to community resources, and special support for victims of relationship violence and sexual assault. They can be reached at (773) 907-4786. Room 1946.

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.

Sapling Learning Online Homework (Required)

Each week, an online homework assignment will be due, typically midnight on Monday night. The first assignment is due midnight, Monday September 2nd. Each homework assignment is graded out of 100 points. Your homework score contributes 25% to your grade in the course. The full grading policy is described on the Sapling Learning website. Multiple attempts are permitted, but each wrong answer incurs a penalty for that question.

Sapling's chemistry questions are delivered in a web browser to provide real-time grading, response-specific coaching, improvement of problem-solving skills, and detailed answer explanations. Dynamic answer modules enable one to interact with 3D models and figures, utilize drag-and-drop synthetic routes, and draw chemical structures - including stereochemistry and curved arrows. Altogether, Sapling provides more value than a solutions manual, and goes beyond a mere assessment exercise to give a learning experience.

To get started:

1. Go to <http://saplinglearning.com> and click "US Higher Ed" at the top right.
2. If you already have a Sapling Learning account, log in and skip to step 3.

If you have Facebook account, you can use it to quickly create a SaplingLearning account. Click the blue button with the Facebook symbol on it (just to the left of the username field). The form will auto-fill with information from your Facebook account (you may need to log into Facebook in the popup window first). Choose a password and time zone, accept the site policy agreement, and click "Create my new account". You can then skip to step 3.

Otherwise, click "create account". Supply the requested information and click "Create my new account". Check your email (and spam filter) for a message from Sapling Learning and click on the link provided in that email.

3. Find your course in the list (listed by subject, term, and instructor) and click the link.
4. Select a payment option and follow the remaining instructions. Access cards can be purchased online or from the bookstore (i.e. when using a book voucher):

Sapling Learning Online Homework (One-Term Access)

ISBN 978-0-9833859-5-0 \$25 (\$37 in the bookstore)

or

Sapling Learning Online Homework (Full Year Access)

ISBN 978-0-9833859-6-7 \$50 (\$60 in the bookstore)

- Once you have registered and enrolled, you can log in at any time to complete or review your homework assignments.
- During sign up – and throughout the term – if you have any technical problems or grading issues, send an email to support@saplinglearning.com explaining the issue. The Sapling Learning support team is almost always faster and better able to resolve issues than your instructor.

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			

August/September 2013			
Monday	Tuesday	Wednesday	Thursday
26 First Class Topic A, B	27	28 Lab 0 Topic B	29
Sept 2 <i>Labor Day Holiday</i>	3	4 HW 1 (A, B) <i>(due 12:00 AM)</i> Lab 1 Topic C	5
9 HW 2 (C) Topic D	10	11 Lab 2 Topic D	12
16 HW 3 (D) Topic E	17	18 Lab 3 Topic E	19
23 HW 4 (E) Exam Review Topic F1	24	25 Exam 1 (A-E) Topic F1	26

- A – Review of Organic I: Structure & Nomenclature (Ch. 1-3, 5)
 B – Review of Organic I: Mechanisms (Ch. 4, 6-11)
 C – Review of Organic I: Spectroscopy (Ch. 12, 13)
 D – Mass Spectrometry (Ch. 14)
 E- Introduction to Organometallic Compounds (Ch. 15)
 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)

October 2013			
Monday	Tuesday	Wednesday	Thursday
Sept. 30 Topic F1	Oct 1	2 Lab 4 Topic F1	3
7 HW 5 (F1) Topic F2	8	9 Lab 5 Topic F2	10
14 HW 6 (F2) Topic G	15	16 Lab 6 Topic G	17
21 HW 7 (G) Topic H	22	23 Lab 7 Topic H <i>Mid-term grades due</i>	24
28 HW 8 (H) Exam Review Topic I	29	30 Exam 2 (F-H) Topic I	31

- Lab 0 (A,B) Check-in, safety, review of lab techniques
 Lab 1 (C) Determination of an unknown by IR, NMR, and MS
 Lab 2 (D, E) Dichlorocarbene addition
 Lab 3 (E) Grignard synthesis of triphenylmethanol
 Lab 4 (F) Aldol condensation: Synthesis and hydrogenation of chalcones
 Lab 5 (F) Benzoin condensation using thiamine
 Lab 6 (G) Wittig (Horner-Wadsworth-Emmonds) synthesis of stilbene
 Lab 7 (H) Benzocaine

Note: This schedule, including the list of topics and lab experiments, is subject to change.

November 2013			
Monday	Tuesday	Wednesday	Thursday
4 HW 9 (I) Topic J	5	6 Lab 8 Topic J	7
11 HW 10 (J) Topic K, L	12	13 Lab 9 Topic K, L	14
18 <i>Withdrawal deadline</i> HW 11 (K, L) Topic M	19	20 Lab 10 Topic M	21
25 HW 12 (M) Topic N	26	27 Topic N	28 <i>Thanksgiving Holiday</i>
26 HW 13 (N) Topic O	27	28 Lab 11 Topic O	29

J – Conjugated Systems (Ch. 20)
 K – Benzene and Aromaticity (Ch. 21)
 L – Reactions of Benzene (Ch. 22)
 M- Amines (Ch. 23)
 N - Carbohydrates (Ch. 25)
 O - Proteins (Ch. 27)

December 2013			
Monday	Tuesday	Wednesday	Thursday
2 HW 12 (O) Course Review	3	4 Lab 12 Class presentations	5
9 Class presentations Exam review	10	11 LAST CLASS Final (A-O)	12

Lab 8 (I, J) Diels-Alder Reaction (Hexaphenylbenzene)
 Lab 9 (L) Nitration of aromatics
 Lab 10 (M) Synthesis of an azo dye
 Lab 11 (N) Reactions of carbohydrates
 Lab 12 (O) Isolation of casein from milk

Note: This schedule, including the list of topics and lab experiments, is subject to change.