Syllabus : Organic Chemistry Lecture 1

Term 2, 2018/2019

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Office hours: daily at 8:00 AM, 1:00 PM, and any time that I am here.

Catalog description

CHE 225 - Organic Chemistry I (1) **Lecture Chemistry of carbon compounds. Determination of molecular constitution and configuration and the chemistry of common functional groups.**

Required Materials

Each student must have the textbook- Bruice; *Organic Chemistry* (5th Ed. ISBN 0-13-196316-3) and a molecular model kit. You will need access to the accompanying solutions manual (ISBN 0131963287).

# **Class hours**

Class will meet every day from 9:00 AM to 11:00 AM and again from 1:30 PM to 3:00 PM. It is expected that students will be prepared, show up **on time**, and actively participate in all class meetings. If for any reason you are not able to make it to class you must contact the instructor as soon as possible by email. Class will consist of lecture, discussion, quizzes, group work, and problem solving. Students should plan on spending a **minimum** of two hours outside of class for each hour spent in class. The instructor will be available in the lecture room at 8:45 AM and at 1:15 PM to answer questions and for additional help with problem solving.

# Course Requirements

* Students must pass all course competencies. Multiple opportunities will be provided.
* Students must actively participate in all class activities and have no unexcused absences. (Any absence or tardiness must be discussed in person with the course instructor.)
* Students must complete all assignments in good faith. Work that is judged to show inadequate effort will be returned to the student and redone.
* Students must make their best effort to prepare for and complete the exams.
* Students must generate as many pages of hand-written work as they reasonably can.

College policy states that students requesting to drop the course on the fifteenth day must have attended all classes and completed all of the assignments.

# Grading

This course will use a competency-based grading system. Students who pass all competencies and meet all course requirements will be guaranteed a grade of ‘C’ or better. Homework assignments and exam questions will be awarded 0, 1, or 2 bonus points each. Students meeting all competencies and earning 3/4 of the possible bonus points are guaranteed an ‘A’ in the course and students earning ½ of the possible points are guaranteed a ‘B’ in the course. (At the instructors discretion, these cut-offs may be lowered but will not be raised.) Cut-offs for A-, B+ B- and C+ will be determined proportionally. Any passing grades below a ‘C’ must be negotiated with the instructor. At the end of the course you will turn in a folder of all of the work you generated during the term and awarded bonus points.

# Competencies

Competencies are critical skills in a specific topic that a student must be able to demonstrate. For Organic Lecture I these skills include:

1. Defining the term pKa and memorization of five key pKa values along with their acid base conjugate pairs. (*EPO – knowledge*, Ch 1)
2. Memorization of nine key functional groups (including nomenclature). (*EPO – knowledge*, Ch 2)
3. Demonstration of how curved arrows show the movement of electrons in bond-making and bond-breaking steps. (*EPO – reasoning*, Ch 3)
4. Drawing and naming stereocenters using (R-) and (S-) designations. Defining and providing examples for the following terms: enantiomer, diastereomer. (*EPO – reasoning, knowledge,* Ch 5)
5. Showing delocalization of electrons through proper resonance structures. (*EPO – reasoning,* Ch 7)
6. Drawing SN1 and SN2 mechanisms and correlating them with energy diagrams. (*EPO – inquiry*, Ch 8)
7. Ranking ions and molecules according to stability. (*EPO – inquiry*, Ch 9)
8. Defining and providing examples for the following terms: oxidation, reduction, catalyst, substitution, elimination. (*EPO- knowledge, communication*, Ch 10)
9. Explaining the concept of nuclear magnetic resonance including chemical shift, peak integration, and peak-peak splitting. (*EPO – communication*, Ch 13)
10. Drawing a mechanism for the hydrolysis of an ester in acid and in base. *(EPO – reasoning,* Ch 16)
11. Drawing a mechanism for the forward and reverse direction of the formation of a cyclic hemiacetal. (*EPO – reasoning*, Ch 17)

Students who pass a competency on the first try will be awarded one bonus point. Students who require more than two tries to pass a competency will be charged one bonus point.

# Academic honesty

*Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College’s requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading “Academic Honesty."*

Another aspect of academic honesty requires that answers given on quizzes and exams are not copied from or by other students. Students are expected to protect their work from being seen by others and to avoid looking at another’s work. Cell phone use during quizzes and exams is not permitted.

# Equal opportunity

*Cornell College makes reasonable accommodations for persons with disabilities.  Students should notify the Coordinator of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format.  For more information on the documentation required to establish the need for accommodations and the process of* [*requesting the accommodations*](http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml.)*, see*[*http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml*](http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml)*.*

# Educational Priorities and Outcomes (EPOs)

  The homework in this course will address knowledge, inquiry, reasoning and communication. Specific EPOs are listed with individual competencies. The lecture will also address vocation, ethical behavior, citizenship, and well-being where appropriate.

# **A word about well being**

Your brain is a physical part of your body. If you do not take care of your body, your brain will not function to its full potential. If you want to do your best in the class, do not ignore the importance of a healthy diet, reasonable amounts of sleep, and effective methods of dealing with stress. Be sure to regularly take some time to look at the big picture and remember how this course contributes to your life goals.

Students have a right to a safe and reasonably comfortable learning environment. If you encounter any circumstances that interfere with your full participation in class activities please make them known to the course instructor. This can be done in person, by email, or even by an anonymous note. If I can do anything to help make this experience more productive for you please let me know.

CHE 225 Homework(*EPO- knowledge, inquiry reasoning, communication*)

The homework for this course will consist of a problem set and a chapter review. Download the problem set sheet for each chapter from Moodle.

**Directions for the problem set:** Selected problems from Bruice are assigned and the answers are given in the answer key. It is important that you work each problem in this order. 1) Review the relevant concepts. 2) Read the problem, collect any information needed to solve problem, analyze the information, solve the problem, and think about your answer. Try to do this without looking back in the chapter or at your notes. 3) Do something else for a short time. 4) Look over your answer and make any corrections. 5) Look at the answer to the problem and immediately assign yourself a grade. 6) Fill in your grade on the sheet provided and record the approximate amount of time (in minutes) you spent on the problem and a reflection on your work. When all problems are finished, give yourself an overall grade for the problem set. Total up your times, and comment on your overall performance.

**Self-grading rubric**

1. Answer is completely correct and work is clearly shown. Concepts are adequately explained in clear language using proper terms with structures or pictures where appropriate.
2. Answer is correct but may have a missing atom/charge or improper mechanistic arrow. Explanation may be slightly unclear and terms may be slightly imprecise.
3. The process used was on track but there may be mistakes in structure or some misunderstanding of the concept.
4. Competency was not demonstrated.

**Comments:** Be sure to indicate if you needed to look back in the chapter or at your notes. If the answer was correct write a short summary of the most important feature of the problem (the take –home-lesson). If your answer was incorrect, indicate why you were not able to solve it and what you could do differently next time. Indicate if there were parts of the reading that you did not understand. If you struggled with any of the problems, work similar problems until you feel comfortable with that type of problem.

**Keep a copy of all of your work.** I may ask to see it if there are discrepancies between what you report on your homework and how you perform on exams and quizzes.

**Directions for chapter reviews**

On a single sheet of paper, prepare a one-page study guide for the chapter that summarizes the most important information. You may wish to include:

* Key terms and definitions
* Important reactions and mechanisms
* Sample problems
* Concept maps
* Outlines
* Informative charts, graphs, or tables
* Molecular level drawing

You are limited to one page. You will be graded on the amount of information conveyed, clarity, organization, and creativity.

# **Advice to the student**

Welcome to the study of Organic Chemistry. This is the first of two lecture courses on Organic Chemistry–the laboratory is taught as a separate course. It is intended for students majoring in chemistry, biology, or biochemistry. Two semesters’ worth of introductory chemistry are required and the topics of Lewis structures and pKa are particularly important. While this course may have a reputation for being very difficult, it really does not have to be. There are a few things that I want you to know right from the start.

* This is not a weed-out course. Everyone in this class is capable of improving and earning a good grade.
* You should not be here just to get a requirement out of the way or to get a certain grade. You are here to learn about organic chemistry.
* Do your best work and the grade will take care of itself.
* I am here to help you in any way that I can, but I can’t do the work for you or excuse you from doing it yourself.
* Don’t try to memorize everything but a few things are necessary to have memorized. Work to see the relationships between the topics.
* Learn the basics really well and the more difficult material will be much easier.
* Plan on working hard and learning more than you thought was possible.
* I hope that you enjoy learning about this amazing and useful field.

Much of the difficulty encountered by students in this course comes from not making a sufficient effort early on or with ineffective study habits (such as not writing enough). If you are working hard and having difficulty, I recommend that you find a more effective way to study. Study tips may be found on the course Moodle page.

It is expected that students peruse the assigned material before attending class and re-read the material after class. Attempting the problems before the reading is complete may be frustrating for the student. This entire course builds on a few foundational principles and if they are not mastered, the rest of the course will be much more difficult. Do not wait until you experience difficulty to bring out your best effort and do not wait until you are in trouble before seeking the help of your course instructor, tutor, or academic advisor.

I believe that writing is the single most effective way to learn organic chemistry. Writing includes writing definitions, summarizing concepts, drawing structures, reaction equations and mechanisms. If you struggle with a topic in this course, I advise you to write more about it. Note that writing is different than copying. You must process the material and internalize it. Paper and pencils are perhaps the least expensive part of your education. Do not throw away a $200K education in order to save a few bucks on paper and pencils. Research seems to indicate that frequent, forced recall is the key to “Making it Stick”. Do not trust how well you **feel** you know the material – **write it out!**

# CHE 225 Course Schedule

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| --- | --- | --- | --- | --- | --- | --- |
| **Day** | **Topic** | **Reading** | **Homework due**  (8:59 am sharp) | | | **Competency Quiz** |
| M 9 / 24 | Structure and bonding, acids and bases | Ch 1 | - | | | - |
| Tu 9 / 25 | Organic compounds | Ch 2 | - | | | #1 |
| W 9 / 26 | Alkenes | Ch3 | Ch 1 | | | #2 |
| Th 9 / 27 | Stereochemistry | Ch 5 | Ch 2 | | | #3 |
| F 9 / 28 | Finish material |  | Ch 3 | | | #4 |
| M 10 / 01 | **Exam 1** |  | Ch 5 | | | - |
| Tu 10 / 02 | Delocalized Electrons | Ch 7 | - | | | - |
| W 10 / 03 | Substutution of Alkyl Halides | Ch 8 | - | | | #5 |
| Th 10 / 04 | Elimination of Alkyl Halides | Ch 9 | Ch 7 | | | #6 |
| F 10 / 05 | Reactions of Alcohols | Ch 10 | Ch 8 | | | #7 |
| M 10 / 08 | Finish material |  | Ch 9 | | | #8 |
| Tu 10 / 09 | **Exam 2** |  | Ch 10 | | | - |
| W 10 / 10 | NMR Spectroscopy | Ch 13 | - | | | - |
| Th 10 / 11 | Carbonyl Compounds I | Ch 16 | - | | | #9 |
| F 10 / 12 | Carbonyl Compounds II | Ch 17 | Ch 13 | | | #10 |
| M 10 / 15 | Finish Material |  | Ch 16 | | | #11 |
| Tu 10 / 16 | Review |  | Ch 17 | | | - |
| W 10/ 17 | **Final Exam 9-Noon** | | |  |  |  |