

# Chemistry 227: Organic Chemistry I

## Section 510 / Fall 2015

Tuesday and Thursday 2:20–3:35 PM  
Room 2104, Chemistry

### Instructor

Prof. David Powers

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eCampus listing: 15 Fall Chem 227 510: Organic Chemistry I

### Office Hours

Wednesday 8:30–10:00 AM or by appointment, Chemistry 320

Organic chemistry is the study of the structures, properties, and chemical reactions of carbon-based molecules. The questions of organic chemistry – What is the relationship between molecular structure and observed properties? How do molecules participate in reactions with each other and how do we predict the reaction outcome? – underpin much of modern biology, biochemistry, chemical engineering, petroleum engineering, physiology, pharmacology, health sciences, materials science, and polymer science. Organic Chemistry I and II (CHEM 227 and 228) comprise a two-semester sequence designed to provide an introduction to the concepts of organic chemistry. By the end of this course, you should be able to describe the bonding in organic molecules, classify organic molecules by functional groups, identify functional-group-based reactivity patterns, and design syntheses of new organic compounds.

Organic chemistry is a challenging course in large part because it requires you to master both a new set of terminology and unfamiliar graphical representations of organic molecules. In addition, the types of problems that we will encounter in this course require application of the principles covered in class using deductive reasoning and analogy. The only way to succeed in the course is to practice. We will work through problems during class and during review sessions; the in-class problems will provide an example of how to practice organic chemistry skills. In addition, you should practice both individually and in small study groups to reinforce the problem-solving strategies that we work through as a group.

### Prerequisites

General Chemistry

### Course Learning Objectives

By the end of this course, students should be able to:

1. Describe bonding in simple organic compounds in terms of carbon hybridization, geometry, and polarization.
2. Compare and contrast the structures, properties, and reactions of aliphatic hydrocarbons (alkanes, alkenes, alkynes), alkyl halides, alcohols, and ethers.
3. Draw the structure of simple organic molecules given the proper chemical name including descriptors for stereochemistry (*cis/trans*, *E/Z*, *R* and *S*).

4. Predict the three-dimensional structure of organic molecules by applying the basic principles of bonding, hybridization, and conformational analysis.
5. Use the principles of thermodynamics and kinetics to characterize organic chemical reaction energy changes, reaction rates, and mechanisms.
6. Depict reasonable reaction mechanisms using the curved arrow formalism for reactions involved in the synthesis and transformation of the above functional groups.
7. Predict the outcome from a set of organic molecules and reagents involved in synthesis and reaction of the above functional groups using the basic patterns of reactivity and reaction principles covered in the text.
8. Identify appropriate starting materials and reagents to synthesize simple organic molecules based on the studied functional groups.
9. Predict the type of reaction mechanism involved in nucleophilic substitution and elimination reactions of alcohols, ethers, and alkyl halides based upon substrate structures, reactant, and solvent characteristics.
10. Solve chemical problems involving the studied functional groups using the basic generalizations and principles covered in the course and reasoning by deduction and analogy.

## Texts

John McMurry, **Organic Chemistry**, 9<sup>th</sup> Edition, Cengage Learning, ISBN-10: 1-305-63871-9 or ISBN-13: 978-1-305-63871-6.

*Supplemental:* Susan McMurry, **Study Guide and Solutions Manual for McMurry's Organic Chemistry**, 9<sup>th</sup> Edition, Cengage Learning, ISBN-10: 1-305-08214-1 or ISBN-13: 978-1-305-08214-4. E-package for the access to TAMU Organic OWL homework system.

Molecular models, which help visualize three-dimensional structure, are recommended to help with homework problems and can be used during all exams. An appropriate kit is sold by the undergraduate chemistry club and should be for sale outside of lecture or in Chemistry 104.

## Help Sessions

Weekly help sessions will be held on Monday evenings from 7:00–8:00 PM in Room 2104. We will review selected problems as well as some of the key points from the lecture.

## Contacting Me

I hope you will have lots of questions as we proceed through the semester. There are a few reliable ways to get the help you need. In addition to regular office hours (Wednesday mornings, 8:30–10:00 AM, Chem 320) and help sessions (Monday evenings, 7:00–8:00 PM, Chem 2104), there is a course eCampus site (15 Fall Chem 227 510: Organic Chemistry I). **All science questions should be submitted to the eCampus page via the "227 Questions" forum in the Discussion menu;** I receive a lot of emails, and do not want to miss any of your questions. I will post answers responses within 24 hours. As an added benefit, you will be able to see questions posted by your classmates, so you will also be able to see what is confusing your classmates. There is a second forum, called "Study Groups" that can be used to set up study group with other classmates in the section. *If you need to send an email from within the OWL homework program, you must include **Chem227 OWL** in the subject line or I might not see it.*

Please contact me via email with any other concerns; I will do my best to respond within 24 hours.

## Course Grades

OWL homework (mastery and multimedia)	20 points
OWL End-of-Chapter (EOC) questions	40 points
Three in-class examinations	300 points (100 / exam)
<u>Final examination</u>	<u>200 points</u>
Total	560 points

OWL homework and the EOC questions are designed to help you to succeed in this course, as the most important key to learn organic chemistry is ***to practice***. OWL homework allows ten attempts to get the correct answer. However, you want to be prepared before starting the EOC questions because you will have only three chances to get the right answer for each question. The mastery questions mirror in-chapter questions from the text and EOC questions mirror the examples at the end of the text chapters; if you are struggling, the answer key will have discussion about how to approach the types of questions that you will see in OWL. OWL questions may appear on the in-class and final exams. Students are strongly encouraged to work in groups on homework assignments, as this is a great way to increase your understanding of course material, but make sure not to rely on your study partners for the answers, as they will not be available during exams. The course Facebook page is a good way to find other students in the course that may be good study partners. **Do not wait until the last minute to start the online assignments; they are time consuming.** I will announce due dates in class and due dates will be visible within the OWL interface. A Texas A&M-specific technical support site for any OWL issues can be found at: <http://support.cengage.com/magellanweb/ClassLandingPage.aspx?OptyId=1-1ZAFUA5&AccountId=1-TO-52&TechCode=TPC30>.

In-class examinations cover the assigned material in the text, supplementary material, and any other assigned material. All in-class exams are comprehensive, but material covered since the previous test will be emphasized. Make-up tests will be given only for documented excused absences as designed in the official Texas A&M University Student Rules, Section 7.5. If the student is seeking an excused absence, he/she must notify the instructor as soon as possible after the absence, but no later than the end of the second working day after the last date of absence. Cheating will not be tolerated. The minimum penalty for cheating will be a zero score on the exam and an entry into your record in the Department of Student Life. Please read the appropriate section of the Texas A&M University Regulations on this subject.

Your grade will be based on your *cumulative* performance towards the total number of points possible in the course and will not be graded on a curve. The cutoffs will be **no higher than**,  $A \geq 90\%$ ,  $B \geq 80\%$ ,  $C \geq 70\%$ ,  $D \geq 60\%$ . **You can determine the lowest possible grade that you have at any given time by determining what percent you have of the total points possible at that time.** The cutoffs may be lower if this is warranted based on the class average and other factors. I have adopted this grading scale in an effort to decrease competition between students. Theoretically, everyone can get an "A".

## Americans with Disabilities Act (ADA) Policy Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Disability Services in Room 126 of the Koldus Building, or call 845-1637.

## Aggie Honor Code Policy

*"An Aggie does not lie, cheat or steal, or tolerate those who do."*

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the process of the Honor System. Additional information about the Aggie Honor Code can be found at: <http://www.tamu.edu/aggiehonor/>. The consequences for cheating and plagiarism on any assignment associated with CHEM227 will result in an unsatisfactory grade for the course.

## Schedule of Lectures and Tentative Exam Dates

Listed below is a schedule of **approximate** lecture coverage and **approximate** exam dates. Exams will cover through the end of the week prior to the exam.

<u>Chapter</u>	<u>Title</u>	<u>Approximate # of Lectures</u>
1	Structure and Bonding	2
2	Polar Bonds; Acids and Bases	2
3	Organic Compounds: Alkanes and Their Stereochemistry	2
4	Organic Compounds: Cycloalkanes and Their Stereochemistry	2

### **Tuesday September 29, EXAMINATION #1**

5	Stereochemistry at Tetrahedral Centers	2
6	An Overview of Organic Reactions	2
10	Organohalides	2
11	Reactions of Alkyl Halides: Nucleophilic Substitution and Elimination	2

### **Thursday October 29, EXAMINATION #2**

7	Alkenes: Structure and Reactivity	2
8	Alkenes: Reactions and Synthesis	2
9	Alkynes: An Introduction to Organic Synthesis	2

### **Tuesday November 24, EXAMINATION #3**

17	Alcohols and Phenols	1
18	Ethers and Epoxides; Thiols and Sulfides	2

### **Wednesday December 16, 1-3 PM, Final Exam**

**First (and likely only) Extra Credit Assignment: (3 pts)** Hand in a 3x5 card with 1) a picture of yourself, 2) your section #, and 3) your full name and what you would like to be called. It is due by next Tuesday (September 8<sup>th</sup>). To make it easier for me to learn your name, please use the following format:

<b>Picture</b>	<b>Section #</b> _____
<b>Full Name</b> _____ (If there is a name that you prefer to go by, please also include that.)	