

**CHE-251**  
**Organic Chemistry II**  
**Fall 2017**  
**Gustavus Adolphus College**

Prof. Scott Bur  
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**Textbooks**    Lecture: Organic Chemistry (2<sup>nd</sup> edition), Klein 2015  
                  Lab: James W. Zubrick, The Organic Chem Lab Survival Manual: A Student's Guide to Techniques, 9<sup>th</sup> ed., 2012.  
                  Lab: Davis, H. B.; Tyson, J. F.; Penchenik, J. A. A Short Guide to Writing about Chemistry, Pearson 2010.

**On-Line**        Moodle (<http://moodle.gac.edu/>)

**Supplies:** Molecular models.

**Classroom:**    9:00 - 9:50 MTWF in NHS AUD  
                  11:30 - 12:20 MTWF in NHS AUD

**Office Hours:** My scheduled office hours are the following:  
                  Monday and Wednesday 1:30 pm - 2:30 pm  
                  Or by appointment. Please see my Google calendar for open times.

**Attendance**

Attendance at the class lectures is important to your understanding and enjoyment of chemistry. You will be responsible for anything that is announced or discussed in lecture.

## Goals of the Class

In second semester organic chemistry, we will study the chemistry of the carbonyl and amine functional groups, reactions of aromatics and conjugated systems. We will primarily be focused on reaction mechanisms. However, since we will become familiar with a broad spectrum of reactions, we will also expand our attention to include organic synthesis. We will learn how to plan the synthesis of complex organic compounds from more simple compounds and to use spectroscopic and other data to determine structures.

In addition, biological systems use organic reactions (though in a steady state, rather than equilibrium). What might seem confusing, and maybe a little like hocus pocus, actually follows the rules for organic reactions. Many biological reactions are more understandable if you see them through the lens of organic chemistry.

Organic chemistry is more than a set of reaction to memorize. Although it may not seem like it, organic chemistry is governed by logical reasoning. It's a little "fuzzier" a logic than you might be used to, because the systems we study are complex, but it is logical none-the-less. This course will help you understand the logic of organic chemistry. Specifically, you should be able to do the following by the end of the course:

- Predict if a reaction is near or far from equilibrium
- Reason through the mechanism of a reaction using curved arrow notation
- Predict the products of a reaction based upon the starting materials and reaction conditions.
- Propose the synthesis of molecules from simpler starting materials.
- Elucidate the structure of simple organic molecules using spectroscopic methods.
- Identify simple biomolecules, especially carbohydrates.
- Explain common biochemical pathways (e.g. the tricarboxylic acid cycle) in terms of organic chemistry reactions

## Academic Honesty

I expect you to be honest. The policy of the college states in part:

*...Gustavus Adolphus College expects all students to adhere to the highest standard of academic honesty, and to refrain from any action that impinges upon the academic freedom of other members of the college community. In all academic exercises, examinations, presentations, speeches, papers, and reports, students shall submit their own work.... In the case of cheating or plagiarism, the instructor will inform the student and the office of the Dean of the Faculty of the nature of the offense, the penalty within the course and the recommendations of the instructor as to whether further disciplinary action by the dean is warranted.*

Anyone caught cheating on an exam or assignment will receive a grade of 0 for that exam or assignment. Repetition will result in an F for the course. If you have any questions about these policies, please come see me, or refer to the Gustavus Guide.

### **Accessibility Resources**

Gustavus Adolphus College is committed to ensuring the full participation of all students in its programs. If you have a documented disability, or you think you may have a disability of any nature (e.g., mental health, attentional, learning, chronic health, sensory, or physical) and, as a result, need reasonable academic accommodation to participate in class, take tests or benefit from the College's services, then you should speak with the Accessibility Resources staff, for a confidential discussion of your needs and appropriate plans. Course requirements cannot be waived, but reasonable accommodations may be provided based on disability documentation and course outcomes. Accommodations cannot be made retroactively; therefore, to maximize your academic success at Gustavus, please contact Accessibility Resources as early as possible. Accessibility Resources (<https://gustavus.edu/advising/disability/>) is located in the Center for Academic Resources and Enhancement. Accessibility Resources Coordinator, Kelly Karstad, ([kkarstad@gustavus.edu](mailto:kkarstad@gustavus.edu) or x7138), can provide further information.

### **Help for Multilingual Students**

Support for English learners and multilingual students is available through the Center for International and Cultural Education's (<https://gustavus.edu/cice/>) Multilingual and Intercultural Program Coordinator (MIPC), Carly Houston Overfelt. The MIPC can meet individually with students for tutoring in writing, consulting about academic tasks, and helping students connect with the College's support systems. If requested, the MIPC can provide students with a letter to a professor that explains and supports appropriate academic arrangements (e.g., additional time on tests, additional revisions for papers). In addition, English learners and multilingual students can seek help from peer tutors in the Writing Center (<https://gustavus.edu/writingcenter/>).

### **Homework**

Because chemistry is a collaborative science, you will be assigned several group homework assignments throughout the semester. These homework assignments will be collected for a grade. I will assign the groups (4-5 people) and distribute the homework assignments one-week before they are due. One person in each group will be required to contact the other group members to arrange meeting times and one set of homework will be turned in, with all of your names, for credit. The group homework assignments will be due on September 22<sup>nd</sup>, October 13<sup>th</sup>, November 10<sup>th</sup>, December 8<sup>th</sup>. (Christmas in Christ Chapel is the weekend of December 1 - 3, so this is also the date of the fourth exam.)

There are also a number of excellent questions in the textbook. It is your responsibility to ensure mastery of the concepts presented in these problems.

### **Tests**

The test dates are: Friday, September 29<sup>th</sup>; Friday, October 20<sup>th</sup>; Friday, November 17<sup>th</sup>; and Friday, December 8<sup>th</sup>. The scheduled final exam is Monday, December 18<sup>th</sup>, 1:00 - 3:00 p.m. (Subject to change. Please check the final exam

schedule on WebAdvisor for official time and place.) All of the exams will be held in Wallenburg auditorium.

## Grading

**This is important, so please read it twice:** The exams may consist of multiple choice and/or short-answer type questions. They will test your understanding of the material covered up to the date of the exam. *In addition to being able to remember facts and principles from lectures and the text, you will be expected to extend the principles learned to new situations and to offer explanations of the behavior of compounds not yet examined, based on what you have learned.* On every exam, it will be assumed that you are familiar with all the material from the beginning of the course.

The breakdown of your grade is the following:

Homework .....	20%
Four one-period exams.....	40%
Comprehensive final exam.....	20%
Laboratory.....	20%

The final cumulative total, weighted as shown above, will be assigned a grade based upon a standard scale: 93 - 100% = A; 90 - 92% = A-; 87 - 89% = B+; 83 - 86% = B; 82 - 80% = B-; etc. ***I reserve the right to revise the grading scale as seems appropriate for the class.***

**If you do not complete all of the laboratory projects, you cannot pass the course, even if you've taken the course previously.**

## Course Coverage

The schedule below gives an outline of the topics we will study:

Review I: Structure and Bonding  
Review II: Acids and Bases  
Review III: Reaction Mechanisms  
Chapter 13: Alcohols, Phenols  
Chapter 14: Thiols, Ethers, and Sulfides  
Chapters 10: Alkynes  
Chapter 28: Organometallic Compounds (see moodle for chapter download)  
Review IV: Spectroscopy  
Chapter 17: Conjugated  $\pi$ -systems  
Chapter 19: Aromatic Substitution Reactions  
Chapter 20: Aldehydes and Ketones  
Chapter 21: Carboxylic Acids and Derivatives  
Chapter 22: Carbonyl Alpha-Substitution and Condensation Reactions  
Chapters 24, 25, and 26: Introduction to biomolecules  
Special Topics: Carbohydrate metabolism (See moodle for Chapter 22 from McMurry)  
Chapter 23: Amines and Heterocycles

**Laboratory**

There are two very different lab experiences being offered this semester. The first (T,W sections) is a traditional second-semester organic laboratory, and the second (R sections) is an introduction to research laboratory focused on small molecules that bind to important proteins. Please see the laboratory course packs for details.