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**Office Hours:** Tues, Thurs, Fri afternoon (use [tungle](#))

**Class:** MWF 11:30 a.m. – 12:20 p.m., Ebaugh 202  
**Laboratory:** W 1:30 – 4:20 p.m., Ebaugh 215  
**Office:** Ebaugh 208

Dear Students,

Welcome to Chem 251, a new class in a new curriculum in the Department of Chemistry and Biochemistry at Denison University. I'm looking forward to meeting each of you and working closely with you in the classroom and laboratory this fall.

This semester we will explore several main areas of organic chemistry, building on the foundation course you had last semester. Our laboratory experiments will complement your classroom learning as much as possible. In the laboratory, you'll develop your hands-on laboratory skills.

In a separate document you'll find the day-to-day schedule of readings from the course text *Organic Chemistry* by Dr. Paula Y. Bruice. Dr. Bruice's text is thorough, yet very readable. She has spent years refining her text with your learning in mind. For your benefit, there are many diagrams with helpful notes and worked-out problems in the text. You should read the assigned text sections before you come to class. And, although the text is wonderful to read, reading is a minor way you should be engaged with the book. The major thing to do with this book is to sit down with some pencils, an eraser, and sheets of blank paper in order to work on the problems. Do the problems that come at the end of sections of a chapter, and do the many problems at the end of the chapter. A large stock of good problems is a hallmark of this text. *Working on problems, an active process, is how you learn chemistry.* Doing the readings, while necessary, is not sufficient alone. Take the lists of problems I'll give out to be a starting point. It is always better to work on more problems than those assigned. Dr. Bruice personally wrote the solution manual for her text. It is thorough and comes with extra tutorial sections. I recommend that you acquire a copy.

Someday, after Denison, you may have the occasion to learn a new subject, on your own, just from a textbook. However, that's not how we're doing things right now. Along with the textbook, we have three class meetings a week for the 24 of you and me. (There's also lab; we'll cover that later.) What's our class time for? Well, as you're reading, maybe making some notes as you read, and as you're working on problems it's inevitable that you'll have questions. When you get those questions answered, uncertainty will be removed, and you'll learn more. That's a big thing we can do together—work through your questions, in class, in a group.

Class time is for something else too. Think about something in your life where you practice: athletic drills, or an art, dance, or music studio. When we get ready for a performance or a competition, there's a time for rehearsal, where we run through the things we already know. Before that, there's a time to learn and develop the skills we bring together in performance. The learning, whether in swimming, painting, or dance, for example, comes slowly, and is usually hard won. Michael Phelps, for example, didn't wake up one morning and swim the butterfly in exemplary form. Yo-Yo Ma didn't walk into a room, find a cello, and begin to make beautiful music. Likewise, no one expects you to pick up the tools of organic chemistry and come straight to the exam ready to lay down flawless reaction mechanisms and multi-step syntheses. You can do it, but between then and now, there's going to be "studio time," time in the classroom where you're called on to test and develop your knowledge and understanding. This time in class, like all time in class, is a supportive time and environment. The work we do in class "stays in class" so to speak. So long as you're engaged in the conversations, activities, and thinking processes during class, and you can contribute your thoughts, whether right, wrong, or somewhere in between, you're doing just fine. You probably don't remember learning how to walk, but it's safe to assume you were sup-

ported and encouraged through your failed attempts and stumbles. That's the kind of environment we'll be creating here.

We'll have some other, specific resources for you too. These are described below.

**a. Weekly review sessions.** I'll schedule a classroom in Ebaugh once a week, normally Thursday evening 7–9 p.m. for a totally open review session. You can invite your friends from other sections to attend. Here I'll field any type of question from class or lab. We'll work through problems from start to finish if you want. There's no new material covered here—anything discussed here will have also been seen in class or in the book—but many students find the relaxed environment, entirely driven by student questions, to be valuable.

**b. Online homework.** This is my biggest contribution to assist you in your responsibility to keep up with the course material. Assignments posted on the Sapling Learning site are due each week, and are coupled to the material we are covering in class around that time.

**c. Online question-and-answer (with a peer-to-peer component).** I'm happy to get emails from you, but I'm asking you to confine email to confidential, individual issues (questions about grades, recommendations, schedule conflicts, etc.). Questions about course material (problem sets, homework, labs, etc.) are of interest to the entire class; all students could benefit from the answers. Many times, in fact, students can contribute to the answers. We'll use a great platform called Piazza to manage questions like this. At the site [piazza.com](http://piazza.com) you can post and respond to questions. I monitor the site regularly and I will post to enhance or correct student replies as needed. (I'll also answer questions.) Part of your class participation grade will come from the number of meaningful contributions you make toward answering queries over the course of the semester. This course site will enhance the community aspect of our course.

**d. Office hours appointments.** When you have questions you'd like to address in person I'm really happy to meet with you. I've set aside time on Tuesdays, Thursdays, and Fridays especially for that. In order to use the time efficiently, I ask that you make all appointments through a web-based application at [tungle.me/jordanfantini](http://tungle.me/jordanfantini). Please use the site to confirm an appointment time even if we've verbally agreed to meet.

**e. Quizzes.** Quizzes contribute a relatively small percentage of your course grade at the end of the semester but they are invaluable along the way as a low-stakes way to assess your mastery of the course material leading up to an exam. Quizzes will be announced in class and are administered on the same website as the online homework: [saplinglearning.com](http://saplinglearning.com)

**f. Examinations.** My primary role in the course is to support your success in the course. Much of what's described above falls into that category. I'm charged with another role, which is to assess and evaluate your mastery of the course material. The primary (but not sole) way I do this is with the three exams during the semester and the final at the end. Together, these contribute 50% of your overall course grade. Because exams figure prominently in your grade, I've spent a lot of time developing my approach to exams for this course. I use two things in particular that you may not have come across in previous classes: evening exams and exam retakes.

**f.1 Evening exams.** As you know, our class meets for 50 minutes, and many of you have a class before or after it, if not at both times. Our classroom is being used immediately before and after our course. Common practice would be to start as close to the beginning of class as possible, then let students stay a few minutes late, perhaps up to the start of the next class. The last part of such a period is often distracting, disruptive to the next class, and would make some of you late for class as well. More importantly, whether 50 or 60 minutes, and whatever the environment, the number of questions I can reasonably ask in that time frame will only cover selections from the applicable content, or cover all the content, but at too low a level. What I do to get around this is schedule exams in the evening in a two-hour block from 7–9 p.m. I write an exam with suitable content coverage that will take about 80 minutes to complete. A person or two finishes in about 60 minutes, and several people stay the whole 120 minutes. Importantly, those that stay the whole time say they didn't feel they were under any time pressure and that they had

enough time to do the exam. So, you're being graded on how well you know the material and not on how you do in a time-pressured situation. Also, I ask about 8 or 9 questions compared to 5 or 6 questions in an hour-exam setting. Research shows that you get a more accurate assessment of your mastery when you are asked more questions about the material. We can accomplish this with evening exams.

I appreciate your participation in the evening exam system and I hope you'll agree it's an effective way to have our exams. The dates for all three exams are given later in the syllabus (pending getting rooms reserved) and I expect you to clear your social calendar for these exams. But if you have any Denison-related obligations that conflict in time I expect you to honor those obligations and to take our exam at a convenient alternate time. Typical Denison-related events include sports practices, games and matches, arts rehearsal and performance, lectures by invited speakers, and the activities of any Denison-recognized club or organization. This practice has worked smoothly over several years; typically 90% of the class is able to make it to the exam at the scheduled time.

**f.2. Retake exams.** Sometimes our level of performance doesn't result in the grade we desire or expect. There can be many different reasons for this, and you can participate in the retake program regardless of reason. My rationale for the retake program is two-fold. First, when a student gets an unexpectedly low score on the first exam, they spend the rest of the semester trying to dig out of a "hole." Moving forward, this is at best a demoralizing environment in which to learn, and can in fact make the balance of the semester feel stressful and hopeless. Second, within the semester, the course material builds on itself, so inadequately learning some beginning material gives a weakened foundation for learning in the rest of the semester. With the retake program, there is an incentive to go back and learn the material more thoroughly.

How the program works, briefly, is that with any grade of B- or lower you may take the retake exam, offered about a week later, which has similar problem structure and similar content. You keep whichever grade is higher, except that the earned grade on the retake is capped at a B. The retake program is intended for those that earned a D or F the first time around, but it is open to any student that could potentially improve their grade.

**g. Final exam.** The final exam will be administered at the time and place established by the University Registrar. The date and time is already set (Thursday, December 13 at 2 p.m.). I will not grant exceptions to this policy to accommodate your travel plans, or other reasons, so please plan accordingly. Also, it is normal to have two final exams on the same day, so I won't grant an exception on this basis either. I will assist any student in rescheduling that has three scheduled finals on that day.

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We will use learning goals (also called learning objectives or learning outcomes) this semester to provide a structure on what you should be learning. I refer to these learning goals when I construct exams to make sure that a broad collection of the goals are covered on the exam. Learning goals are given in a separate document.

The general areas of organic chemistry we'll cover this semester are:

1. alcohols, ethers, epoxides and related sulfur compounds
2. alkenes and alkynes
3. radicals
4. aromatic compounds
5. carbonyl-containing compounds
6. integrating topics (including organometallic and biological)

For most of the course we will follow the order of presentation in the book. But a fair amount of the time we jump round a bit, so refer closely to the daily schedule of subjects and reading.

**Course Goals** (see **Learning Objectives** given out with each chapter for detailed goals.)

- ◆ To make connections between the shape and electronic structure of molecules, and their reactions
- ◆ To master a body of organic reactions in order to propose multi-step syntheses of compounds
- ◆ To learn the fundamentals of organic structure determination by a combination of NMR, IR, UV-vis, and mass spectrometry
- ◆ To learn a great deal about the reactions of compounds containing the C=O group
- ◆ To continue to develop an understanding of the principles of reaction mechanisms
- ◆ To develop an understanding of the elements of an organic reaction
- ◆ To continue to learn techniques for laboratory analysis
- ◆ To foster an appreciation for the relationship between organic chemistry and biological systems

**Office hours**

Office hours are on Monday and Thursday afternoons. **All appointments must be made using [Tungle](#)** so that I can be sure to note the time of our appointment in my calendar.

**Required Materials**

*Organic Chemistry* (6th Edition) by Paula Y. Bruice

[Sapling Learning](#) Online Homework package

Safety goggles (not safety glasses)

Bound Composition Notebook (must have permanently attached pages)

**Suggested Optional Materials**

*Study Guide and Solutions Manual* by Paula Y. Bruice

*Student Model Kit* – A model kit to build organic molecules and to help visualize the three dimensional structure of compounds. The model kit is not required, but it is strongly recommended!!!

**Note Taking**

Note taking is an important part of any class. Your notes are your primary source of information when studying. It is important, therefore, to approach note taking in a useful way from the first day of class. To get the most out of your notebook, you should be taking notes on all aspects of class time: lecture, questions, and discussions. ***When you or your classmates ask a question, pay attention! I tailor my answers to be useful and relevant to the entire class.*** Mark any passages that I stress more than once as particularly important. I will write a broad outline of the topics covered each day on the white board. These outlines should provide you with headings for your notebook, but your notes should have more detail. I will write equations, problems and structures on the board or show figures on the screen when I think it is important for illustration. **These illustrations are not meant as a complete set of notes.**

## How to Succeed

The best way to get a good grade in this class is to truly understand the material. The better you understand, the better your grade will be. Please try not to get caught up in memorization, focus on the learning.

- ◆ Do all the problem sets—you will see these types of questions again.
- ◆ Do all the online homework
- ◆ Do all the textbook problems—the textbook problems cover the basics thoroughly and offer more-involved problems. **Let the textbook problems guide you to read the book.**
- ◆ Ask questions! Questions let me know where to focus my help.
- ◆ If you are a good memorizer, make flash cards—memorizing can't get you all the way but it can help.
- ◆ Utilize the Chemspa. These students are there to help and have been in your shoes.
- ◆ Before each exam, do the problem sets and textbook problems again without looking at the answers! Only if you can do them at home will you be able to do them on the exam.
- ◆ Don't fall behind! As hard as it is to keep up, it is harder to catch up.
- ◆ Don't highlight passages in the book unless you have done everything else above first!

## Assignments

Problems out of the textbook will be assigned for each chapter. These assignments will not be collected. Remember that practice is the best way to reinforce learned concepts and uncover holes in your knowledge. Working through these suggested problems is *essential* to doing well in this course. Problem sets will be assigned, collected and graded to give you more feedback on your understanding. Sapling Learning online homework will also be assigned.

## Course Communication.

I've set up a course question-and-answer site [piazza.com](http://piazza.com). This is a place we can address chemistry questions for the benefit of the whole class. Please post any chemistry questions for me on that site instead of sending by email. All other questions, including questions of a personal or confidential nature, should still be sent by email.

This is the third semester I have used the piazza site. It worked nicely last year. It was recommended by one of the profs in Math.

## Online Homework Links.

Here is the web page for the online homework. Registration instructions are on the Piazza page. Online homework will be due approximately once a week.

<http://www.saplinglearning.com/>

## Exams.

***Exams are: Thursday September 20 at 7 p.m., Thursday October 25 at 7 p.m., and Thursday November 29 at 7 p.m.***

Since the exam dates are set far in advance I expect all students to be able to plan appropriately. No make-ups will be given. If you have a legitimate verifiable excuse for missing an exam please see me in advance of the exam day to discuss your options. The conditions for taking an evening-scheduled exam at an alternate time are explained at the end of this syllabus. The college does not allow a final to be given at any time other than that scheduled. Our **Final is December 13, 2012 at 2:00 p.m.** (until 5 p.m.).

## Optional Exam Retakes.

***For the first two exams in the course, I shall prepare two versions of the exam.*** They are similar in most fashions and neither one is made intentionally more difficult than the other. Should a student not be satisfied with the grade they earn on an exam the first time around, they may take the optional retake. The student's exam grade shall be the higher of the two grades, EXCEPT that the highest grade that can be earned for credit on the optional retake is a "B". This means an 82% is the highest grade that will be counted on a retake (low end of the "B" range). In other words, the retake exists to give the opportunity to overcome a great "goof-up" the first time around, but on the other hand, an "A" must be earned on the first attempt. Retake exams will be in the week following the exam.

***There is no such retake available for the Third Exam or the Final Exam.*** (See also the explanation earlier in the syllabus.)

## Grade Determination

The *tentative* point total is as follows:

3 Exams	300	
Final Exam	200	
Quizzes/Assignments/Particip.	150	
Sapling Learning homework	50	
Drug paper	100	(more info to come)
Oral presentation	50	(more info to come)
<u>Laboratory</u>	<u>200</u>	
<b>Total Points</b>	<b>1000</b>	

The 200 points that make up the laboratory component of the grade will roughly be weighted as follows: lab results and analysis 40%; quizzes, reports and notebook record 50%; lab technique as assessed by instructor 10%.

The *tentative* grade assignments for the course are:

- 88 – 100% - some form of A
- 78 – 87% - some form of B
- 68 – 77% - some form of C
- 58 – 67% - some form of D
- < 58% - F

I may lower the cutoffs for receiving a given letter grade, but I will not raise them. I will not be grading on a bell curve with some set number of D's or F's. It may be possible for everyone to receive A's if everyone has put forth maximum effort and has complete mastery of the material.

***A Comprehensive Final Exam*** is scheduled for Thursday, December 13th at 2:00 p.m. You must take the Final, at the time scheduled, in order to pass the course.

### **Disability Statement.** (text of this section provided by the Office of Academic Support and Enrichment)

Any student who feels he or she may need an accommodation based on the impact of a disability should contact me privately as soon as possible to discuss his or her specific needs. I rely on the Academic Support & Enrichment Center in 102 Doane to verify the need for reasonable accommodations based on documentation on file in that office. If you wish to take advantage of these accommodations, please let me know in advance so the appropriate arrangements may be made.

### **Academic Integrity Statement.** (text and image of this section provided by the Provost of Denison University)

Proposed and developed by Denison students, passed unanimously by DCGA and Denison's faculty, the Code of Academic Integrity requires that instructors notify the Associate Provost of cases of academic

dishonesty, and it requires that cases be heard by the Academic Integrity Board. Further, the code makes students responsible for promoting a culture of integrity on campus and acting in instances in which integrity is violated.



Academic honesty, the cornerstone of teaching and learning, lays the foundation for life-long integrity. Academic dishonesty is intellectual theft. It includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for evaluation. This standard applies to all work ranging from daily homework assignments to major exams. Students must clearly cite any sources consulted—not only for quoted phrases but also for ideas and information that are not common knowledge. Neither ignorance nor carelessness is an acceptable defense in cases of plagiarism. It is the student's responsibility to follow the appropriate format for citations. Students should ask their instructors for assistance in determining what sorts of materials and assistance are appropriate for assignments and for guidance in citing such materials clearly.

For further information about the Code of Academic Integrity see <http://www.denison.edu/academics/integrity/>

### **Writing Center.** (text of this section provided by the Denison University Writing Center)

The Center is a free resource available to all Denison students. Student writing consultants from many majors help writers one-on-one in all phases of the writing process, from deciphering the assignment, to discussing ideas, to developing an argument, to finalizing a draft. Because proofreading is a last step in that process, writers should leave plenty of time for getting their ideas right before expecting proofreading help. Consultants also can help writers with personal documents, like job and internship applications. The Center is located on the fourth floor of Barney-Davis Hall; satellite locations are on the third floor of the Library (the Entry level) and the first floor of Fellows near the Computer Lab. Appointments between 4 p. m. and 9 p. m., Sunday through Thursday, can be made in the Barney location by phoning 587-JOT1. The satellite locations are drop-in; check the website at <http://www.denison.edu/writingctr/> for those hours.

### **Courtesy Statement.**

Please come to class on time, and plan to stay until the end. Please turn your cell phones off during class and **do not send or receive text messages**. If your phone rings during class, I will try to dance to its tune until you turn it off. I will also be duly embarrassed if my phone rings—yes I have made this mistake a time or two before. The use of lap top computers during class time is not allowed.

### **Assignments**

*Working with a pencil and paper—actively engaged with your textbook and the end-of-chapter problems—is one of the most effective tools a student has for learning organic chemistry.* I will assign problems from the textbook that relate to the covered material. Because the ideal learning process is iterative, it is important to complete these problems, then review the material to better develop the concepts and then repeat the practice problems. These are not graded, but are strongly suggested for success and mastery of the course material. Working through these problems is essential to doing your best in this course. If you have questions on these problems, please ask. If you have questions, chances are your classmates do as well.

Once a week you will be assigned a set of online homework problems using the Sapling Learning system.

There will be other assignments associated with the course, including Problem Sets. See the following section on Quizzes..

### **Quizzes**

There will be approximately ten(10) quizzes this semester. Quizzes will be announced ahead of time. At the end of the semester I will drop some amount of your lowest (or missed) quizzes. *Because of this drop policy, there will not be make-up quizzes, even if the quiz is missed for an excused absence.*

There will be several problem sets handed out over the course of the semester. These count toward your grade in the same category as quizzes, though the longer sets will be worth more points. These problems are written by me and are directly related to the types of questions you will encounter on an exam.

**Engagement/Participation**

Your class engagement/participation grade will be based on the amount and quality of effort that I perceive you are putting into the class. Ways to make it evident to me that you are putting forth effort to learn the material include: (1) attend class, (2) do the homework problems, (3) ask questions and respond to questions in class, (4) answer questions during problem sessions, (5) bring questions to ask me during office hours, (6) attend help sessions, (7) form study groups. Class engagement and participation will increase your level of success in this course and increase how much you get out of the course. In terms of your grade, I also take this into consideration when a student's numerical grade is very near a dividing line between two grades.

**Attendance**

I will not take attendance, but I think it's a great idea to come to class. Material presented in class complements the textbook, so if you miss a class you are responsible for begging for class notes from your classmates.

Unexcused absence from an exam will result in a score of zero on the exam. Examinations may be made up or an adjustment will be made if an excused absence is submitted and accepted prior to the examination. It is your responsibility to provide written verification of excused absences. Sports and arts schedules are ALREADY PUBLISHED! Please don't wait until just before a game/match/recital/etc. to inform me that you need to miss class for an extra-curricular event.

**Laboratory**

TO OBTAIN A PASSING GRADE IN THE COURSE YOU MUST COMPLETE ALL ASSIGNED LABORATORY WORK. Makeup of non-health related excused lab absences must be arranged ahead of time. Excused lab makeups should be done during the same week the rest of the class does the lab experiment. When you need to make up lab with another section, you must inform me, but it is still **your responsibility to obtain permission to attend the other professor's lab**. Please exercise good manners by seeking that permission at least 24 hours before their lab is scheduled to meet.

**Office Hours**

There are not scheduled office hours for this course. I'm available to meet with you on Tuesday, Thursday, and Friday afternoons and possibly other times as needed. Please make an appointment via [tungle.me](http://tungle.me) to meet. Generally choose a 30-minute meeting duration.

Come to office hours with any questions about the course material. I encourage you to bring some friends and we will work on things at a white board. You can also post questions on Piazza. The "Chemspa" hours will be announced in the second week of class.

**Evening review sessions.** I'll hold one of these every week, if possible. Any changes from the schedule will be announced; it will normally be on Thursday evenings at 7 p.m.



# Laboratory Syllabus

## Introduction

This lab coincides with the second semester lecture course in organic chemistry. While there is a relationship between the lab and lecture materials it will sometimes not be very direct. Thinking and doing organic chemistry require distinct approaches. In the laboratory we will be using important techniques for doing organic chemistry—distillation, recrystallization, extraction, etc.—and learning how materials actually behave. If done properly, these efforts will strongly complement your classroom-based understanding of organic chemistry. Analytical techniques in chromatography and spectroscopy will get extensive attention.

You will be learning (1) fundamental ideas and techniques important to doing laboratory work, (2) careful observation and record keeping, (3) reliability and independence in the organic laboratory, and (4) the scientific questions that are important in the organic chemistry laboratory. Particular care should be devoted to your pre-lab preparations.

## Safety

Working in an organic chemistry laboratory poses certain risks which we have attempted to minimize. However, safety in the laboratory requires a strong commitment from all of us.

1. Safety goggles must be worn at all times. Do not wear contact lenses in the lab.
2. Sandals should not be worn in the lab at any time and shorts are discouraged. Clothing is much easier to replace than skin! A laboratory coat may be a good investment.
3. Never work alone in the laboratory. Someone must always be aware of what you are doing. Unauthorized experiments are not permitted.
4. Know the location and purpose of the safety devices in your lab.
5. Dispose of glassware and chemical wastes in the containers provided. Minimize the amounts of chemicals you use.
6. Know the properties of the chemicals you are using.
7. Avoid the use of open flames.
8. Avoid contact with the materials you are handling. Inhalation and absorption through the skin or open cuts are common routes of entry. Gloves may be recommended for certain operations.

## The lab notebook

This semester you will make significant progress in learning to keep a notebook record of your work.

*Use the beginning of the notebook keep a Table of Contents*, which should be kept up to date. All pages should be numbered and none should be torn out. The record of each experiment should include the following sections:

### Before coming to lab: (STARTING WITH WEEK 2! You can come to Week 1 without this done!)

1. Title and experiment reference.
2. A statement of purpose—be specific.
3. Balanced equations, where appropriate, that define stoichiometry of the limiting reagent, the formation of side products, and/or the mechanism.
4. A table of reactants, products, solvents, and reagents that list relevant physical properties and the amounts of materials used. The information required for this table can be found in the description of the experiment, the Aldrich Chemical Co. catalog, *the CRC Handbook of chemistry and Physics* or the *Dictionary of Organic Compounds*.
5. Calculation of the theoretical yield. Your table should include all the information that was used to calculate the theoretical yield.

### As you proceed to do the experiment:

7. A record of what you actually do that includes observations of physical changes, specific details about techniques used and the results obtained, and any calculations, *created as you perform the experiment*. Analytical results such as TLC slides should be attached in the notebook and their interpretation recorded.

### During or after the experiment (as appropriate):

8. Your interpretation of results and a discussion that explains the results.
9. A conclusion.

You should prepare your notebook record in such a way that someone not only can repeat your work but also can repeat it with more understanding than if only the lab text were available. In other words the notebook record should allow someone else to benefit from the fact that you did the experiment.