

Instructor: Ogar Ichire (PhD)
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Office hours: Open door

Lab meets:

Lab: Olin 232

Required Materials:

Text: Laboratory Techniques in Organic Chemistry, Fourth Edition
Mohrig, et. al., W.H. Freeman and Co., © 2014, ISBN 978-1-4641-3422-7 (Techniques - **required**)

CATALYST Organic Chemistry Lab, CHEM 2461, 2462, 2463 by J. Hornback (some labs – not required)

Students will be **required** to wear safety **goggles** and **lab coat** during lab.

A laboratory notebook (see lab notebook requirements)

Canvas Access (labs and postlabs will be posted to Canvas)

Additional References available:

<https://www.organicdivision.org/links/>

Course Philosophy:

This course is designed with the educational goals and mission of the University of Denver and the Chemistry Department in mind. The chemistry department's mission is to develop confident, well-prepared students who can contribute to the society on issues relating to modern chemistry and science. Students are expected to develop strong oral and written communication skills, to engage in critical thinking, to develop excellent laboratory skills, to work on independent research projects, and to prepare for careers in industry, academia, and professional areas.

In keeping with this mission this course aims to develop the following skills:

1. Know and use standard lab techniques.
2. Know and use basic analytic tools, techniques, and instrumentations.
3. Use and analyze chemical literature.
4. Communicate scientific issues in writing.
5. Apply current chemical theory/content to solving problems.

In particular, Organic Chemistry Lab will meet these goals by:

1. Reinforcing the common techniques and procedures used in synthetic organic chemistry (Ochem I lab) and introduce you to characterization of organic compounds.
2. We will use the chemistry reference materials to identify chemical properties and hazards associated with each chemical that we use and make in lab. Part of each pre-lab assignment is to gather this information into a table format in your lab notebook.
3. Being able to effectively communicate an understanding of chemical theory in writing is essential to all practicing scientists. The only way to establish these skills is through practice. Therefore, each lab will include a post-lab or lab report assignment which will ask you to effectively communicate your lab results, the interpretation of these results, and explain relevant chemical theory.

Organic Chemistry II Laboratory

Organic chemistry I laboratory was designed to help you learn some routine laboratory techniques performed in the industry and to show you how typical organic reactions are run and their setups. For organic chemistry II lab, we will reinforce these basic techniques and skills when we run reactions and purify products, but we will mainly be focused on analytical tools and techniques used by organic chemist for structure identification and characterization. We will use analytical instruments such as gas chromatograph (GC), infrared spectrometer (IR spec), ultraviolet-visible (UV-Vis)

spectrometer, mass spectrometer (MS) and Nuclear Magnetic Resonance spec to identify and analyze commercial compounds and inhouse compounds made during the lab.

Parts of a Lab Assessment

Pre-lab assignments:

Each lab will have a pre-lab or before-you-begin (BYB) assignment to be completed in your laboratory notebook before the start of lab. Note that each prelab will have a reading section that introduces you to the analytic instrumentation, the theory and uses of that instrument and along with some analytic techniques. It is expected that you complete this reading before coming to lab. Also, **the labs will be standalone** – that is, the lab topics might not have been covered in lecture, but the materials (the techniques book and lab procedure) given to you are sufficient for the lab. We expect you to read the *Laboratory Techniques in Organic Chemistry* book and the lab procedures and do the lab and answer the post lab questions that follow. A one-page (or more) summary of your reading of the techniques book would count for 10 points of your prelab.

Doing the Lab and Lab Performance:

You are expected to show up to lab and do each experiment. **There will be no makeup labs.** This part of your grade will be for actual doing the lab and how prepared you are for the lab. 20 points will be for showing up and doing the lab and another 20 points for readiness. To earn all 20 points for lab performance you should be prepared for the lab, pay attention to lab techniques, safety, cleanliness, and complete the lab in a timely fashion. You will lose points if you do not have a lab procedure ready, use your cell phone in lab, spilled chemicals, leave drawers unlocked, behave inappropriately, use equipment incorrectly, or leave your equipment/glassware outside your drawer at the end of lab. All shared glassware must be washed and returned to the designated location.

Post-lab assignments (Reports):

Each lab will have a post-lab assignment or report due at the **beginning** of lab **or on Canvas** according to the schedule. Post-labs should be typed unless noted. Late post-labs or reports will lose points according to the following guidelines: 1 day late minus five points, 2 days late minus 10 and so on. A week late from the due date would be minus 30 points.

Course Grading:

Your score in the course will be determined using a point system as listed below:

<i>Areas evaluated:</i>	<i>Frequency × Points</i>	<i>Total Points in Area</i>	<i>Approximate Percentage of Grade</i>
Pre-lab (Reading summary is worth 10 pts)	7 × 20	140	17.5 %
Doing the Lab and Lab performance	7 × 40	280	35.00 %
Post-lab or Reports	7 × 40	280	35.00 %
Safety Monitor: -Assigned cleaning of common areas -Safe lab condition during and after lab	50	50	6.25%
<i>Lab Final – Structure Determination</i>	<i>50</i>	<i>50</i>	<i>6.25%</i>
<i>Total Points</i>		<i>800</i>	<i>100%</i>

Grade	Range	Grade	Range
A	100 – 94 %	C-	<74 – 70%
A-	<94 – 90%	D+	<70 – 67%
B+	<90 – 87%	D	<67 – 64%
B	<87 – 84%	D-	<64 – 61%
B-	<84 – 80%	F	<60 – 0%
C+	<80 – 77%		
C	<77 – 74%		

Note: Final grades and percentage ranges are subject to change by the instructor

Students are expected to retain all returned graded coursework until final grades are assigned at the end of the course. Please keep all graded assignments that are returned to you until a final grade has been assigned for the course. It is **YOUR RESPONSIBILITY** to check for grading errors. Individual scores will be posted on Canvas as soon as they become available.

Laboratory Safety: The mastery of chemistry requires the student to master laboratory skills and the handling of chemicals with various levels of associated hazards. The University has taken the necessary steps to minimize student risks by equipping chemistry labs with devices that lower student exposure to hazardous chemicals as well as developed a vibrant set of safety procedures and requirements. However, we expect you to read and follow all safety procedures outlined in each experiment. Failure to comply with lab safety can result in a zero point for that lab and repeated safety problems from you or your partner can result in a **Fail** grade in the course.

Attendance:

Regular attendance is expected. You must be in the lab at the assigned starting time to receive full credit for the lab. **There will be no makeup labs**

Academic Integrity:

While I advocate collaborative learning and teamwork, I also firmly believe that everyone should maintain the highest ethical standards. As such, I support and will strictly enforce the Honor Code of the University of Denver. www.du.edu/honorcode.

Honor Code Statement.

All members of the University of Denver are expected to uphold the values of *Integrity*, *Respect*, and *Responsibility*. These values embody the standards of conduct for students, staff, faculty, and administrators as members of the University community. These values are defined as:

Integrity: acting in an honest and ethical manner;

Respect: honoring differences in people, ideas, and opinions;

Responsibility: accepting ownership for one's own conduct.

Pioneer Pledge.

As a University of Denver Pioneer, I pledge:

- to act with INTEGRITY and pursue academic excellence;
- to RESPECT differences in people, ideas, and opinions and;
- to accept my RESPONSIBILITY as a local and global citizen;

Because I take pride in the University of Denver I will uphold the *Honor Code* and encourage others to follow my example

Lab Due Dates:

Date	Lab		Assignments Due	Reading (techniques book)
Week1	Introduction to Organic chemistry lab Check-in, Safety, and Syllabus			Chapter 1
Week2	Lab1	Check-in Distillation and GC		Chapter 2-3 & 21
Week3	Lab 2 MLK week – Do the computations at home	Functional Groups and Computation IR spectroscopy	Pre-lab 1 (20 pt)	See Pre-Lab
Week4	Lab2	IR Spectroscopy (Wet Lab)	Pre-lab 2 (20 pt) Post-lab1	See Pre-Lab
Week5	Lab 3	Steam Distillation - Eugenol	Pre-lab 3 (20 pt) Post-lab2	See Pre-Lab
Week6	Lab 4	Grignard Reaction	Pre-lab 4 (20 pt) Post-lab 3	See Pre-Lab
Week7	Lab 5	Two-step Organic Reaction	Pre-lab 5 (20 pt) Report 4	See Pre-Lab
Week8	Lab 6	Hydrogenation of Curcumin	Pre-lab 6 (20 pt) Post-lab 5	See Pre-Lab
Week9	Lab 7	Synthesis of Acetaminophen	Pre-lab 7 (20 pt) Report 6	See Pre-Lab
Week10		Checkout & Lab Final (structure determination)	Report 7	

