

Winter 2021

Instructor: Ogar Ichire (PhD)

TA:

Office: Olin 205A

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Office hours: Open door

Lab meets: Monday - Thursday

Lab: Olin 232

Format: Hyflex

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**)

Technology: High-Speed Internet and laptop or computer

Canvas Access: Lab materials will be uploaded in Canvas.

You will need a lab coat and splash goggles for each in person lab.

Essential Materials:

Technology: laptop, tablets, internet, stylus pen, headphones, printer, scanner(or scanner apps)

Additional References available: [Scifinder-n](#) [WebMO](#) <https://www.organicdivision.org/links/> [Synthetic Organic Chemistry](#),

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 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 instrumentation.
3. Use and analyze chemical literature.
4. Communicate scientific issues in writing.
5. Apply current chemical theories in the laboratory and to solve problems.

Our 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 the 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 the 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 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 theories.

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 the 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 an organic chemist for structure identification and characterization. We will use analytical instruments such as gas chromatography (GC), infrared spectrometer (IR spec), ultraviolet-visible (UV-Vis)

spectrometer, mass spectrometer (MS) and Nuclear Magnetic Resonance (NMR) spectroscopy to identify and analyze commercial compounds and in-house 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 along with some analytic techniques. It is expected that you complete this reading before coming to the lab. Also, **the labs will be standalone** – that is, the lab topics might not have been covered in the lecture, but the materials (the techniques book and lab procedure) given to you will be enough 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 the lab and do the experiment. **There will be no makeup labs.** This part of your grade will be for 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 preparedness for the lab. 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 the lab, spill chemicals, leave drawers unlocked, behave inappropriately, use equipment incorrectly, or leave your equipment/glassware outside your drawer at the end of the 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 told otherwise. Late post-labs or reports will lose points according to the following guidelines: 1 day late (-5 points), 2 days (-10 pts) 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 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 conditions during and after lab	50	50	6.25%
<i>Lab Final – Structure Determination</i>	<i>50</i>	<i>50</i>	<i>6.25%</i>
Total Points		800	100%

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 materials 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. And it is also YOUR RESPONSIBILITY to check for grading errors. Individual scores will be posted in Canvas as soon as they become available.

Laboratory Safety: The mastery of chemistry requires students to learn 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 and required. You must be in the lab at the assigned starting time to receive full credit for the lab. If you plan to miss a lab for any reason, please contact the TA and instructor for alternate arrangements. If time and space allow, you can make up the lab in another section, otherwise, you may earn no credit for a missed lab.

Note: Because of COVID-19 alternative labs will not be available this quarter.

Our Hyflex format will have students work in partners/groups of two: one partner in person and the other online. The partners will switch roles each week, so one week you will be online and the following week in person. This format is to maintain social distancing in the lab and to follow the guidelines of the university to have no more than 12 people (max capacity) in the lab. Attendance for both in-person and online partners is compulsory and cameras during zoom session should be working and on all through lab periods. Also, note that all submissions would be electronic and please keep your TA safe in the lab and stay 6 feet from him/her.

Academic Integrity:

While I support collaborative learning and teamwork, I also strongly believe that everyone should maintain the highest ethical standards for assignments and reports. 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:*Note: Labs are subject to change*

Week1_Jan11	No Lab			<i>Chapter 1</i>
Week2_Jan18 (No Lab)	MLK	No Lab		<i>Chapter 2-3 & 21</i>
Week3_Jan25	Lab 1	*Introduction to Organic chemistry lab Safety, and Syllabus *Distillation and GC	Pre-lab 1 (20 pt)	<i>See Pre-Lab</i>
Week4_Feb1	Lab2	Functional Groups and Computation IR spectroscopy	Pre-lab 2 (20 pt) Post-lab1	<i>See Pre-Lab</i>
Week5_Feb_8	Lab 3	Steam Distillation - Eugenol	Pre-lab 3 (20 pt) Post-lab2	<i>See Pre-Lab</i>
Wee67_Feb15	Lab 4	Grignard Reaction	Pre-lab 4 (20 pt) Post-lab 3	<i>See Pre-Lab</i>
Week7_Feb22	Lab 5	Two-step Organic Reaction	Pre-lab 5 (20 pt) Report 4	<i>See Pre-Lab</i>
Week8_March1	Lab 6	Hydrogenation of Curcumin	Pre-lab 6 (20 pt) Post-lab 5	<i>See Pre-Lab</i>
Week9_March8	Lab 7	Synthesis of Acetaminophen	Pre-lab 7 (20 pt) Report 6	<i>See Pre-Lab</i>
Week10_March15		Lab Final (structure determination) OR Crystal Growth Experiment	Report 7	