



CHEM2470 Organic Chemistry I Laboratory

The University of Toledo
Department of Chemistry & Biochemistry
College of Natural Sciences
CHEM 2470 – All Sections

Instructor: Dr. Emily Dzurka

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Office Hours: In-Person: Tuesday 10 – 11 am, Wednesday 10 am – 12pm

Virtual: Monday 3 – 4 pm, Wednesday, 9 – 10 am, or by appointment

Office Location: WO 2268B

Office Phone: (419) 530-4934

Term: Spring 2022

Class Location/Day/Time: see end of syllabus

Credit Hours: 1

CATALOG/COURSE DESCRIPTION

Practice of organic laboratory techniques. Approved chemical safety goggles meeting the American National Standard Z87.1-1968 must be worn by every student during every laboratory class meeting.

REQUIRED COURSE ACCESS

We will predominately work through Blackboard. Blackboard is a course management system provided by the University of Toledo and can be accessed at <https://blackboard.utdl.edu/> . Your access code is your UTAD username and password. You should consult the site regularly for news and announcements. Handouts, lecture notes, and lab experiments will be posted. The system also permits you to check your grades at any time and to email your instructor or other students in the class.

COURSE OVERVIEW

Welcome to Organic Chemistry! The purpose of this laboratory course is to introduce students to the techniques that organic chemists (as well as biochemists, physical chemists, etc.) use in their daily routines. After learning and understanding those techniques, students will apply their knowledge to new situations to understand synthesis reactions, molecular structure determination, and analysis of (un)known compounds. Organic chemistry laboratory is important for several reasons. It introduces students to many different laboratory practices and concepts that will be used in subsequent chemistry laboratory classes (CHEM 2470 and beyond) and in other laboratory situations in biology, pharmacy, and chemical engineering (just to name a few!).

STUDENT LEARNING OUTCOMES

Upon completion of this course, the student will be able to:

- *Interpreting and following scientific directions*
- *Names and proper usage of lab instruments*
- *Understanding of general properties of compounds (including solubility, miscibility, acid/base chemistry, etc.)*



- *Demonstrate their knowledge of departmental safety rules through their laboratory practice, including the ability to dispose of waste properly.*
- *Apply basic stoichiometric algorithms (calculating limiting reagents, theoretical yield, mole ratios) in the context of organic chemistry.*
- *Demonstrate a command of the rules for assigning significant figures in their work, specifically in calculations and laboratory measurements and calculations.*
- *Understand and be able to use the basic operations of an organic chemistry laboratory including gravity and vacuum filtration, liquid-liquid extraction, simple and fractional distillation, reflux, recrystallization, thin-layer chromatography, gas chromatography, column chromatography, drying of solids and solutions, and the theories behind these techniques.*
- *Know the significance of pK_a values in experimental steps.*
- *Identify and assess the purity of organic compounds using analytical techniques, including melting point, thin-layer chromatography, IR, and gas chromatography.*
- *Deduce organic structures using spectroscopic methods, including infrared (IR), ^1H - and ^{13}C - nuclear magnetic resonance spectroscopy, and mass spectrometry*
- *Determine molecular formulas from a mass spectrum by using the Rule of 13 and other techniques*
- *Deduce hydrogen deficiency (degrees of unsaturation) from a molecular formula and use this information to help deduce a structure*
- *Be able to follow a detailed experimental procedure and construct a flow diagram to illustrate it.*
- *Depict and explain detailed chemical mechanisms for all laboratory reactions (and their related reactions)*
- *Demonstrate the ability to maintain a properly maintained laboratory notebook*
- *Construct a lab report that includes an analysis of the data collected, and discussion of the outcomes and answers to open questions associated with the experiment.*

PREREQUISITES AND COREQUISITES

Students must have completed the General Chemistry sequence before enrolling in this course (CHEM 1230/1240, 1280/1290) with a grade of C- or better, as well as Organic Chemistry I (CHEM 2410) and Organic Chemistry I Laboratory (CHEM 2460) with a grade of C- or better. Students also are required to be concurrently enrolled in (or have successfully passed) Organic Chemistry II lecture (CHEM 2420). Please note a student, registered for both CHEM 2420 and 2470 concurrently, who is intending to drop/withdraw from the lecture course by mid-semester (in first 8 weeks) must also drop the associated lab course. A student withdrawing from the lecture during the last weeks of allowed withdrawal (weeks 9-10) may be allowed to finish the lab course if they have a grade of C or better in the lab and permission of the lab instructor.

REQUIRED INSTRUCTIONAL MATERIALS (TEXTS AND ANCILLARY MATERIALS)

- A laboratory notebook to write down observations, etc. This does not have to be a carbonless notebook; a normal notebook will work.
- Approved safety goggles (can be purchased from the UT bookstore or from the UT-ACS group)
- *There is no required textbook for this class!* All materials will be provided



COMMUNICATION

You are urged to communicate with Emily Dzurka or the Teaching Assistant about any aspect of the course which concerns you or which might limit your success. We want you to be successful in this course, so let's work together!

STUDENT RESPONSIBILITIES

1. Be on time and be prepared. ***If you are more than 20 minutes late for a laboratory session, you will not be permitted to attend that session.***
2. Read the laboratory assignment and appropriate lecture material prior to each laboratory session. It is required that a laboratory notebook be kept to record pre-lab, notes and observations, experimental results and discussions.
3. Follow lab safety rules and COVID-19 specific rules.
4. Turn in all work as assigned.
 - Pre-labs are due by 11:59 pm the night **before** your registered section. ***You will not be allowed to perform the experiment without completing the pre-lab for it.***
 - Lab reports and worksheets are due at the date listed in the course schedule.
5. ***Clean up:*** Be certain that your area of the laboratory table is properly cleaned after use. Wash and return all glassware and other instruments and equipment to their proper areas. Check the sink to be sure that it is clear of all glassware and trash.

Safety Requirements: There will be another document that will go over specific safety policies and procedures, but here are the basic rules of the lab:

1. Eating, drinking, and smoking are NOT PERMITTED in the laboratory.
2. Non-registered persons are not permitted in the laboratory.
3. Appropriate laboratory apparel including footwear is required (i.e.: jeans, cotton shirts, no loose clothing, etc.). Students who are wearing clothing inappropriate for lab will be asked to leave the lab. The students may be allowed to come back in the lab (a) if they changed into clothing appropriate for lab and (b) if they are back no later than 20 minutes from the beginning of the lab period.
4. Safety goggles **MUST BE WORN BY EVERYONE** while experiments are being conducted. Your TA will determine and announce when goggles may be removed. The appropriate eyewear must be splash goggles, which are available for purchase from the UT bookstore.
5. Masks must be worn at ALL TIMES and must cover both your nose and mouth.

Students should consult the safety handout concerning additional rules and guidelines for laboratory work. ANY violation of the safety rules/guidelines will result in a loss of technique points. **If a student repeatedly violates these safety rules the laboratory coordinator has the right to remove the student from the laboratory room.**



COURSE STRUCTURE

Laboratory, Prelabs, & Postlabs

- Labs will be principally conducted by your TA.
- You will be required to have appropriate clothing, including safety goggles and masks before being allowed to enter the lab.
- You will be expected to adhere to all of the lab safety rules.
- Have your pre-lab turned in by 11:59 pm the night **before** your section. Your TA will not allow you to enter if this is not turned in on time.
- All post-labs are due at the date listed in the course schedule.

Quizzes and Final Examination

There will be two quizzes and one final examination that will be taken through Blackboard, and the dates are as follows:

- **Quiz 1** March 18th (Friday)
- **Quiz 2** April 8th (Friday)
- **Final Examination** April 22nd (Friday)
- Quizzes and the final exam are timed, and they will be available from 6:00 am to 11:59 pm and you can take it at a time that works best for you during that window. Lockdown Browser/Webcam is NOT required.
- Students who unexpectedly miss a quiz or exam due to extreme circumstances such as severe illness, death in the family, or car accident should inform their instructor *ASAP*. **Documentation** such as a physician's note, funeral program, an accident report, etc is required. An email to the instructor is expected. In all other cases a missed exam will result in 0 on the quiz or exam.

Worksheets

There will be 4 worksheets this semester and will be found on Blackboard under the "Worksheets" tab. All the worksheets are due at the appointed time in the course schedule. The due dates are in the course schedule below.

Technique and Cleanliness

Technique points are determined by the TA and laboratory coordinator. These are earned during each lab experiment. Components of the technique score include laboratory safety, attitude, demonstration of competent lab techniques, ability to perform routine tasks in a timely manner, and neatness of lab drawer, work area, shared equipment, and chemicals. If the lab is found to be messy at the end of the lab period, either by the laboratory coordinator, TA, or the chemistry stockroom, the entire class will lose cleanliness points.



OVERVIEW OF COURSE GRADE ASSIGNMENT

Course Points:

The following is the distribution of possible points in the course:

Safety Quiz	10 pts
Lab Reports (9 @ 50 pts each)	450 pts
Capstone Report	100 pts
Worksheets (4 @ 20 pts each)	80 pts
Quizzes (2 @ 20 pts each)	40 pts
Technique (9 @ 5 pts each)	45 pts
Lab Cleanliness (9 @ 5 pts each)	45 pts
Final Exam	<u>100 pts</u>
Total:	870 pts

Grade Scale: These are the minimum percentages (points) needed to receive the indicated grade:

A	90%	A-	87%	B+	84%	B	81%
B-	78%	C+	75%	C	72%	C-	69%
D+	66%	D	63%	D-	60%		

Please note that extra credit will NOT be given in this class. In order to compensate for differences in grading among TAs, different grading scales or grading adjustments may be used in order to ensure that fair grade assignments are made for each lab section.

You can monitor your grade throughout the semester via the online grade book in Blackboard. It is your responsibility to ensure that every entry made by your TA is correct. At the end of the semester a final grade will appear in Blackboard. You will have two days to notify your instructor via email of an error in your final grade. Once the grades are uploaded to the official UT grade system, grade changes can no longer be done quickly.

LATE WORK POLICY

Any documents that are **not** turned in to Blackboard on the due date will count as late.

Lab Reports: Late assignments will receive a 5-point grade deduction for each day late. Any assignment 1 week late or later will receive a zero (0) grade.

Worksheets: Worksheets can be found on Blackboard. Late assignments will receive a 3-point grade deduction for each day late. Any assignment over 1 week late will receive a zero (0) grade.

Quizzes and Exams: There will be no make-up exams or quizzes. Students who unexpectedly miss a quiz or exam due to extreme circumstances such as severe illness, death in the family, or car accident should inform their instructor *ASAP*. **Documentation** such as a physician's note, funeral program, an accident report, etc is required. An email to the instructor is expected. In all other cases a missed exam will result in 0 on the quiz or exam.



POLICY ON REGRADING

If you have any questions or concerns about your grade or want to contest a grade for a certain assignment, you need to present the assignment directly to the laboratory coordinator, Emily Dzurka, and she will re-grade the assignment – not your TA. There is only a one-week window (after you have received your graded assignment back from your TA) in which you can contest the grading of an assignment, lab report, or quiz, so please check your graded assignments as soon as the assignment grades are posted by your TA.

LAB ATTENDANCE POLICY

Attendance is mandatory unless you have a valid excuse. You are expected to be on time and ready for lab at the beginning of each lab period. You will not be allowed into the lab if you are substantially late (20 minutes or more), or if your pre-lab is incomplete. During the first 20 minutes, your TA will cover the basic information necessary to complete that day's experiment, safety issues, precautions, and locations of chemicals and other materials. After the experiment has begun, for safety purposes, your TA needs to be working with all students, not covering the information for those students who are late. Therefore, if you are more than 20 minutes late, you will not be permitted to attend the laboratory and it will be counted as an unexcused absence. If you miss an experiment, you may make it up only by attending another lab section during the week that particular experiment is scheduled, and if the lab coordinator and TA are notified prior to going to another section. It is up to you to make these arrangements either in person or via e-mail. Be sure to arrange this as soon as possible because not all lab sections have availability for attendance for make-up labs.

EXCUSED ABSENCE POLICY

Excused absences will be given only to students who miss a lab under the conditions listed below. A student will be excused from **no more than two absences** during the semester. Students who will not be able to attend lab at the scheduled time due to an irresolvable conflict with a major responsibility must provide some written documentation to verify the conflict. This situation may occur for students on official university business, including athletes. Approval must be obtained before the scheduled lab period. Students who do not attend lab due to illness, car accident, and death in the family or similar extreme circumstance should inform their instructor of their difficulties **within 7 days** of the missed lab period. These difficulties must also be documented by a physician's note, an accident report, pastor's note, etc. Contact information for the police department, pastor, etc. must be included on the note or report.

You must submit to the lab coordinator the supporting document within **7 days** of missing a lab experiment by emailing me at Emily.dzurka@utoledo.edu. Excused Absence requests received after 7 days and those with no supporting documentation will not be approved. If an excuse is deemed as acceptable by the lab coordinator, your final course grade will be computed accordingly.

In all other circumstances, a missed lab experiment will result in a grade of 0. You will not be excused from lab for personal reasons. Examples of missing a lab due to personal issues include, but are not limited to: oversleeping, transportation problems, vacation plans, work schedule conflicts, fire alarms in adjacent buildings, etc. If you know in advance that you will miss a lab session, and if you let laboratory coordinator know well in advance of the absence, every effort will be made to find an alternative lab section for you to attend. Your postlab report will **not** be graded if you do not attend the experiment the week it is scheduled.



IMPORTANT COVID-19 SPECIFIC RULES

Due to the current additional requirements implemented to prevent the spread of COVID-19, the following summary outlines some important changes to this semester's lab course.

- There will be **no loaner goggles** supplied by the Chemistry Stockroom. You must own your own goggles. You must arrive appropriately dressed (no exposed skin except for arms shoulders down, closed toe shoes that will not be penetrated by a simple spill) and with approved goggles.
- We recommend that you bring a **spare mask** to lab in case yours gets exposed to chemicals by accidental touching etc.
- If you show any kinds of symptoms – do not attend lab and reach out to Emily Dzurka immediately. Virtual materials can be made available, and you will be able to finish work that you would otherwise miss due to the quarantine.
- 50% of the labs must be done in-person, otherwise an incomplete will be issued and the labs must be made up in a future semester
- Online lab videos will only be provided to students who are in quarantine, waiting on COVID-19 test results, or have tested positive. For an online lab to be granted documentation of the test/mandated quarantine must be provided.

UNIVERSITY POLICIES

Policy Statement on Non-Discrimination on the basis of Disability (ADA): The University is an equal opportunity educational institution. Please read [The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance](#).

ACADEMIC ACCOMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the [Student Disability Services Office](#).

ACADEMIC POLICIES

As a student at The University of Toledo you should be familiar with the policies that govern the institution's academic processes, for example, academic dishonesty, enrollment status, grades and grading. Please read through the undergraduate academic policies. Students are expected to attend every class meeting of courses in which they are registered. Please read the missed class policy. Undergraduate Policies: <http://www.utoledo.edu/policies/academic/undergraduate/>

INCLUSIVE CLASSROOM STATEMENT

In this class, we will work together to develop a learning community that is inclusive and respectful. Our diversity may be reflected by differences in race, culture, age, religion, sexual orientation, gender identity/expression, socioeconomic background, and a myriad of other social identities and life experiences. We will encourage and appreciate expressions of different ideas, opinions, and beliefs so that conversations and interactions that could potentially be divisive turn, instead, into opportunities for intellectual and personal development.



Inclement Weather Policy

If classes are cancelled on a lab day, lab **WILL PROCEED** at the next scheduled lab meeting. We will adjust the experiments to account for the reduced availability of lab time.

LAB COURSE SCHEDULE

The following table will be used as our schedule for this semester. This is subject change as needed. Postlabs and worksheets due dates are listed, and all materials will be uploaded to Blackboard. The prelab is due by 11:59 pm the night before your lab section. All postlabs and worksheets are due by the dates listed in the course schedule.

Week	Lab Exercise	Due Dates & Notes
Week 1 – Jan 17 th – Jan 21 st	No Lab	• Jan 21 st – Safety Video/Quiz on Blackboard & Signed Policies and Procedures Form
Week 2 – Jan 24 th – Jan 28 th	Check-In & NMR Lecture	
Week 3 – Jan 31 st – Feb 4 th	Exp 1: Competitive E _{Ar} S Reactions	• Feb 4 th - ¹ H NMR Worksheet
Week 4 – Feb 7 th – Feb 11 th	Exp 2: Reductive Amination Reactions	• Feb 11 th - Postlab 1
Week 5 – Feb 14 th – Feb 18 th	Exp 3: Aldol Condensation	• Feb 18 th - Postlab 2
Week 6 – Feb 21 st – Feb 25 th	Exp 4: Esterification of Unknown Alcohols and Acids	• Feb 25 th - Postlab 3 & ¹³ C NMR Worksheet
Week 7 – Feb 28 th – Mar 4 th	Exp 6: Synthesis of Carbonyl-Based Polymers	• Mar 4 th - Postlab 4 & Mass Spec Worksheet
Spring Break – No Lab		
Week 8 – Mar 14 th – Mar 18 th	Exp 7: Suzuki-Cross Coupling of Unknowns	• Mar 18 th – Quiz 1 – completed on Blackboard & Postlab 6
Week 9 – Mar 21 st – Mar 25 th	Exp 8: Mizoroki-Heck Coupling Reaction	• Mar 25 th - Postlab 7
Week 10 – Mar 28 th – Apr 1 st	Exp 9: Host:Guest Chemistry of Self-Assembled Cages	• Apr 1 st - Postlab 8
Week 11 – Apr 4 th – Apr 8 th	Exp 10: Synthesis of an Unknown Heterocycle & Checkout	• Apr 8 th – Quiz 2 – completed on Blackboard & Postlab 9



Week 12 – Apr 11 th – Apr 15 th	Capstone Report	<ul style="list-style-type: none"> Apr 15th – Postlab 10 – uploaded to Blackboard & Watch Using Rule of 13 Video on Blackboard
Week 13 – Apr 18 th – Apr 22 nd	No Lab – Final Exam will be completed on Blackboard	<ul style="list-style-type: none"> Apr 22nd – Capstone Report & Final Exam – both will be uploaded/completed on Blackboard
Week 14 - Apr 25 th – Apr 29 th	No Lab	

LAB LOCATIONS, TIMES, AND DATES

Below are the lab sections for the Spring 2022 semester. Please note your section, room, lab time and day.

Section	Room	Meeting Time	Meeting Day
001	BO3087	8:30 am – 12:20 pm	Tuesday
003	BO3087	1:00 – 4:50 pm	Tuesday
004	BO3089	1:00 – 4:50 pm	Tuesday
005	BO3087	5:30 – 9:20 pm	Tuesday
007	BO3087	8:30 am – 12:20 pm	Thursday
009	BO3087	1:00 – 4:50 pm	Thursday
010	BO3089	1:00 – 4:50 pm	Thursday
011	BO3087	5:30 – 9:20 pm	Thursday
013	BO3087	8:30 am – 12:20 pm	Friday
016	BO3087	1:00 – 4:50 pm	Friday



SPECIAL COURSE EXPECTATIONS DURING COVID-19

Maintaining a safe campus during the ongoing COVID-19 pandemic remains a top priority. UToledo continues to follow the guidance of the U.S. Centers for Disease Control and Prevention and Ohio Department of Health to keep our campus safe.

ATTENDANCE

The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course. Before coming to campus each day, students should take their temperature and complete a self-assessment for symptoms of COVID-19, such as cough, chills, fatigue or shortness of breath. Anyone with a temperature at or above 100.0 degrees Fahrenheit or who is experiencing symptoms consistent with COVID-19 should not come to campus and should contact their primary care physician or the Main Campus Health Center at 419.530.3451 or Health Science Campus Student Health and Wellness Center at 419.383.5000. For more information on the symptoms of COVID-19, please go to <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>

COVID-19 testing for sick students is available on both Main Campus and Health Science Campus. Call 419.383.4545 for an appointment. Absences due to COVID-19 quarantine or isolation requirements **are** considered excused absences. Students should notify their instructors and follow the protocols summarized in this document on [Navigating COVID-Related Course Concerns](#).

In the event that you have tested positive for COVID-19 or have been diagnosed as a probable case, please review the [CDC guidance](#) on self-isolation and symptom monitoring, and report the disclosure to the Division of Student Affairs by emailing StudentAffairs@utoledo.edu or by connecting with their on-call representative at 419.343.9946. Disclosure is voluntary and will only be shared on a need to know basis with staff such as in the Office of Student Advocacy and Support, The Office of Residence Life, and/or the Office of Accessibility and Disability Resources to coordinate supportive measures and meet contact tracing requirements.

FACE COVERINGS

Face coverings are required while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. Students will not be permitted in class without a face covering. If you have a medical reason preventing you from wearing a face covering due to a health condition deemed high-risk by the CDC, submit an [online application](#) to request an accommodation through the Office of Accessibility and Disability Resources. Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. Students already affiliated with the Office of Accessibility and Disability Resources who would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility specialist to discuss their specific needs. You may connect with the office by calling 419.530.4981 or sending an email to StudentDisability@utoledo.edu.



VACCINATION

Doctors and other health care professionals agree that the best way to protect ourselves and each other is to get vaccinated. Case data clearly show that vaccines remain highly effective at preventing serious illness from COVID, including the highly contagious delta variant. If you have not yet received your COVID vaccine, the University encourages you do so as soon as possible. No appointment is needed to get the shot at the UTMC Outpatient Pharmacy, University Health Clinic or Main Campus Pharmacy. Once you receive the COVID vaccination, please register on the COVID Vaccine Registry site at:

<https://utvaccinereg.utoledo.edu/>.

SPECIAL NOTES

It's important to note, that based on the unpredictability of the COVID-19 virus, things can change at any time. So please be patient and understanding as we move through the semester. Please refer to <https://www.utoledo.edu/coronavirus/> on a regular basis for updates to current requirements or mandates. I also ask that you keep me informed of concerns you may have about class, completing course work/assignments timely and/or health concerns related to COVID.