
PRINCIPLES OF ORGANIC CHEMISTRY LAB

CHEM 2455L Fall 2019

TLC 3107

Section 01: Thursdays, 9am-12pm

Section 02: Thursdays, 2pm-5pm

Instructor: Dr. Megumi Fujita

Office: TLC 2122 Office phone: 678-839-6024

E-mail: mfujita@westga.edu

Office Hours: M 12:30-3, T 10:30-12:30, W 12:30-2, F 8-10 & 12-2 or by appointment

Course Material:

- **CHEM 2455L Laboratory Manual: Principles of Organic Chemistry Lab, 4th Edition** Required, available as a course pack at the UWG Bookstore.
- **Organic Chemistry Model Kit:** This is required for this lab course, and is useful for the CHEM2455 lecture course. Available at the UWG Bookstore.
- **Safety goggles** are required to be worn during the lab. Goggles can be borrowed from the common stock. If you wish to purchase your own goggles, you may do so through Ms. Amber Rainey at the Chemistry Office (TLC2135, \$5, you will need to take a slip to the Purchasing Office at Aycock Hall, pay, and bring back the receipt), or at Home Depot or from Amazon.com.

Co-requisite: This course should be taken with CHEM2455, which is a co- or pre-requisite concurrent. If you withdraw from the lecture class, you should also withdraw from the lab.

Course description:

This is the laboratory component of the one-semester organic chemistry course Principles of Organic Chemistry designed primarily for biology majors.

The first half of the semester, you will learn **basic organic laboratory techniques** and their uses (melting point measurement for compound identification and purity assessment, recrystallization for purification, thin layer chromatography for mixture separation and identification, liquid-liquid extraction for separation of organic compounds). These techniques are widely applicable, and will be used again in the second half of the semester.

In the last half of the semester, you will experience a variety of **organic chemical reactions** (nucleophilic substitution reactions, alcohol and aldehyde oxidation, ketone reduction, and esterification). **Infrared spectroscopy** will be introduced as a powerful tool to analyze the presence and absence of important functional groups in the reaction products. When you carry out organic synthesis reactions, you will review how to calculate the **limiting reactant, theoretical yield, and % yield**. All of the reaction labs are aligned with the lecture contents to symbiotically enhance your learning. One lab, the molecular modeling, is specifically designed as a practice and visualization session for the topics of molecular conformation and stereochemistry, when they are covered in the lecture.

Learning Outcomes:

1. You will be able to carry out basic organic laboratory techniques, including melting point measurement, recrystallization, safe boiling, chromatography separation and analysis, liquid-liquid extraction, reflux, and infrared spectroscopy.
2. You will demonstrate the knowledge on the vocabulary and concepts on the organic laboratory techniques listed above.
3. You will demonstrate your understanding of how the types of various organic compounds (e.g. functional groups) correlate to their properties such as solubility, chromatographic behavior, and in several reaction types (e.g. acid-base, redox, carbonyl chemistry).
4. You will be able to evaluate experimental results to determine the identity, purity, and yield of organic reaction products.
5. You will be able to report experimental outcomes in clear and scientific manners in writing.
6. You will know safe laboratory practices handling laboratory glassware, equipment, chemical reagents, and chemical wastes.

Safety: The hazards encountered in CHEM2455L are significantly higher than those encountered in the Principles of Chemistry Labs (CHEM1211L and 1212L). The safety contract must be completed, signed, and turned in on the first day of lab before you will be allowed to begin experimental work. Read the experiment before starting each experiment. You should be aware of safety hazards associated with each experiment before you begin work. Students with known conditions (i.e. respiratory problems, allergies, pregnancy, etc.) should consult with the instructor for special precautions.

Grades (90-100% A, 80-89% B, 70-79% C, 60-69% D, <59% F)

Prelab quizzes (10%)

Postlab reports (60%)

Lab final exam (20%)

Online Environmental Health & Safety (5%)

Instructor points (5%)

Preparation for Each Lab: The labs will require preparation and careful work to complete in the allotted time. Read all laboratory material before coming to lab, and take the **on-line prelab quiz on CourseDen**. The deadline for the prelab quizzes will be 2 hours before the beginning of lab class.

During the lab: Complete all the laboratory activities during the laboratory class period. Most labs are individual work. Some labs allow working with a partner, but each student will still complete their own report. If you complete all the work early (>30 minutes before the end of the class period), show all the records to the instructor and get a permission to leave early.

Tardiness / Missed Lab: Lab attendance is mandatory. At the beginning of each laboratory important information regarding the day's experiment, including the safety issues, will be discussed. You must be present. If you miss the bulk of the prelab instruction, you may not be

permitted to work in the lab and it will be counted as an equivalent of unexcused absence with a grade of zero). Even if you are allowed to work on the lab after being late, the tardiness will result in a lower grade.

Unexcused absences will result in a grade of zero for the missed lab. If you have a valid excuse for missing a lab, email or contact the instructor **BEFORE** the start of the lab. If an excuse is due to a university-supported event (e.g. Sport team, conference presentation), a letter from the supervisor should be sent to the instructor well in advance. An absence due to medical or legal situations must accompany a valid document. A missed lab with a valid excuse will be handled on a case-by-case basis (make-up lab arrangement, alternative assignments, etc).

Postlab reports: Completed Post-lab reports must be turned in by the **beginning** of the next lab class (except a few labs require “In-class worksheet” which must be completed by the end of the lab period). If you miss the deadline, you can still submit the report for grading, but **late submission penalty of 10% per day** will apply (5% within the same day but late). This means if the submission is late by 10 days, you can receive no grades.

Lab final: A closed-book lab final exam will be given on the day of checkout. The study guide is included in the lab manual.

Instructor points: your instructor will assign points based upon your punctuality, ability to work within the time assigned, respect for safety rules, respect for the instructor, TAs and other students, clean up after each lab, and good attitude.

Online Environmental Health & Safety: All students who will work in a laboratory are required to complete the following TWO online training modules under <http://www.usg.edu/facilities/resources/training> **by the second lab period.**

1. **Right-To-Know Basic Awareness with the Global Harmonized System**
2. **Hazardous Waste Awareness**

*At the end of each online training, a **Certificate will be displayed with your name**. Instead of printing them, please take a digital picture of the screen (or use Print Screen function), and **save the screen images as “Lastname basic” or “Lastname hazardous”** (with your own last name, of course), and deposit the images to the assignment folder in CourseDen. If you have completed these RTK training earlier this academic year (July 2019-) and can present the evidence (e.g. your on-campus employer’s e-mail confirmation), you may do so instead.

Academic Misconduct: Honesty in reporting results is one of the essential characteristics of your laboratory work. Any form of academic dishonesty or misconduct will be penalized to the fullest extent possible, including a grade of zero in the assignment or grade of F for the entire course, or in a serious case, expulsion from the university. **Falsifying data** includes (but is not limited to) fabrication of data for lab work you did not do, and changing poor data to better-looking data. Little of your grade depends on getting "good" quantitative results; you will be more severely penalized for misrepresenting results than for honestly reporting "poor" results. Any type of cheating for the final exam will result in a grade F for the entire course.

Other policies:

- You need to wear closed toed shoes (no sandals allowed). You are not allowed to do any laboratory work if your feet are not appropriately covered.
- You need to wear your safety goggles at all time in the lab. Even if you are done and not handling chemicals, as long as other students are still handling chemicals, you must wear safety goggles.
- The use of cell phones and electronic devices is strictly forbidden at any time during the lab. An exception is the use of a cell phone as a timer. No other functions should be used.
- Do not take pictures of the whiteboard. You must use your own hands and take notes. This is for your own education. Taking notes is a great way to learn.
- You are to work at the station that has been assigned to you at the beginning of the semester and nowhere else.
- Please review the campus-wide common policies on academic support, honor code, email policy, credit hour policy, HB 280 campus carry policy, and mental health support on the following webpage: <https://www.westga.edu/administration/vpaa/common-language-course-syllabi.php>

LABORATORY SCHEDULE CHEM2455L

***** Note: the order is rearranged to fit the lecture plan *****

Dates	Lab #	<i>Experiment</i>
8/15	0	Syllabus, Lab safety, Check-in
8/22	1	Melting point
8/29	2	Recrystallization
9/5	4	Thin layer chromatography (TLC)
9/12	5	Column chromatography: Separation of plant pigments
9/19	3	Molecular modeling (In-class worksheet)
9/26	6	Acid-base, liquid-liquid extraction
10/3		No lab (Fall Break)
10/10	7	Nucleophilic substitution reactions (SN1 and SN2)
10/17	8	IR spectroscopy (In-class worksheet)
10/24		(No lab... study for lecture exam.)
10/31	10	Test for functional groups (Alcohols, Aldehydes, Ketones, and carboxylic acids)
11/7	9	Reduction of a ketone with hydride
11/14	11	Ester synthesis
11/21	*	Postlab 11 due. Optional Review Session to prepare for Lab Final
11/28		Thanksgiving week
12/5	12	Checkout and Lab Final Exam