Chemistry 255 Lab Fall 2025
Mondays 6:30–9:30 PM SCCT 1069

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Office Hours: Monday 3–4:30 pm, Wednesday 1–2 pm, Thursday 4–5:30 pm or by appointment

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Welcome to Chem 255 Lab! You will find the full lab syllabus and schedule of experiments on the course blackboard. Be sure to familiarize yourself with it in addition to what is highlighted here. The experiments this semester will have a puzzle for you to solve using spectral data and your mechanistic understanding. Thus, for many experiments you will be collecting your own IR and NMR spectra and collect GC/MS data. There are two instructional videos for prepping and loading NMR samples on blackboard and you will have to pass the NMR test before the first experiment. This semester you will have the choice to use either TopSpin **or MestReNova** to process your NMR data and make professional looking spectra. On blackboard there are instructions for installing and using either program. MestReNova may be a good choice for those who previously had difficulties getting TopSpin working on their computers.

Attendance: Please ensure you show up to lab **on time** each week. In addition to an overview of the week's experiment, the prelab lecture may contain key safety information that is crucial to the safety of yourself and others. If you are unable to attend your session for any reason (e.g. illness, athletics), please contact me as early as possible. If you have not alerted me before the session begins, you will receive a zero for the experiment.

Lab Safety: You are responsible for both your personal safety and the safety of others around you in the lab. If you have any questions regarding safety or are unsure of something, please ask. As with prior labs, read the lab safety rules on blackboard and complete the lab safety quiz before doing lab work. **Use of phones and electronic devices should be limited during the lab**, and should never be used near the hood or while wearing gloves. If you spill chemicals on yourself/somewhere else, break glass, or sustain any cuts/injuries, please tell me or the TA. You are expected to follow instructions on chemical use and waste disposal provided by myself or the TA. Failure to follow safety rules could lead to your dismissal from lab (resulting in a zero for that lab).

Pre-lab: Preparation is key to your success and safety in the lab. Pre-labs are due at the start of lab, and students without a completed pre-lab will not be allowed to begin the experiment. Your pre-lab should be written in your lab notebook and should be no more than one page. The copy page will be collected. There is an example pre-lab on blackboard for a general model of what is expected. In general, the pre-lab should contain:

1. Header information: experiment title, name, and date.
2. A sentence for the purpose of the lab.
3. A written and balanced equation for any reactions that will be performed including drawn out structures for all organic chemicals. The structures of solvents and inorganic reagents are not necessary.
4. A table of reagents (including solvents) that includes molecular weight, the moles used, the amount used, the molar equivalents, appropriate physical properties (e.g. density and boiling point for liquids, melting point for solids), and **any major safety precautions** (look up Safety Data Sheet online).
5. A table of the name, molecular weight, and physical properties of the organic product(s).
6. References to any sources used for #4 and #5.
7. A calculation of the theoretical yield(s) of any reactions (show calculations; see Padias pp. 20–21).
8. A brief experimental plan (refer to example on blackboard); this should be just a few bulleted lines.

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Lab Notes: These will be recorded in your notebook as you work in the lab, and should be submitted before you leave the lab. You should record your actual procedure, actual amounts used, all data, **observations and details**. Record weights to four decimals. This is the record of what you did; anyone should be able to repeat the experiment using exclusively your notes! There are two styles for keeping lab notes you can choose from (see "Samples of pre-labs, notebooks, and labelled spectra" on blackboard for more details):

1. During lab, write in paragraph from or a bulleted list (using past tense) all procedural steps and observations in lab as you do the experiment. No additional preparation before lab is necessary.
2. Before lab, prepare numbered procedural notes in the left column of a new page. Then during lab in the right, write in the past tense your observations and any deviations to the pre-written procedure opposite of each numbered step.

Lab Clean Up: You are responsible for cleaning up your hood and glassware before you leave lab. Clean glassware by rinsing organic residue into the organic waste jar with a small amount of acetone, wash with soap and water, and then return it to your drawer. Do no leave glassware out on the bench, in a sink, drying rack, or hood.

Lab Reports: You will have a lab report to submit in paper for all experiments except one, which will have an oral report. These are due at the start of your lab session according to the due dates listed in the lab schedule. All writing should be in past tense, using passive voice. There are three general formats for the reports this semester:

1. For some reports there will be specific questions to answer included in the lab handout. Your responses may be handwritten on the lab handout sheets or typed in a separate document. Write out all work for any calculations. Be sure to be concise and say only what is needed to answer the question.
2. For reports without specific questions at the end of the handout, you will write a brief (no more than two pages) discussion section to analyze your results. These reports should be. These should begin with a summary of your collected data, such as yield, and include any calculations. For the majority of this section you will interpret your results, writing a strong argument to support your conclusions. There are tips for writing strong arguments below.
3. For one experiment you will do an oral report (there is no pre-lab or lab notes for this experiment either). You will receive detailed instructions for the oral report in the experiment's lab handout. You are required to have an appointment with the OCC before you give your presentation.

For all labs, you will be working with spectral data to analyze the outcome of the experiment. You will be required to submit your labeled spectra for each experiment and there is a guide to labeling spectra properly on blackboard. Properly labeling spectra is crucial to the report and to your analysis so take care reviewing this. If you have any questions, please do not hesitate to ask for help! For many reports, you will also need to write a mechanism for the performed reaction. These can be handwritten in your reports but must be complete, including arrow pushing.

Grading: Your pre-lab, lab notes, and report will receive one letter grade; each experiment will be weighed equally. Late reports will be penalized with a partial letter grade deduction per day (one letter grade per week). If a report becomes three weeks late, it will receive a zero. Failing to turn in two labs will result in failing the course. If you have a reason you may need an extension, you must contact me before the due date (ideally as early as possible) so we can arrange something. Please reach out if you need help or are feeling overwhelmed.

Honor Code: All submitted work must be your own. You may work through data and discuss ideas with a friend or classmate, but when you write your report, do your own writing, label your own spectra, write your own mechanisms, etc. Discussions about data or collaborations with others must be acknowledged in the report. The use of outside resources (e.g. textbooks, journals, etc.) must be properly cited. Use of generative AI, such as ChatGPT, is prohibited. It is an honor code violation to copy someone else's pre-lab, or use someone else's data, ideas, spectra, writing, etc. Please review the complete Honor Code statement in the full lab syllabus.

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Writing Tips: For the written portion of the reports, you need to craft a strong argument to support your conclusions using your data. This could be as little as a single paragraph and at maximum a page or two (you do not need to draft a "full" report with introduction, methods, etc.). Consider what you are trying to argue and craft a logical framework that best supports your point. In most cases, the evidence for your conclusions will come primarily from your spectral data. Start with the **most convincing** piece of evidence first then work down to less important pieces of data that help support your point. Everything you write should make a point, and as you write, reflect on how this is supporting the argument. Thus, do not list all of the peaks present in your IR or NMR spectra. What is the key peak that clearly shows the product is what you say it is? What is the key piece of data narrowing it down to a specific regioisomer? Start with these key peaks first then discuss other peaks or data that supports your conclusion but may not be as distinctive in helping you draw your conclusion.

Use confident language in your writing. Phrases such as "could possibly mean" or "seems to indicate" are not arguing your point; choose your words carefully to present your argument. Avoid phrases such as "matched with" or "fit with" because they are not accurate word choices. You can only "match" if you are comparing your spectrum to one from the literature, which you are not for any written component of this course.

In organic chemistry, you are almost always basing your arguments on some aspect of the structure of the molecule(s) of interest. The functional groups present in the structure are especially important. **Show the structures in your report!** Leave space in your typed argument where you can draw in the structures after you print it out. You must draw the structure on all of your spectra. No computer-generated structure or chemistry drawing software is needed.

Here are some additional basics to keep in mind:

- Reports should be typed and double-spaced (12 point, Times New Roman preferred)
- Write in **passive voice**, past tense. That means do not use I, we, us, our, etc.
- Always include units when discussing numerical data
- Use superscripts and subscripts where appropriate
- One is a "spectrum", multiple are "spectra"
- When referring to a number in your text, write out the number (i.e. "there were four compounds", not "there were 4 compounds").
- The names of chemical structures are not capitalized (excluding at the beginning of a sentence) unless you are referring to a trade name like Tylenol or Aspirin
- When a chemical name starts with a prefix like *tert*- or *p*- (note the italics), the prefix is not capitalized at the beginning of a sentence but the first "regular" letter of the name is, e.g. "*o*-Dichlorobenzene was added…."