

Chemistry 222L: Basic Organic Chemistry Lab II, Spring 2018

Meeting Times	Lab Section 00B: Tuesday 6:00 pm – 9:00 pm (<i>first meeting Jan. 23</i>) Lab Section 00C: Wednesday 6:00 pm – 9:00 pm (<i>first meeting Jan. 24</i>) Lab Section D3: Thursday 1:40 pm – 4:40 pm (<i>first meeting Jan. 25</i>) Lab Section 00D: Thursday 6:00 pm – 9:00 pm (<i>first meeting Jan. 25</i>)		
Location	OSB 401		
Instructor	Dr. Austin Scharf		
E-mail	austin.scharf@emory.edu		
Office	OSB 206		
Office Hours	Tuesdays 2:00-3:00 pm (drop-in) Wednesdays 2:00-3:00 pm (drop-in) Or by appointment (e-mail to set up a time)		
Website	https://canvas.emory.edu/courses/39152		
Description	The organic chemistry lab is a place where you will have the opportunity to discover how organic molecules behave and apply your knowledge to real-world separations and analytical methods. You will think through the scientific method and design your own experiments. Through this process, you will learn to think like a chemist. You will also have the opportunity to hone your skills in scientific writing through several lab reports.		
Learning Outcomes	By the end of Chemistry 222L, students will <ol style="list-style-type: none">1. Apply the concepts of molecular structure, polarity, and intermolecular forces in order to predict physical and chemical properties and explain how laboratory techniques work.2. Use physical and chemical properties to separate mixtures and identify pure substances.3. Practice scientific record keeping skills in a laboratory notebook.4. Concisely present the context, methods, evidence, and evaluation of experiments in brief scientific reports.5. Apply concepts of stoichiometry, reaction mechanism, and physicochemical properties to explain and implement organic chemical reactions.6. Interpret spectroscopic data to identify organic compounds, and use that spectroscopic data to describe purity.		
Course Materials	Required: Carbon-copy notebook (your first-semester notebook is fine) Three-ring binder for background information and reading materials Safety glasses Pen (black or blue only) Basic, four-function calculator There is no lab manual for this course. I will post pre-lab reading materials and procedures to the course Canvas page. You are responsible for printing these materials and bringing them to lab.		
Grading	Lab sessions	8% per lab session x 7 wet-lab sessions = 56% overall	
	Lab reports/CERs	1 CER (4%) + 1 st lab report (5%) + 2 nd lab report (6%) = 15% overall	
	Spectroscopy problem sets	3.5% per problem set x 4 problem sets = 14% overall	
	Written final exam	15% overall	

Your final letter grade will be determined by the usual scale. *There is no automatic rounding or curve to course grades.*

	93		90		87		83		80		77		73		70		67		60	
A		A-		B+		B		B-		C+		C		C-		D+		D		F

Lab Sessions

Each lab session is worth **100 total points**:

- 50 points notebook content and style
- 20 points pre-lab quiz
- 20 points post-lab quiz
- 10 points safety and stewardship in the lab

Laboratory Notebooks: The lab notebook is the most important document in the entire course. It is the record of *everything* you do in the lab, from your preparation *before* lab, to the procedures you undertake *during* lab, to the analysis of your data *at the end of* lab. As such, it accounts for *more than a quarter of your entire grade in Chem 222L*.

Pre-lab quizzes: A short quiz, available on Canvas, will be due before each lab period to determine your level of preparation. You'll be free to use any resources you wish (except your classmates!) to complete this quiz.

Post-lab quizzes: A quiz will be given at the end of most laboratory sessions. These quizzes will cover the concepts behind the experiments or techniques just completed and may include concepts from previous experiments. Much of the information learned in this lab class is cumulative; therefore, you will be held responsible for these thematic concepts throughout the semester.

Safety & Stewardship (see below for more details on safety policy): Because safety in the laboratory is paramount, you must adhere to the safety policies in the lab. *You will never be penalized for an accident*, but you will lose safety points for coming to lab underprepared or disobeying safety rules. In addition, the laboratory space is shared by a large number of separate sections; to be good stewards of the communal space, we expect you to maintain your lab bench and hood in a safe, clean, and organized manner.

Lab Reports

Scientific discoveries build on the shared wisdom of the scientific community. If this were not the case, every scientist would have to rediscover the structure of the atom or the evolution of species for herself. Long before these scientific discoveries are picked up by the mainstream media or appear in textbooks, they are reported in scientific journals. Therefore, writing is crucial to the progression of science. Scientific writing is also helpful to your development as a scientist. Evaluating data and communicating it in a concise and cohesive manner forces you to understand the chemical principles behind your experiments.

For these reasons, you will have the opportunity this semester to build skills in scientific writing. You will submit one "Claim, Evidence, Reasoning" (CER) summary (worth 4% of your overall grade), and **two full lab reports**, worth increasing percentages (5% and then 6%), for a total of 15%.

CER: Experiments 2-3 (Acetylation of Ferrocene, Column Chromatography)

due two weeks after the completion of Exp. 3 (i.e. Feb. 27, 28, Mar. 1)

First full lab report: Experiments 4-6 (Grignard Reaction)

due two weeks after the completion of Exp. 6 (i.e. Mar. 20, 21, 22)

Second full lab report: Experiments 7-8
due two weeks after the completion of Exp. 8 (i.e. Apr. 17, 18, 19)

Full lab reports will adhere to the following format:

Identifying Information
Beginning Question
Claim(s)
Evidence
Reasoning
Reflection, Errors, & Improvement
Literature Cited

The CER is an abbreviated report, for which only the **Claim(s), Evidence, and Reasoning** sections are required.

Your CER and lab reports must be typed, and may be no longer than **three pages**, double-spaced. It is easy to be long-winded and write everything that may be relevant. It is more challenging to write concisely. Think carefully about your experiment, evaluate the evidence you collected, and present only the most important information in a coherent fashion. An additional document, available on Canvas, provides more detail about the expectations for lab reports.

Problem Sets	One of the key skills you will be developing this semester is the ability to interpret spectroscopic data to identify compounds. You will have one in-class and three out-of-class problem sets throughout the semester, which will require you to interpret spectroscopic data to identify organic compounds. These problem sets will also evaluate your understanding of the concepts behind spectroscopic techniques, rather than your ability to memorize patterns of spectroscopic behavior.
Written Final	Everything you learn in this course is interconnected. Every technique builds on previous techniques and concepts. You will be learning a series of techniques that you will have to use and apply throughout the year. Not only do you need to learn <i>how</i> to perform all the techniques, but you must also understand the theory behind them. Consequently, you will be tested on your understanding and application of these techniques in a written final exam, to be held during the penultimate week of classes for the semester (Apr. 17-19), during your regular lab period.
Safety & Stewardship	The chemistry lab can be a dangerous place, but with the proper training, caution, and care, it can be an exceptionally effective learning environment... not to mention some fun! Some of the most important safety guidelines are listed here; the complete safety policy will be covered during the first course meeting.

Attire (Personal Protective Equipment). All students are expected to come to lab wearing lab-appropriate clothing. This means that shirts should have at least short sleeves, and should entirely cover the chest and abdomen (no tank tops or similarly “scant” shirts). Shoes should entirely enclose your feet and not pose any tripping hazards (no sandals, ballet flats, or heels). You must come to lab wearing durable, long pants that entirely cover the ankles (jeans or slacks are best); ***due to the inherent danger of many of the reactions we will perform, shorts and skirts are not permitted in Chem 222L.*** Students are expected to wear safety glasses *at all times while in the lab – even while sitting at desks or not actively working with chemicals*; regular eyeglasses are not sufficient, and should be covered by splash-resistant glasses. Hair that

reaches past the shoulders must be tied back. Students who arrive to lab without the appropriate attire will be sent back to their dorm to change, and will lose safety points.

Safe Practices. Each experiment will come with its own set of new techniques and considerations. Students are expected to read all handouts prior to lab, and familiarize themselves with proper, safe methods for each technique undertaken. The instructor will also discuss safe practices before each experiment begins. These practices may involve proper use of laboratory glassware, safe storage and use of reagents and solvents, proper operation of laboratory equipment, and safe disposal of hazardous waste. Students who do not demonstrate consistent, conscientious, and intentional safe practices in the lab may lose safety points. Egregious or repeated violations of safe practices may result in exclusion from the course, after verbal and written warnings from the instructor.

Stewardship. The organic chemistry lab is a communal space, shared by three other sections of Chemistry 222L, as well as a host of Chem 202 sections. We all share benches, hoods, drawers, equipment, reagents, and glassware. As such, we must be good stewards of our community resources. This means that students should leave the lab *cleaner and more organized than they found it*: glassware should be cleaned and placed on drying racks; reagents, solvents, and other items replaced where they were found; equipment in clean, working order, and the hoods and benches wiped clean with paper towels.

Attendance	Attendance at all lab sessions is <i>mandatory</i> , and there are no makeup sessions. In the event of extenuating circumstances (e.g., a serious illness), please contact me BEFORE the beginning of the lab session to make arrangements. If I am not contacted prior to the missed lab, you will receive a zero for that lab.
Late Work	Assignments turned in late will lose 10% if turned in within 24 hours of the due date, an additional 15% if turned in within 24-48 hours, and will receive no credit if turned in more than 48 hours past the due date. Weekends are included. Late work that is turned in over a weekend must be scanned and submitted by email <i>in addition</i> to submission of a hard copy.
Honor Code	Lab sessions are an ideal setting to promote collaborative learning. You are encouraged to discuss experiments with others before lab and while in lab. You may work with your classmates on in-class assignments, with the exception of post-lab quizzes. However, your problem sets, pre- and post-lab quizzes, lab reports, and final written examination must be your work alone . You must not work with another student after the lab is over, except to share or confirm lab notebook <i>data</i> (not analysis or interpretation) with your lab partner(s). Collaboration beyond this on any report is a violation of the Oxford College Honor Code and will be treated as such.

Tentative Organic Lab Schedule
Spring 2018

Experiment #	Dates	Experiment title
Introduction	Jan. 23-25	Intro/safety/check-in
Exp. 1	Jan. 30-31, Feb. 1	Spectroscopy (primarily “dry lab”)
Exp. 2	Feb. 6-8	Acetylation of Ferrocene
Exp. 3	Feb. 13-15	Column Chromatography
Exp. 4	Feb. 20-22	Grignard, Week I
Exp. 5	Feb. 27-28, Mar. 1	Grignard, Week 2
Exp. 6	Mar. 6-8	Grignard, Week 3
--	Mar. 13-15	No Lab (Spring Break)
--	Mar. 20-22	Writing workshop (<i>tentative</i>)
Exp. 7	Mar. 27-29	Microwave Suzuki Reaction, Week 1
Exp. 8	Apr. 3-5	Microwave Suzuki Reaction, Week 2
--	Apr. 10-12	Review and Recap, Course Evaluations
Final	Apr. 17-19	Written Final Exam
--	Apr. 24-26	No lab