

Description: A one-credit-hour laboratory course designed to accompany organic chemistry lecture.

Pre- and Co-requisites: Grade of 'C-' or better in 1 year of General Chemistry Lecture and Lab and Chem 223

Materials: Making the Connections<sup>3</sup> by Anne B. Padias (ISBN: 978-0738074368)  
Permanently-Bound, Duplicate-Page Notebook (ISBN: 978-1930882003 for example)  
Full-length lab coat  
Safety goggles (will be provided during safety training)

Course Homepage: Announcements, assessments, copies of the handouts, the grade book, etc. are posted on [Sakai.luc.edu](http://Sakai.luc.edu). You are responsible for this material, so you should check Sakai frequently.

Grading: Course grades consist of the following components:

Information Resources Assignment	10 pts
Lab Safety Quiz	10 pts
Chemical Structure Drawing Assignment	5 pts
9 Pre-lab Exercises, 10 pts each	90 pts
9 Pre-lab Physical Property Tables, 3 pts each	27 pts
9 Data Collection and Analysis, 12 pts each	108 pts
Lab Exam #1 (In-class)	100 pts
Lab Exam #2 (via Sakai)	<u>50 pts</u>
	400 pts total

A>93%, A->90%, B+>87%, B>83%, B->80%, C+>77%, C>73%, C->70, D+>67%, D≥60%, F<60%

Information Resources Assignment: This assignment is completed via Sakai in order to familiarize students with authoritative, reliable resources to consult for finding physical property data on organic chemicals.

Lab Safety Quiz: This quiz is completed via Sakai and covers the important lab rules that all students are expected to follow in order to maintain a safe working environment.

Structure Drawing Assignment: This assignment will expose students to chemical structure drawing programs ChemSketch and/or ChemDraw. Be sure to bring your laptop to class the last day if you have one.

Pre-Lab Preparation: Success in organic lab depends on advance preparation. Therefore, there are several things that must be done before coming to lab. One major component of pre-lab preparation is to thoroughly read and understand the experimental procedure and the assigned background reading listed on Sakai. Before coming to lab, students must complete the pre-lab exercise via Sakai. Some of the pre-lab questions will come directly, word-for-word out of the reading assignments to ensure students are completing the readings. Students are allowed unlimited attempts until the due date, and assessments must be submitted to count. Work that is saved but not submitted before the deadline will be ignored. Spelling, grammar and significant figures count. Students should also complete a physical property table in their lab notebook prior to every experiment, which should contain all relevant physical properties and safety information for the compounds being used in the lab that day. The duplicate notebook page containing the physical property table must be turned in prior to the start of lab in order to receive credit.

Data Collection and Analysis: At the end of each experiment and before leaving lab, all students must report their experimental data to the Teaching Assistant. The TA will record the results for each experiment and/or collect any relevant graphs, spectra, etc. If results are not reported or items are not handed in before leaving the lab, the data can be emailed to the TA before the start of the next lab period, but it will only be worth half credit. No data will be accepted after the start of the next lab period.

Students are strongly encouraged to record their results in a laboratory notebook. A properly-maintained notebook keeps all of your results in one place. The format of the notebook is described in the Padias text and in a handout posted on Sakai. One of the most important facets of experimental work is that data should be recorded as completely and accurately as possible. Sometimes, important discoveries are made when things don't behave as expected. Therefore, it is critical that students report their actual data and not what it is thought that the correct answer should be. Students who complete the entire experiment in good faith will automatically receive half of the Data Collection and Analysis points. The remainder of the points will be awarded based on things such as accuracy, completeness of the data, identification of unknowns, etc. Data Collection and Analysis point deductions will also be made for safety violations, not participating in collecting the data, not finishing the experiment, borrowing safety items, etc.

**Lab Exams:** The first lab exam will be completed in-class and will cover the five technique experiments. Be sure to bring a No. 2 pencil and Student ID to the in-class exam. Goggles and lab coats are not needed. The second exam will be completed via Sakai and will primarily cover the types of calculations involved in synthesis experiments. Both exams will include material covered in class, the background readings, as well as some co-requisite and pre-requisite material. Points will be deducted for not following instructions.

**Grading:** In order to facilitate anonymous grading of student work by the TAs, students should only include their student ID numbers on assignments that are submitted for a grade. For this course, these assignments will include the Pre-lab Physical Property Tables for each experiment as well as any graphs or spectra submitted as part of the Data Collection and Analysis score, if applicable for a particular experiment.

**Re-grades:** All requests to have items re-graded must be submitted in writing to the Instructor within one week after the graded materials are returned to the student.

**Attendance:** Students are expected to attend every lab session. Due to safety constraints and size limitations, students will not be allowed to make up an experiment in another section. Missing a lab period will result in an automatic score of zero for the 10 Data Collection and Analysis points and the 3 Pre-lab Physical Property Table points for that experiment. However, students have the opportunity to earn the points back for one absence, no questions asked. Absent students can hand in a missed Physical Property table at the start of the next lab period and will also be provided with one out-of-lab exercise to make up the Data Collection and Analysis points. The make-up exercises will vary depending on the experiment, and students should contact their instructor for the assignment. Make-up assignments must be handed in within one week of the absence to earn the points. Please note that the normal Sakai due dates for the pre-lab exercises will still apply, and students are responsible for all of the material on the lab exams. Missing more than 2 experiments will result in automatic failure of the course.

There will be an attendance sheet that students are required to sign upon entering the lab. It is critical that the attendance sheet exactly match who is present in the lab in the event of an emergency. If a student must leave the lab after signing in (e.g.; to use the restroom, get a drink of water, etc.) be sure to log out on the attendance sheet. For safety's sake, in order to better results and to be fair to lab partners, limit any time out of the lab. Students who leave the lab for a period longer than 10 minutes will receive a deduction from the Data Collection points for that experiment.

Additionally, students must be signed in prior to the start of the pre-lab lecture to ensure everyone's on-time arrival to class. Tardiness or just not signing in will result in a point deduction from the Data Collection and Analysis points for that experiment. Students must be present for the pre-lab lecture because important safety-related information is covered. Any student who misses the pre-lab lecture will not be allowed to perform the experiment and will receive a zero for the Data Collection and Analysis points for that experiment. Safely working with chemicals requires undivided attention! As such, any behavior that indicates a student is not paying attention during the pre-lab will result in the student not being allowed to perform the experiment. This includes, but is not limited to, sleeping, looking at one's phone or computer, talking, etc.

**Safety Rules:** Read the safety rules carefully and follow them throughout the course. Anyone who does not adhere to the safety rules will receive point deductions and may not be allowed to remain in the laboratory.

Students must bring your eye protection and lab coat with you to every experiment, as well as dress in appropriate clothing and footwear. One time during the semester, a student may borrow goggles and/or a lab coat. There will be a deduction from the Data Collection and Analysis points for each item. These items cannot be borrowed more than once per semester.

Academic Integrity: Each student is expected to do her/his own work. Although the lab is constructed so students may work in pairs during an experiment, all work submitted for a grade must be an individual effort. The penalty for academic dishonesty is a grade of 'F' for the course.

Late Policy: Unless otherwise specified, materials that are submitted late but on the same day as they were due will receive a 10% deduction. There will be an additional 25% deduction for each day or portion of a day, including weekends, they are late after that.

Email: Faculty email addresses are posted on the open Internet for every software bot and spammer in the world to see. Therefore, faculty Outlook accounts are configured differently and an outside contractor also scans faculty email. Because of this and a Federal law relating to student privacy (FERPA), students must use a Loyola email address when contacting the TAs or the instructor about this course. Emails from outside sources are often blocked automatically. In the subject line of an email, put Chem 225- section number and TAs name.

Course/Instructor Evaluation – IDEA: Loyola has the IDEA program for instructor and course evaluations. At the end of the semester, students can complete an online evaluation of this course based on criteria set by IDEA and by the instructor. For this lab course, the main objective is learning to apply course material to improve thinking, problem solving, and decisions. Other important objectives include gaining a basic understanding of the subject and developing specific skills needed by professionals in the field. By the end of this course, students should be able to characterize organic compounds by measuring their physical properties, isolate organic compounds using a variety of purification techniques and, lastly, to synthesize organic compounds using chemical reactions. Keep these objectives in mind throughout the course.

Interactions with TAs: In order to increase the amount of individual assistance each student receives in lab, Teaching Assistants will participate in delivering this course. If at any time during the semester, any questions or concerns arise about the behavior of the Teaching Assistant, please contact the Instructor.

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Mr. Thomas, LSB 124, (773) 508-8115, [tthoma1@luc.edu](mailto:tthoma1@luc.edu)

## Experiments

1. Functional Group Identification
2. Boiling Point and Density of Organic Liquids
3. Distillation and Refractive Index of Organic Liquids
4. Melting Point and Crystallization of Organic Solids
5. Extraction
6. Synthesis: Substitution
7. Synthesis: Elimination
8. Natural Product Isolation
9.  $^{13}\text{C}$  NMR Spectroscopy