

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

Pre-requisites: CHEM 223 and CHEM 225

Materials: Making the Connections³ 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. You are responsible for this material, so you should check Sakai frequently.

Grading: Course grades consist of the following components:

Lab Safety Quiz	5 pts
9 Pre-lab Exercises, 5 pts each	45 pts
9 Data Collection and Analysis, 10 pts each	90 pts
Notebook Check	20 pts
Spectroscopy Analysis	40 pts
2 Exams, 100 pts each	<u>200 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%

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. It must be completed before the first experiment is performed.

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 on Sakai. If there are techniques mentioned in the procedure that one does not recall from first semester organic chemistry lab, the student should consult the technique readings in the Padias text as necessary.

Before coming to lab, students must complete the pre-lab exercise via Sakai. 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 WHO DO NOT COMPLETE THE PRE-LAB WILL NOT BE ALLOWED TO PERFORM THE EXPERIMENT.

Notebooks: The ability to keep good records is a valuable skill. Before coming to class, the pre-lab portion of the notebook must be completed. The Instructor/TAs will be checking notebooks before each experiment. Anyone who has not completed the pre-lab portion of the notebook will not be allowed to perform the experiment. The lab notebook format is posted on Sakai and there is also a description of how to complete a lab notebook in the Padias text. The pre-lab portion includes the Title, Objective, a complete Table of Reagents, a Balanced Chemical Equation, Pre-lab Calculations (i.e.; moles of each starting material and the Theoretical Yield), and an Outline. The Theoretical yield calculation must indicate the expected amount of product in grams for a solid product or milliliters for a liquid product. The remaining portions of the lab notebook are filled out as the experimental work is completed.

The duplicate pages of the notebook will be collected twice for each experiment—once before the experiment begins and once at the end of the experiment. As a further incentive to do a good job on the notebook, the notebook pages for each student will be collated and stored in an envelope for the student to use during the exams. Only materials pertaining to the experiment currently being completed can be added to the envelope.

Data Collection and Analysis: At the end of each experiment and before leaving lab, each student must show the final product to the Teaching Assistant. The quantity and quality of the product will be recorded and evaluated. Point deduction may be made for low yields and/or impure products. Point deductions may also be made for safety violations, late arrival, not participating in lab, not finishing the experiment, not participating in collecting the data, borrowing safety items, etc. Finally, before leaving lab, students must submit the duplicate pages from their lab notebooks, which will be stored for use by the student during the in-class exams. Only materials pertaining to the current experiment can be submitted.

Notebook Evaluation: At the end of the term, each student's lab notebook will be evaluated for completeness and following the proper formatting guidelines. In particular, there should be no missing or illegible pages.

Spectroscopy Analysis: Synthesis experiments require evidence that the desired product was in fact produced. Spectroscopic methods like NMR and IR play a significant role for this in modern organic chemistry. Students will be required to perform and turn in spectroscopic analyses of the products for several experiments during the semester. Since this analysis is dependent on student use of instrumentation and time restrictions of lab, spectroscopic analysis might not be the same for all students. There are two days of open lab time scheduled at the end of the semester, which will be used on a case-by-case basis if more time is needed for spectroscopy analysis. More details on this will be indicated on Sakai and questions can be directed to the Instructor as needed.

Exams: In general, exams will cover material covered by the experiments. This includes, but is not limited to, the information discussed in the prelab videos, background readings, as well as any pre-requisite material needed to perform the experiments. For exams, be sure to bring a No. 2 pencil and a Student ID. A lab coat, goggles, and a calculator are not required. During exams, each student will be provided with a simple calculator, a periodic table, and the notebook pages submitted with each experiment. Points will be deducted for not following instructions.

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 Data Collection and Analysis points. However, the pre-lab exercise can still be completed. The normal due dates apply. The missing Data Collection and Analysis score can be replaced with points earned by completing an alternate experiment, which will be provided to the student upon request. It is up to the student to request the make-up assignment from the Instructor within a week of an absence. Students will still be responsible for any missed material on 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 class 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 any important safety-related information that is covered before the experiment begins.

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. Safely working with chemicals requires undivided attention! As such, any behavior that indicates a student is not paying attention during lab can 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. 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: All students in this course are expected to have read and to abide by the demanding standard of personal honesty, drafted by the College of Arts & Sciences, which can be viewed at: <http://www.luc.edu/cas/advising/academicintegritystatement/> 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. Any instance of dishonesty (including those detailed on the website provided above) will be reported to The Chair of The Department of Chemistry & Biochemistry who will decide what the next steps may be. The penalty for academic dishonesty is a grade of 'F' for the assignment or the course, depending on the circumstances.

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 than those of students 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 226- 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 will 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 of organic chemistry. 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.

Course Repeat Rule: Effective with the Fall 2017 semester, students are allowed only THREE attempts to pass Chemistry courses with a C- or better grade. The three attempts include withdrawals (W). After the second attempt, the student must secure approval for a third attempt. Students must come to the Chemistry Department, fill out a permission to register form or print it from the Department of Chemistry & Biochemistry website: <http://www.luc.edu/chemistry/forms/> and personally meet and obtain a signature from either the Undergraduate Program Director, Assistant Chairperson, or Chairperson in Chemistry. A copy of this form is then taken to your Academic Advisor in Sullivan to secure final permission for the attempt.

Students Needing Accommodations: If a student has any special needs, please let the instructor know in the first week of classes. The university provides services for students to improve accessibility. Any student who would like to use any of these university services should contact the Student Accessibility Center (SAC), Sullivan Center, (773) 508-3700. Further information is available at <http://www.luc.edu/sac>.

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.

Loyola University Absence Policy for Students in Co-Curricular Activities: Students missing classes while representing Loyola University Chicago in an official capacity (e.g. ROTC, intercollegiate athletics, debate team, model government organization) shall be allowed by the faculty member of record to make up any assignments and to receive notes or other written information distributed in the missed classes. Students should discuss with faculty the potential consequences of missing lectures and the ways in which they can be remedied. Students must provide their instructors with proper documentation (develop standard form on web) describing the reason for and date of the absence. This documentation must be signed by an appropriate faculty or staff member, and it must be provided as far in advance of the absence as possible. It is the responsibility of the student to make up any assignments. If the student misses an examination, the instructor is required to give the student the opportunity to take the examination at another time.

<https://www.luc.edu/athletheadvising/attendance.shtml>

Accommodations for Religious Reasons: If you have observances of religious holidays that will cause you to miss class or otherwise effect your performance in the class you must alert the instructor **within 10 calendar days of the first class meeting of the semester** to request special accommodations, which will be handled on a case by case basis.

Contacts: Dr. Eisenberg, FH-104, (773) 508-8714, jeisenberg2@luc.edu
Mr. Thomas, LSB 124, (773) 508-8115, tthoma1@luc.edu

Experiments

1. Sodium Borohydride Reduction of Benzophenone
2. Potassium Permanganate Oxidation of Benzyl Alcohol
3. Conjugated Dienes & Structural Effects on Acidity
4. Diels-Alder Reaction of Anthracene and Maleic Anhydride
5. Identification of an Unknown Ketone
6. Carboxylic Acid Strength and Buffers
7. Fischer Esterification
8. Acylation of an Aromatic Amine
9. Polymers