

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

Pre-requisites: Grade of 'C-' or better in Chem 223 and Chem 225

Co-requisite: Chem 224

Materials: Making the Connections³ By Anne B. Padias (ISBN: 978-0-7380-7436-8)
Permanently-Bound Composition Notebook

Safety goggles are provided during safety training and must be brought to every lab. A full-length lab coat is also required.

Course Homepage: Announcements, assessments, extra 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:

Online Safety Training	5 pts
Best 9 of 10 Pre-lab Exercises, 5 pts each	45 pts
Best 9 of 10 Data Collections (Products), 10 pts each	90 pts
Best 9 of 10 Post-lab Exercises, 20 pts each	180 pts
In-Class Exam	55 pts
Formal Lab Report	55 pts
Chemistry Literature Searching Exercise	10 pts
Notebook Evaluation	55 pts
Online Exam	<u>55 pts</u>
	550 pts total

A>94%, A->90%, B+>88%, B>84%, B->80%, C+>78%, C>74%, C->70, D+>68%, D≥60%, F<60%

Online Safety Training: All students must watch the presentation posted on Sakai and score 5/5 on the Safety Training Quiz before being allowed to work in the laboratory. There are unlimited attempts.

Pre-Lab Preparation: Success in organic lab depends on advance preparation. Therefore, there are several things you must do before coming to lab. One major component of your pre-lab assignment is to thoroughly read and understand the experimental procedure and the assigned background readings listed on Sakai. Before coming to class, you must also 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 pre-lab exercises must be submitted to count. Work that is saved but not submitted before the deadline will be ignored. Spelling, grammar, and significant figures count. Check the Sakai gradebook to ensure the score was successfully recorded before coming to class.

Lab Notebooks: Before coming to class, you must also complete the pre-lab portion of your lab notebook. The TA will be checking notebooks before the experiment begins. Anyone who has not completed the pre-lab portion of the notebook will not be allowed to perform the experiment. Think of your completed pre-lab as your admission ticket to each 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, Table of Reagents, Balanced Chemical Equation, Pre-lab Calculations (i.e.; moles of each starting material and the Theoretical Yield), and an Outline. The remaining portions of the lab notebook for each experiment are to be completed in class. The ability to keep good records is a valuable skill and keeping an organized lab notebook will facilitate completion of the post-labs. The entire notebook will be physically collected for grading at the end of the last experiment.

Data Collection: At the end of each experiment and before you leave lab, you must report your experimental results to your Teaching Assistant. The TA will record your results for each experiment. If you do not report

your results before leaving lab, you can email your data to your 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. The lowest Data Collection score will be dropped. For synthesis labs, if you do not show your product to your TA before placing it in the waste jar, you will not receive the Data Collection points.

One of the most important facets of experimental work is that the data should be recorded as completely and accurately as possible. Sometimes, important discoveries are made when things don't behave "as they should". Therefore, it is critical that you report your actual data and not what you think the correct answer should be. Students who complete the entire experiment in good faith with receive all of the Data Collection points. You do not have to worry about your data being "right". Data Collection point deductions will be for safety violations, not finishing the experiment, etc.

Post-lab Exercises: Short questions pertaining to the experiment you have just completed will be posted on Sakai. These should be completed after lab ends and are due at the beginning of the next lab period. Students are allowed three attempts until the due date and the assessments must be submitted to count. Work that is saved but not submitted before the deadline will receive ignored. Spelling, grammar and significant figures count.

Formal Lab Report: A formal, type-written lab report over the Diels-Alder experiment will be due the week before Spring Break. This report should be clearly written using proper scientific grammar (do not use first person tense like "I did this" or "we saw this"). More detailed guidelines for the report will be discussed in class and posted on Sakai.

In-Class Exam: The first exam will be completed in person after the first three experiments. Be sure to bring a No. 2 pencil and your Student ID with you. You do not need to bring your goggles and lab coat. The exam will include material covered in class, the background readings, as well as co-requisite and pre-requisite material. Points will be deducted for not following instructions.

Online Exam: The second exam will be completed via Sakai and is due at the beginning of the lab period in the last week of class. Only one submission is allowed. The exam is not timed, so students may save their work and return to it later, but the exam must be submitted to count. Work that is saved but not submitted before the deadline will receive an automatic 20% deduction. Spelling, grammar, and significant figures count.

Chemistry Literature Searching Exercise: Organic chemistry is a vibrant, living science that is perpetually changing and building upon itself. New compounds and new reactions are constantly being discovered. These advancements are normally published in journal articles and conference proceedings. This is sometimes called the primary literature. In this exercise, which is completed via Sakai, you will learn about some tools for navigating the vast amount of information in the chemistry-related primary literature. Three attempts are allowed. Students may save their work and return to it, but the exercise must be submitted to count. Work that is saved but not submitted before the deadline will receive a 20% deduction.

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

Attendance: You are expected to attend every lab session. Due to safety constraints and size limitations, you will not be allowed to make up an experiment in another section. Missing a lab period will result in a zero for the Data Collection portion of that experiment. However, you may still complete the Pre-lab exercise and Post-lab exercise Analysis portion for that experiment. The normal due dates will still apply. Also, remember that there is a drop policy for the Pre-lab exercises, Data Collections, and Post-lab exercises. Missing more than 2 experiments will result in automatic failure of the course. If you are concerned about recording the content of the experiment in your laboratory notebook, contact the instructor.

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 you must leave the lab after signing in (e.g.; to use the restroom, get a drink of water, etc.) be sure to log your exit on the attendance sheet. For safety's sake, in order to better results and to be fair to your lab partner, limit your 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, you 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 points for that experiment. Students must be present for the pre-lab lecture because important safety-related information is covered. Any student who misses a significant portion of the pre-lab lecture will not be allowed to perform the experiment and will receive a zero for the Data Collection points for that experiment. Safely working with chemicals requires your undivided attention! As such, any behavior that indicates that you are 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. You will be provided a pair of safety goggles at the beginning of the course. You must bring your eye protection and lab coat with you to every class, as well as dress in appropriate clothing and footwear. One time during the semester, a student may borrow goggles, a lab coat or socks. There will be a deduction from the Data Collection 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.

Course/Instructor Evaluation – IDEA: Loyola has the IDEA program for instructor and course evaluations. At the end of the semester, you will complete an online evaluation of this course based on criteria set by IDEA and by the instructor. For this course, the main objective is learning to apply course material. In particular, our objectives are 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.

Co-Requisite Chem 223 Lecture Course: The following statement came from the chemistry department office regarding dropping lecture but staying in lab.

IMPORTANT: Students wanting to drop lecture after midterm may stay in the co-req lab:

- *Only if the midterm grade, in lecture, posted in LOCUS, is a D or better.*
- *Students must continue to attend lecture until the week of the drop date to gain as much background knowledge as possible.*
- *For Spring 2017 students wishing to drop lecture, and have a mid-term grade of D or better, can seek assistance from the Department of Chemistry & Biochemistry office beginning Monday March 20th at 9:00am through Monday March 27 - 4:00pm.*
- *Students with a midterm grade of F who decide to withdraw from lecture must also withdraw from lab.*
- *NO EXCEPTIONS.*

Email: You must use your Loyola email address when contacting the TAs or the instructor for this course. Emails from outside sources are often blocked automatically. In the subject line of your email, put Chem 226-section number and TAs name.

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. Structural Effects on Acidity
4. Diels-Alder Reaction of Conjugated Dienes
5. Nitration of *N*-Acetyl-*p*-Toluidine
6. Reactions of Carbonyl Compounds—Derivative Formation and Aldol
7. Acylation of an Aromatic Amine
8. Carboxylic Acids and Buffers
9. Fischer Esterification
10. Polymers