

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA  
CHM 4220L, Organic Synthesis Lab, Spring 2020



**Lecture:** Tues. 4:00–5:50 pm Room 5-138 Secn 01, CRN 32974  
**4220L Lab:** Fri. 12:00–5:50 pm Room 8-341 Secn 01, CRN 32975

**Instructor:** **Dr. Laurie S. Starkey** Room 4/1-428 Phone: (909) 869-3670  
LSSstarkey@cpp.edu <http://www.cpp.edu/~lsstarkey>

**Office Hours:** Bldg. 4, Room 1-428 – on ground floor (not basement), across the hall from the General Chemistry stockroom, Monday 1-3 pm & Tuesday 9:30-11:30 am (or by appointment)

**Textbook & Materials:**

*Lab:* Students must have GOGGLES, a LAB COAT, and a LABORATORY NOTEBOOK (alternating colored duplicate pages). **Textbook & lab manual will be provided.**

**Prerequisites:** One year of Organic Chemistry (lecture & lab), Quantitative Analysis (CHM 2210/2210L).

**Learning Objectives for 4220L Lab:**

Students will learn to prepare, isolate, purify and characterize organic compounds, using modern synthetic methods. After taking this course, students will be better prepared to work independently in an organic chemistry laboratory. In addition, students will develop the skills needed to search the literature, design a synthesis of a target molecule and plan an experimental procedure.

**On successful completion of this course, students will be able to:**

1. **Demonstrate confidence and work independently** in an organic chemistry laboratory setting while safely executing multi-step organic synthesis experiments.
  - a. hazards associated with chemicals (SDS), heating, vacuum, glassware
  - b. handling chemicals and running reactions (mixing, heating, cooling, monitoring)
  - c. working with air-sensitive reactions and reagents in inert reaction conditions
  - d. reaction workups
2. **Purify an organic compound** utilizing a variety of purification techniques.
  - a. column chromatography and TLC, distillation (simple, fractional, vacuum...), recrystallization, purification and drying of organic solvents
3. **Characterize and determine the structure** of organic compounds using a variety of techniques.
  - a. spectroscopic methods (IR,  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR), melting point.
  - b. Prepare samples for various analytical techniques (e.g., IR, NMR, GC) and be familiar with the operation of the instruments.
4. Use professional standards to maintain a **laboratory notebook**, report results, discuss conclusions.
5. **Use library resources** to research a given topic and prepare a report (e.g., written report, oral presentation, poster presentation).
6. **Design organic synthesis experiments:** finding and making modifications to literature procedures, following reaction progress, determining appropriate workup procedures
7. **Recognize and evaluate hazards** that may be encountered in the laboratory, minimize the risk of hazards, and respond appropriately in an emergency.

**Grading of 4220L Lab:**

Students will be working in pairs but each student is responsible for turning in his/her own lab report. The lab report is due the beginning of the class meeting following the completion of each experiment. Your notebook should be detailed enough that an experienced student should be able to reproduce the experiment without requiring any additional resources/notes. Course grades will be based upon an evaluation of the student's level of preparation and ability to safely conduct each experiment, prelab quizzes, lab reports, problem sets, projects and a final exam.

**Academic Integrity:** CHEATING WILL NOT BE TOLERATED. If any such situation is suspected, University policies will be strictly followed. While collaboration and teamwork are required and encouraged, each student is responsible for his or her own work: prelab, observations, discussion, etc.