

# Organic Chemistry II Laboratory (1 Unit)

## CHEM 2096L

### Spring 2022

ST 219 - 3.5 hours per week 1/17-4/29

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- 1. Student Outcomes:** The following outcomes are expected and will be assessed on laboratory reports, quizzes, and evaluation by the instructor. Upon completion of this course, students will have demonstrated the ability to:
  - a) Purify organic compounds by recrystallization, liquid-liquid and liquid-solid extraction, column chromatography, and distillation.
  - b) Perform synthetic transformations requiring reflux temperatures, solventless, or air-sensitive conditions, and monitor their progress.
  - c) Obtain and use spectroscopic, GC-MS, TLC, melting point, and boiling point data to support or refute the expected identity of experimental products.
  - d) Obtain and use infrared and NMR spectroscopic and GC-MS data to elucidate the chemical structure of an unknown compound.
  - e) Communicate the results of experiments clearly and concisely.
- 2. Program Learning Outcomes:** CHEM PLO 2 (GC, IR) and BCHM PLO 3 (GC, IR) will be assessed directly by faculty laboratory instructors' observation of students' use of instruments.
- 2. Texts:** We will be using a free techniques manual entitled *Organic Chemistry Lab Techniques* by Lisa Nichols. You can download it for free [here](#). Our actual experiments will be posted on Canvas week by week.
- 3. Safety:** Safety is a priority in the lab. You will be required to sign a safety agreement form before you can take part in the lab. If you fail to comply with any one of the rules set forth by the department contained in the safety agreement you may be excluded from the lab.
- 4. Lab Reports:** Lab reports will be due one week after completion of an experiment. Reports handed in late will be penalized 10% per day up to 50%. The reports will consist of 4 major parts: pre-lab, observations, results, and conclusions.
  - a) **Pre-lab:** The pre-lab write-up will be your guide to how the experiment will be performed in class and will be written or typed. It must be completed before coming to class, and you must have your instructor initial it before you are allowed to begin an experiment. If you fail to do the pre-lab write-up, you will not be allowed to participate in the lab and will get a zero for that experiment. The pre-lab will consist of the following information in the order given:
    - i) **Title of Experiment** which is self explanatory
    - ii) **Purpose** which should include information about why you are doing the experiment and what you will learn in the process.
    - iii) **Chemical Information** will be required for every chemical that you will use in an experiment. You will be required to provide physical properties such as boiling point, melting point, density and molecular weight, which can be found from a variety of sources including <http://www.sigmaaldrich.com>. **Safety information** should also be included for every chemical used in an experiment including

1) *signs of exposure*, 2) *first-aid measures*, and 3) *potential hazards*. This information can be found in the Material Safety Data Sheets (MSDS) contained in yellow binders at the back of the lab or on the internet (hazard.com or sigmaaldrich.com ).

- iv) **Procedure** will be a step-by-step list of tasks that you will perform in an experiment as laid out in the Lab text. Each step should be no longer than a sentence and should contain check boxes next to each item so that you can check them off as you go.
- v) **Expected Results** which should include a theoretical yield and expected physical characteristics of product such as color, state, melting point, spectral data, etc.

- b) **Observations:** This is the section in your lab notebook where you record all of your observations such as physical properties, characterization and amount of product.
- c) **Results:** Your report will be typed using 12pt Times New Roman or Arial fonts. This section should include a physical description of your product, overall reactions (which can be drawn), yield calculations including calculations for determining limiting reagents, characterization results, and a discussion of product purity. The relevant results are often best summed up in a table. You will be graded on completion and not for accuracy.
- d) **Conclusions:** This section is where you compare the expected results with those obtained in your hands. You need to explain why we are to believe that you isolated the correct product. If necessary, you should also consider offering a reasonable explanation as to why your results do not match those which are expected.
- e) **Worksheets:** For several labs you will fill out worksheets instead of observations, results, and conclusions.

- 5. **Quizzes:** There will be a quiz given at the beginning of each class on the day that a new experiment is to begin. The quiz will contain material from the previous lab as well as on the experiment to be performed on that day.
- 6. **Grades:** Grades will be calculated based on your score for the multi-step synthesis experiment and your best 5 of the first six experiments. Each of the first six experiments, when combined with the quiz, is worth 50 points and the multi-step synthesis will be worth 100 points.

Prelab	5 pts
Observations	5 pts
Results	15 pts
Conclusions	15 pts
Quiz	10 pts

There are a total of 350 points possible. Your total score, after dropping your lowest score from the first six experiments, will be divided by 350 and then multiplied by 100 to get your lab percentage. This percentage will determine your lab grade as shown below.

92 – 100%	A
90- 92%	A <sup>-</sup>
88-90%	B <sup>+</sup>
82-88%	B
80-82%	B <sup>-</sup>
78-80%	C <sup>+</sup>
72-78%	C
70-72%	C <sup>-</sup>
68-70%	D <sup>+</sup>
62-68%	D
60-62%	D <sup>-</sup>
<60%	F

7. **Make-Up Labs:** Due to the busy room, faculty, and student schedules, no make-up labs will be given. We understand that unforeseeable events might arise which prevent you from coming to lab. For this reason you will be able to drop your lowest lab grade. If you miss a lab with an excused absence, then that lab will be the lab grade that is dropped. If you miss a lab and do not have an excused absence, you will receive a zero for that lab and that zero will not be dropped. Other missed labs will be counted as a zero unless prior arrangements are made.
8. **Student Code of Conduct:** You are expected to conduct yourself in an upright and ethical manner. If you are caught cheating in any form (plagiarism, copying, reporting data fraudulently, etc.) you will be given a failing grade for that course activity. In addition, you will be subject to further disciplinary action as set forth by university policy.
9. **Office Hours:** Every effort will be made to be available during the times indicated below for office hours. You are welcome to schedule an appointment or take your chances and drop by, especially if you find these hours inconvenient.

**Office Hours**

<b>Perry</b>	<b>Rouffet</b>	<b>Minyard</b>
<b>Monday:</b> 3-4:30 pm	10:30-12	N/A
<b>Tuesday:</b> 10-11:30 am		
<b>Wednesday:</b> 8-9:30 am	10:30-12	

10. **Laboratory Schedule:** Below is a schedule of the experiments to be performed.

Week of	Experiment
1-17	Check-In / Safety Information
1-24	S <sub>N</sub> 2 of Sodium Saccharin
1-31	Bromine Addition to a <i>trans</i> -Alkene
2-7	Acid-Catalyzed Dehydration of a Cyclohexanol
2-14	Anise Seed Oil
2-21	
2-28	A Green, Nickel-Catalyzed Suzuki Cross-Coupling
3-7	No Lab Due to Spring Break
3-14	A Green, Nickel-Catalyzed Suzuki Cross-Coupling Cont.
3-21	A Green Diels-Alder Reaction
3-28	
4-4	Multi-Step Synthesis
4-11	No Lab Due to Easter Recess
4-18	Multi-Step Synthesis Continued
4-25	

11. **Academic Accommodations:** PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center ([EAC@pointloma.edu](mailto:EAC@pointloma.edu) or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

12. **University Mission:** Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.
13. **Copyright:** Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.
19. **Academic Honesty:** Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.
20. **Spiritual Care:** Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the [Office of Spiritual Development](#)