Course Syllabus for Organic Chemistry Laboratory 2 (Virtual)

CHEM 129B, Fall 2020

Instructor: Hubert Muchalski, Ph.D.

Contents

Welcome to CHEM 129B, Organic Chemistry Laboratory 2! This document contains all the information you need to know about the course. **Read this document carefully, familiarize yourself with how the course works, and maintain that familiarity throughout the term.** It is nearly 1,700 words for a reason. Almost all questions about the course that you might ask can be answered by referencing the syllabus.

Changelog

This syllabus and schedule are subject to change in the event of extenuating circumstances. If you are absent from class, it is your responsibility to check on announcements made while you were absent. Changes and corrections are listed in the changelog below and will be announced on Canvas.

- 2020-08-15: Syllabus updated and published on Canvas

General information

- **Course name and number**: CHEM 129B (2 Units)
- **Prerequisites**: CHEM 128B with a grade of C or better (can be taken concurrently)
- **Phone**: (559) 278-2711[1]
- **Email**: hmuchalski@mail.fresnostate.edu[2]
- **Office Hours**: I will be available for consultations for 30 min after each class meeting. Walk-in office hours are Monday and Wednesday 12:00–01:00 pm. Additional consultation appointments can be scheduled through calendar function "Find Appointments" on Canvas.
- **Techniques Reference Manual** There are several options here. See Canvas for the full list of resources
- **Canvas:** The central repository for all course materials and information is our Canvas site, accessible through https://fresnostate.instructure.com/courses/24394. The Canvas site will house your grades, links to handouts, videos, and other materials.
- **Personal computer:** You will need a x86 class personal computer, either Windows of macOS that can run desktop applications. Mobile devices have potential to augment the learning experience, but are not capable to run the apps we will use. Refer to Canvas for the computer and software requirements.

Course Learning Outcomes

This course is organized into Modules and aims to help students achieve learning outcomes through online activities. Each module contains materials you need to complete the associated activities. Each course-level student learning outcome is aligned with department-level learning outcomes which are modeled after the standards set by the American Chemical Society.

[1] This is my campus office number which redirects to my personal cell phone. Calling me is the most direct way to reach me. Sometimes 3-minute phone call can solve a problem that multiple email exchanges cannot.

[2] Please note that I typically check email between 11 am and 6 pm, Monday through Friday. Usually, my response time is *within 12 hours of reading the message.* We also have online course tools where you can ask questions to the entire class at any time, making it more likely to get a quick response.

Upon completion of this course students will be able to:

1. Communicate the structure and properties of organic molecules using common drawing and naming conventions
2. Analyze chemical structures and reaction conditions to make and defend predictions about chemical transformations
3. Use online databases to find relevant research articles containing information such as physicochemical properties of organic molecules, synthetic procedures, and spectroscopic data.
4. Use software tools such as ChemDraw to draw chemical structures, reactions, and mechanisms
5. Use software tools such as MestReNova and Topspin to process raw NMR data
6. Plan a synthesis experiment by evaluating the information found in online databases and research articles
7. Analyze the results of an experiment and be able to identify sources of error and suggest improvements;
8. Interpret spectroscopic data of organic compounds to confirm the structure of organic compounds
9. Communicate the results of experiments to the instructor and peers in a written form (lab report)
10. Communicate the results of experiments to the instructor and peers in an oral or poster presentation

Department Student Learning Outcomes

1. Students will apply their understanding of terminology, concepts, theories, and skills to solve problems by defining problems and research questions clearly, formulating testable hypotheses, designing and conducting experimental tests of hypotheses, analyzing and interpreting data, and drawing appropriate conclusions within professional ethical guidelines. (ACS Standards 7.1 & 7.6)
2. Students will demonstrate the ability to conduct laboratory work of high quality including handling chemicals and other laboratory hazards in a safe, ethical, and socially responsible manner, keeping accurate, clear, concise, and complete records of their laboratory work in a notebook, properly using standard laboratory equipment and instruments, and evaluating the reliability and significance of laboratory data, all within professional ethical guidelines. (ACS Standards 7.1, 7.3, 7.6)
3. Students will complete a literature search in one or more of the five chemical sub disciplines by using common literature search techniques and tools to find recent journal articles from the peer-reviewed literature, critically read these articles to extract relevant information, and communicate the significance of these articles in written or oral formats within professional ethical guidelines. (ACS Standards 7.2 & 7.6)
4. Students will demonstrate the ability to clearly and effectively communicate their scientific results and opinions using written formats while following professional style and format conventions within professional ethical guidelines. (ACS Standards 7.4 & 7.6)
5. Students will demonstrate the ability to clearly and effectively communicate their scientific results and opinions using oral formats while following professional style and format conventions within professional ethical guidelines. (ACS Standards 7.4 & 7.6)

6. Students will demonstrate the ability to function effectively in collaborative and group work environments including the ability to work on a component of a larger project and connect work with previous results within professional ethical standards. (ACS Standard 7.5 & 7.6)

Course Modules

1. Chemical Hazards and Risk Assessment
2. Journals and Scientific Databases
3. SciFinder Scholar
4. Managing References
5. Green Chemistry
6. Spectroscopy
7. Synthesis of Methyl Diantilis and its Derivatives
8. Greener Synthesis of Benzil
9. Stereochemistry of Reduction of Benzil with Sodium Borohydride
10. Structural Elucidation of Acetophenone Derivatives
11. Independent Project

Assignments and grading

Table below lists categories of assignment and weights associated with each group.

Item	Value
Lab Safety	12%
Research Tools	8%
Quizzes & Homework	15%
Spectroscopy	15%
Experiments	36%
Independent Project	14%
TOTAL	**100%**

Grade brackets are imposed by course coordinator. In the past, the grading scale followed a pattern close to the following: A = 90–100, B 80–89, C 70–79; D 60–69; and F <60.

Teaching philosophy

I have heard from many people that organic chemistry was their least favorite class in college or that it was very hard. Certainly, being a chemist is not for everyone, but the skills and tools required to solve organic chemistry problems are universal to all natural sciences. I strive to teach skills, rather than simply teaching facts. Critical thinking is the ability to take those facts and to evaluate and apply them in an intellectually disciplined way to solve important problems. My teaching aims to convey to my students that science is new, exciting, sometimes controversial, and related to their everyday lives. I strive to make my students comfortable with science by making

it interesting and personally relevant, especially non-science majors. I found that a good way to accomplish this is to reference current events, news articles, movies, and personal experiences, and then relate them to the principles of chemistry.

In order to promote effective student learning and retention of often complicated and intricate concepts, my courses incorporate different teaching approaches, including lectures, classroom discussions, and group projects. For laboratory courses I seek to create an environment that allows for supervised exploration. For example, in teaching experiments that involve liquid–liquid extraction, I have often found that students come to me saying that they lost their product. They believe they've done something wrong and are concerned for their grade. To their surprise, my response is, "That's fantastic! Let's look for it." The student doesn't know what just happened or why, but she's curious and wants to explore. We set up a micro investigation, analyze every solution that could contain the missing product, and by doing that clarify concepts of liquid density, acid-base theory, and solubility. The confidence they gain from this exercise is revealed when they face an unexpected outcome again and are able to solve problem with minimal assistance. The best learning opportunities arise naturally when students commit small experimental errors that deliver unexpected results. Instead of revealing the answer, I guide students, encourage them to form their own hypotheses and design mini-experiments that help them to determine what caused the odd result. Students seem enjoy those situations not only because they are highly effective learning tools, and are not part of the official lab procedure, but also because they keep students engaged and excited about what they learn in my class.

A teacher□s chief responsibility in the classroom is to maximize student learning. However, one must realize that not all students learn in the same way. Once I spent some time in the class discussing the heat capacity of liquids using a problem I faced the same day. I asked my students to calculate the proportions of boiling and room temperature water one needs to prepare baby formula at the desired temperature. I have found that when students are presented with these linkages between science and "real life," they think like scientists and are engaged on a personal level. One student approached me a few days later saying that he shared the result of the baby formula exercise with his sister who had a newborn baby. It is precisely this kind of retrospective and prospective learning I aim to foster through my teaching, as it encourages students to think beyond the parameters of the class and evaluate their experiences using science.

I work very hard to maintain students' attention and interest. As I continue my teaching career, especially now after the pandemic forced all educators to pivot and adopt to new reality, I want to incorporate new technology, online tools, and resources to enhance student participation and measure the effect I have on students and on their learning. Since many classes will need to be redesigned from the ground up, I'm committed to using proven pedagogies such as backward course design. To monitor and ensure that students fully benefit from my class I invested a lot of time to learn how to effectively use student response systems (clickers) in virtual setting. The third significant shift I made in light of virtual instruction, was adoption of mastery-based grading in most of my assessments. The system gives students control over the grading process and the letter grade is determined by the quantity and quality of evidence students provide provide that they have mastered the concepts of the course. Students have multiple attempts to earn a satisfactory grade on most assignments and the system allows revisions and multiple attempts to demonstrate a satisfactory level of learning (score of 80% or more is considered satisfactory).

If I had to summarize my teaching philosophy in one sentence, I'd say I want to equip my students with skills and knowledge that will take them far beyond the final exam in my course. In our profession we can produce science that will last beyond our end. But, even more importantly, we produce people who go out and make contributions to the world and society in ways we cannot anticipate.

Course policies

Technology issues when submitting work

For assignments submitted electronically, it is your responsibility to make sure they are submitted on time, through any means necessary, even if technology issues arise. If a tech issue arises, it is your responsibility to find another way to get it to me (for example, via an email attachment). Technology issues that are avoidable or resolved with a simple work-around will not be considered valid grounds for a deadline extension. For example, if you are trying to upload a Lab to Canvas and Canvas won't accept the file, you should try again later, use a different browser, or send the file as an email attachment until you can upload it successfully.

Academic Dishonesty

For most assignments you are allowed and encouraged to work with others. However, the final product that you submit for feedback must be the result of your own efforts. Therefore you may share ideas and strategies with others, but collaboration on the actual finished product you submit is not allowed. Your work is expected to be the product of your own thinking, written and explained in your own words with no parts of the work copied from external sources such as books or websites, and done clearly enough in your own mind that you could explain the work from start to finish if asked. Specifically, this excludes:

- copying work from another student;
- copying work from a website;
- paraphrasing work done by another student or from print or internet resources—i.e. putting it in your own words—without coming up with the main ideas and strategies yourself; and
- *allowing or enabling* another student to copy or paraphrase work that you did, even if you did the original work yourself.

Violation of this policy is considered "academic dishonesty" and carries with it strong punitive measures mandated by Fresno State, including possible automatic failure of the course or suspension from the university. For details, please see APM 235 by going to http://www.fresnostate.edu/aps/documents/apm/235.pdf.

You may feel tempted to academic dishonesty at some point in the semester. The work can be difficult, and many of you are under a lot of stress. If you are considering academic dishonesty, please STOP, take a breath, and remember that your classmates and I want you to succeed in the course. You are not alone, and you have a strong network in the class for getting help. The revision and resubmission policies mean that it's OK to turn in work that isn't perfect. There is no need to be academically dishonest! Just do your best on the work, and you'll have the chance to revise it later.

Dropping the course after the census date

A *serious and compelling reason* is defined as an unexpected condition that is not present prior to enrollment in the course that unexpectedly arises and interferes with a student's ability to attend class meetings and/or complete course requirements. The reason must be acceptable to and verified by the instructor of record and the department chair. The condition must be stated in writing on the appropriate form. The student must provide documentation that substantiates the condition.

Failing or performing poorly in a class is not an acceptable "serious and compelling reason" within the University policy, nor is dissatisfaction with the subject matter, class or instructor.

University policies and disclaimers

In addition to course policies, you are expected to be familiar with Academic Regulations described in the University Catalog as well as policies listed below.

Students with Disabilities: Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in the Henry Madden Library, Room 1202 (278-2811).

- Class Schedule Policies: http://fresnostate.edu/studentaffairs/classschedule/policy/
- Copyright Policy: http://libguides.csufresno.edu/copyright
- Students with Disabilities: http://www.fresnostate.edu/studentaffairs/ssd/
- Academic Integrity and Honor Code: http://www.fresnostate.edu/academics/facultyaffairs/documents/apm/236.pdf
- Policy on Cheating and Plagiarism: http://fresnostate.edu/studentaffairs/studentconduct/policies/cheating-plagiarism.html
- Add/Drop Course: http://www.fresnostate.edu/studentaffairs/registrar/registration/
- Computer requirements: https://www.fresnostate.edu/catalog/academic-regulations/index.html#computerreq
- Disruptive classroom behavior: http://www.fresnostate.edu/academics/facultyaffairs/documents/apm/419.pdf

University Services

- Associated Students, Inc.
- Dream Success Center
- Learning Center Information
- Student Health and Counseling Center
- Writing Center