Syllabus for Organic Chemistry Laboratory 1

CHEM 129A, Fall 2020 (Virtual Classroom)

Instructor: Hubert Muchalski, Ph.D.

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.

- 2020-08-14: First draft published on Canvas

Introduction

Welcome to the second semester of course in organic chemistry (CHEM 128B)! In this course we will continue to explore one of the richest and most beautiful areas of modern chemistry: *chemistry of carbon-basaed compounds*. This course is required for majors in life and physical sciences because it covers topics and concepts that are essential for understanding of biochemistry and medicine.

Important note about grading: This course uses a different grading method to one that you might be used to. The details are explained in sections below. *Read the syllabus carefully.* It is nearly 5,000 words for a reason. Almost all questions about the course that you might ask can be answered by referencing the syllabus. If you are uncertain that you understand all rules and regulations, please contact me.

- **Course name and number**: CHEM 128B (75500 02-LEC)
- **Units**: 3
- **Pre-requisite**: Passed CHEM 128A with grade "C" or better.
- **Meetings**: MWF 9:00–9:50 am on Zoom
- **Office Phone**: (559) 278-2711
- **Email**: hmuchalski@csufresno.edu or hmuchalski@mail.fresnostate.edu (they go to the same inbox). Please note that I typically check email between 11 am and 5 pm, Monday thru 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.
- **Office Hours**: Appointments can be scheduled through calendar function "Find Appointments" on Canvas.

Requirements

Course materials

This course uses Immediate Access to course materials. All students have access to a digital version of the textbook and associated materials on the first day of class and have until the 10th day of instruction to OPT-OUT of the low cost digital materials, but will have to purchase the materials elsewhere. Students are automatically charged on the 10th day (5th day for Summer courses) to continue to have access to course materials for the rest of term. See Canvas for details. More info can be found at https://als.csuprojects.org/immediate_access_programs

- **Canvas:** The central repository for all course materials and information found here: https://fresnostate.instructure.com.
- **Textbook:** "Organic Chemistry" by David Klein 3rd edition published by Wiley (via Immediate Access)
- **WileyPLUS with ORION:** Online learning platform and homework. WileyPLUS is integrated with Canvas and all links to assignments and materials will be posted on Canvas. [1]

[1] WileyPLUS version is tied to the edition of the textbook. If you opt out of Immediate Access and decide to buy a paper version of the textbook, make sure that your access code is for the 3rd edition.

- **Classroom Response System:** We will use iClicker Reef mobile app to collect responses to questions posed during class. Physical remotes do not work in a virtual setting.
- **Study Guide and Solutions Manual** As the name suggests. This is optional item. It is included in IA.

Technology

To use the course tools, you will need to have access to the following:

- **A personal computer**: running Windows or macOS, that can run desktop applications and has a reliable access to high-speed internet. A tablet device is an alternative, but the online homework platform doesn't work as well on mobile devices.
- **A modern web browser**: Chrome is preferred, but browsers such as Edge, Firefox, or Safari are also fine.
- **Zoom:** Virtual class meetings will be held via Zoom. Links and passwords to zoom meetings will be published on Canvas.
- **Document scanning tool**: Many assignments in this course are designed to be prepared by hand on paper. Few people own document scanners nowadays, but a mobile device with a scanning app can do a sufficient job at converting paper documents into PDFs. There are number of options available for both iOS and Android. Find one that you like and learn how to use it.
- **Active Fresno State network account** so that you can access email, Canvas, and Google Suite

If you have any issue with accessing any of the above, please let me know as soon as possible. We will use a variety of additional course tools during the semester, but they will be free to use, and you will be taught how to use them as part of the class.

Course content: We will cover chapters 12-22 of the *Organic Chemistry* text. Key topics to be studied include: understanding how structure determines function and reactivity of organic molecules. In every topic, we seek a **conceptual understanding** from several perspectives, the ability to **apply ideas**, development of **logical reasoning and communication skills**, and an **appreciation for organic chemistry as a whole**.

Learning objectives

Upon successful completion of this course you will be able to:

- Communicate the structure and properties using drawing and naming conventions introduced in CHEM 128A
- Analyze electronic structure of molecules to make and defend predictions about their properties.
- Predict products, infer substrates, and propose reagents needed to complete a chemical reactions.
- Use curved arrow notation to depict plausible reaction mechanisms.
- Use spectroscopic data to deduce the structure of the molecule.

Learning modules

- Module 1: Recap of CHEM 128A material
- Module 2: Alcohols, phenols, and thiols (Ch12)
- Module 3: Ethers, epoxides, and sulfides (Ch13)
- Module 4: Infrared spectroscopy and mass spectrometry (Ch14)
- Module 5: NMR spectroscopy (CH15)
- Module 6: Conjugated pi systems and pericyclic reactions (Ch16)
- Module 7: Strucrure and properties of aromatic compounds (Ch17)
- Module 8: Reactions of aromatic compounds (Ch18)
- Module 9: Aldehydes and ketones (Ch19)
- Module 10: Carboxylic acids and their derivatives (Ch20)
- Module 11: Enols and enolates (Ch21)
- Module 12: Amines (Ch22)

The work assigned in this course is designed to help you achieve course learning objectives. Learning is a constructive process, rather then simple transfer of knowledge. Prior to the class meeting, students are required to work actively to get their first contact with new concepts by reading the textbook, watching videos, and completing the pre-class assignments and homework (WileyPLUS). During the synchronous meetings we will learn through group problem-solving activities, discussions driven by classroom response systems, and more. After class meeting, students should regularly study the material by doing practice problems, completing online homework, and other assignments.

Types of graded work

There are four types of assignments and tests that you will encounter in this course:

1. Learning Target Assessments (LTAs).
2. Application/Extension Problems (AEPs)
3. Preparation, practice, and participation (PPP)
4. Final Exam.

LTAs and AEPs

LTAs are short tests assessing student learning within one learning objective. Throughout the semester, you will be asked to provide evidence that you mastered the skills and concepts that by completing short quizzes, each addressing a single Learning Target. LTAs are graded either *satisfactory* or *progressing* and no partial credit is awarded. See "How work is graded in CHEM 128B" below for details.

AEPs are more challenging integrated problems for which students must to clearly communicate a complete solution. AEPs assesses student skills across multiple learning objectives, may require technology, and all will require a formal writeup. AEPs are graded using the EMRN rubric discussed in "How work is graded in CHEM 128B" and can be revised and resubmitted if needed.

Preparation, practice, and participation (PPP)

This category includes poins earned on online pre-class assignments and online homework (WileyPLUS) as well as participation during lecture (iClicker). It is in your interest to complete pre-class assignments because the results guide my decisions about what activities to plan and what concepts to focus on in the upcoming class meeting.

You will also have the opportunity to earn points for participation in clicker questions. Research shows that classroom response systems (clickers) help students learn more and do better in the course. I have successfully used the student response system to gauge student learning and direct the flow of the lecture. You will earn one point for participation in polling sessions and one point for each correctly answered question.

Final examination

Final exam will be on **Monday, December 14th, 08:45–10:45 AM**. Final exam is composed of 70 multiple choice questions designed by experts from the American Chemical Society. The final exam will be administered online via Canvas and the Respondus Lockdown Browser.

How work is graded in CHEM 128B

CHEM 128B uses a mastery-based grading system that is designed to provide you with control over the grading process. The final grade in CHEM 128B will be determined by the quantity and quality of evidence you provide that show you have mastered the course learning objectives. There are 24 Learning Targets in the course, 10 of which are designated as **Core** targets due to their central nature in Organic Chemistry, and the other 14 of which are designated as **Supplemental**. Students get numerous opportunities to demonstrate understanding of the Learning Targets; every time this happens, the student receives a "check" on that Learning Target.

Final letter grade

Your course grade is determined using the table below. In order to earn a particular letter grade, each requirement must be met in the column for that grade, **the highest grade for which all the requirements are met**. There are no statistical or numerical adjustments (a.k.a. grading on a curve). Failing grade (F) is given if not all the requirements for a "D" are met.

Note: In the table, numerical values indicate the minimum level needed to meet the requirement; amounts above this level also meet the requirement. For AEP's, "M+" means "either M or E".

Category	D	C	B	A
Core Learning Targets (10)	5	10	10	10
Supplemental Learning Targets (14)	5	6	9	12
AEPs (8+)	1 M+	2 M+	2 E, 2 M+	3E, 3 M+
PPP (1000+)	500	750	750	750
Final Exam	20%	30%	40%	50%

Revisions and tokens

The grading system in our course insists that you show consistent excellence in all assignments in the course—outstanding work on homework, for example, does not "bring up" poor work on LTAs. This can be challenging, but the course also provides a robust system of revision and reassessment for most graded tasks, so that if you aren't happy with a grade on an assignment, you'll have multiple chances to try again or fix any mistakes.

Scores for WileyPLUS assignments are final. If you do not get a percentage correct to show mastery (>75%), you can reset the assignment and try again until the deadline.

Students can request reassessment for any unsuccessful LTAs. Each additional attempt will cover the same material and have similar problems but will not be identical to past quizzes.

Students can attempt up to three LTAs during a reassessment session or up to two LTAs during a single office hour visit. The 20-minute of LTA is firm and no extra time will be allowed.

To request a (re)assessment, student must reserve an appointment on Canvas (look for "Find Appointments" feature in Calendar).

I found that students tend to defer LTAs until it's too late. Thus, if an attempt at passing a chapter LTA occurs later then 3 weeks after covering it in class (first attempt) or 3 weeks after previous unsuccesful attempt, it will cost two tokens.

If you receive either a *Progressing* or *Incomplete* mark, you will receive feedback on your work, and you can use the feedback to make corrections and then resubmit your work for regrading. You may submit up to one revision per week.

Tokens

Tokens are a "currency" in the course that you use to purchase LTA attempts, assignment regrades, and exceptions to some course rules. Each student begins the course with 20 tokens, and tokens can purchase any of the following:

- one token buys one attempt at passing one LTA;
- one token buys 24-hour deadline extension for online "Mastery" homework;
- two tokens buy one attempt at one LTA beyond the three week window;
- two tokens buy one participation credit; and
- three tokens buy ORION proficiency meter reset.

What are my expectations?

I want you to be successful in this course. I will do my utmost to help you do this, by creating and maintaining a learning environment based on challenge and support and giving my highest professional commitment to your success and well-being. But, **I cannot achieve success for you**. Success in college courses comes from cooperation with instructors, interaction with your classmates, and diligent effort throughout the semester. I like to compare successful classroom interactions to interactions between players and coaches on a sports team. Players do the work and coaches make sure players do the work that helps players succeed.

To be successful in the course, you need to make sure you are always giving an effort to do the following:

- Prepare for the class through the pre-class learning exercises (Skill Builder).
- Attend all class meetings and participate in class activities.
- Be proactive in completing course work and avoid procrastination in all things.
- Maintain awareness of course announcements and calendar events, by regularly checking email, and the course calendar.
- Take initiative to seek out help when you are stuck or have a question by using office visits, SI, study groups, and whatever else works for you.
- Maintain a positive attitude about the class and what you are learning.

There are many strategies to study Organic Chemistry. The hardest and one I don't recommend is rote memorization. There will be a lot of new words, definitions, names, and structures that you will have to commit to memory. Memorizing *everything*, however, is nearly impossible because the amount of material that is covered increases dramatically as the semester progresses. Understanding of the trends, principles, connections, and logic of chemical transformation will give you better chances of success.

Expectations for professor

My primary responsibility is to create a learning environment where it's safe to take risks and make mistakes, without shaming or judgment, and to give you feedback and guidance as you grow in your understanding of the subject. As my students, you have a right to expect from me:

- carefully designed and executed learning activities both in and out of class;
- informative feedback on, and timely return of all graded work (I strive to return all graded work within one week of your turning it in);
- timely responses to all communications; and
- respectful, professional treatment in all personal interactions.

If you perceive that I am falling short in any of these expectations, you have the right and responsibility to give constructive feedback that helps me improve. I will consider all reasonable suggestions in the course regarding my instruction or the course design.

Supplemental Instruction

Supplemental Instruction (SI) is provided for all students who want to improve their understanding of the material taught in this course. SI sessions are led by a student who has already mastered the course material and has been trained to facilitate group sessions where students can meet to compare class notes, review and discussimportant concepts, develop strategies for studying, and prepare for exams. The SI leader attends this class and communicates regularly with the instructor to ensure that accurate information is given. Attendance at SI sessions is free and voluntary for any student enrolled in this course. Students may attend as many times as they choose. A session schedule will be announced in the first few weeks of class. Learn more by watching this video: http://youtu.be/yTLGu5TLOUI

Course policies

Technology issues when submitting work

WileyPLUS and ORION assignments are submitted electronically. It is the student's responsibility to make sure these items are submitted on time, through any means necessary, even if technology issues arise. If a tech issue arises that prevents your being able to submit work on time, 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 or send the file as an email attachment until you can upload it successfully.

Recording of in-class content

Audio and video recordings of class lectures are prohibited unless I give you explicit permission to do it. Students with an official letter from the Services for Students with Disabilities office may record the class if SSD has approved that service.

Academic Dishonesty

Your work on Learning Target Assessments must be done individually, and all collaboration is prohibited.

For take-home 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

Students may drop classes using the on-line system through Thursday, February. The Drop/Withdrawal Form, signed by instructor and department chair, is needed to drop a course after that date. Withdrawals processed before 9/20 will not show on the official transcript. Serious and compelling drop period begins on September 21 and ends on November 20. More details on Admissions web pages

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.

- Class Schedule Policies: http://fresnostate.edu/studentaffairs/classschedule/policy/
- Copyright Policy: http://libguides.csufresno.edu/copyright
- Students with Dissabilities: http://fresnostate.edu/studentaffairs/careers/students/interests/disabilities.html
- Academic Integrity: http://fresnostate.edu/studentaffairs/studentconduct/academic-integrity/
- Policy on Cheating and Plagiarism: http://fresnostate.edu/studentaffairs/studentconduct/policies/cheating-plagiarism.html
- Add/Drop Course: http://www.fresnostate.edu/studentaffairs/registrar/registration/add-drop-deadlines.html

Appendix B: Course Modules and Learning Targets

Learning modules

- Module 1: Recap of CHEM 128A material
- Module 2: Alcohols, phenols, and thiols (Ch12)
- Module 3: Ethers, epoxides, and sulfides (Ch13)
- Module 4: Infrared spectroscopy and mass spectrometry (Ch14)
- Module 5: NMR spectroscopy (CH15)
- Module 6: Conjugated pi systems and pericyclic reactions (Ch16)

- Module 7: Strucrure and properties of aromatic compounds (Ch17)
- Module 8: Reactions of aromatic compounds (Ch18)
- Module 9: Aldehydes and ketones (Ch19)
- Module 10: Carboxylic acids and their derivatives (Ch20)
- Module 11: Enols and enolates (Ch21)
- Module 12: Amines (Ch22)

Learning Targets

Group E: Analyze electronic structure of molecules to make and defend predictions about properties and reactivity of organic molecules.

- E1: State and explain acidity of alcohols as Brønsted-Lowry acids
- E2: Use the MO theory to state and explain the origins of selectivity in addition reactions of dienes and pericyclic reactions (thermal and photochemical)
- E3: **(CORE)** Construct MO diagram and use the MO theory to predict/explain whether a compound is aromatic, antiaromatic, or non-aromatic
- E4: Determine the effect of the existing substituents on the rate and regioselectivity of electrophilic aromatic substitution
- E5: **(CORE)** State and explain acidity of carboxylic acids and amines (and basicity of their conjugate bases) in light of the Brønsted-Lowry theory
- E6: State and explain acidity of enolate precursors as Brønsted-Lowry acids

Group R: Predict products, infer substrates, and propose reagents needed to complete a chemical reaction scheme.

- R1: **(CORE)** Reactions involving alcohols
- R2: Reactions involving ethers and sulfides
- R3: Reactions involving conjugated pi systems
- R4: **(CORE)** Aromatic substitution reactions
- R5: **(CORE)** Reactions involving aldehydes, ketones, imines, and enamines
- R6: **(CORE)** Reactions involving carboxylic acids and its derivatives
- R7: Reactions involving enols and enolates
- R8: Reactions involving amines

Group M: Use curved arrow notation to depict plausible reaction mechanisms

- M1: Draw mechanisms of reactions that involve alcohols
- M2: Draw a mechanism to predict the outcome of ring-opening reaction of epoxides
- M3: **(CORE)** Draw a mechanism to predict the outcome and selectivity of aromatic substitution reaction.
- M5: **(CORE)** Draw mechanisms of reactions that involve aldehydes, ketones, imines, and enamines
- M4: **(CORE)** Draw mechanisms of reactions that involve carboxylic acids and its derivatives
- M6: Draw mechanisms of reactions that involve enols and enolates
- M7: Draw mechanisms of reactions that involve amines

Group S: Use spectroscopic data to determine the structure of a molecule

- S1: **(CORE)** Use IR spectroscopy to determine what functional groups are present in the analyzed sample
- S2: Use MS spectrometry and the degree of unsaturation to deduce structural information about the analyzed sample
- S3: Use NMR data and multiplet analysis to deduce detailed structural information about the analyzed sample