

**Laboratory for Synthesis and Analysis of Organic Compounds**

**Course meetings:** Section 1: Monday 12:30 -5:20 pm Bilger Addition 217  
Section 2: Monday 12:00 -4:50 pm Bilger Addition 214

**Teaching Assistants:**

Monday: Cody Dickinson [cfd4@hawaii.edu](mailto:cfd4@hawaii.edu)  
Thursday: Landon Balkwill [balkwill@hawaii.edu](mailto:balkwill@hawaii.edu)

**Instructor:** P. Williams [philipwi@hawaii.edu](mailto:philipwi@hawaii.edu)  
Bilger 240 808-956-5720

Office hours by appointment over zoom.

**Course Objective:** The objective of Chemistry 445L is for students to develop a broader practical understanding of modern techniques and instrumentation used in synthetic organic chemistry. CHEM 445L has a WI classification, so expect to do a fair amount of writing, to have this writing critiqued and to revise your write-ups on the basis of that feedback before a final grade is assigned to your report. In keeping with the rules governing "WI" courses, the writing part of this course will earn you a significant portion of the final grade. The purpose is to teach you to write technical reports accurately, concisely and to communicate your findings clearly. Shoddily produced documents, ridden with spelling and grammatical errors, will be returned without review (Note that scientific terms often are underlined in red by MS Word despite being spelt correctly).

**Format:** The format this year will be different than in previous years. Each section of twelve students will be divided into two groups of six (A and B), and a student in group A paired with a student in group B. Pairing will be randomly made by the instructor. Students in each pair will alternate in-person attendance each week and work together to complete the synthetic sequence as a team. That is, the student in group B will pick up where student in group A leaves off, and vice versa, with one exception; chromatography of the initial alkylation product. Student pairs will share a notebook that is to be left in the lab in which they record their progress. The purpose of this format is to allow us to deal with social distancing guidelines, equipment issues, and groups of students who may not have had all their ochem labs in-person. It also allows us to train students in how to create a notebook with enough details such that another person could duplicate the work.

**Prerequisites:** Chem 273 and Chem 273L; Declared Chemistry or Biochemistry Major

**Corequisites:** Chem 445

**Grading:**

<b>General Lab Techniques</b>	<b>200 points</b>
(TA's evaluation of skills, % completion of synthesis, responsiveness to revision comments, lab quizzes, etc)	
<b>Synthesis Report # 1</b>	<b>20 points</b>
(Intro Exp 1-4, Exp 1 + NMR Analysis, No Discussion)	
<b>Synthesis Report # 2</b>	<b>60 points</b>
(Revised Syn 1, Exp 2: Exp+ NMR Analysis, Discussion Exp 1 & Exp 2)	
<b>Synthesis Report # 3</b>	<b>120 points</b>
(Syn 1, Revised Exp 2, Exp 3: Exp + NMR Analysis, Revised Discussion part 1-2, Discussion Part 3)	

**Final Synthesis Report**  
**(Synthesis Exp 1-4; all components)**

**160 points**

The report on your synthesis project will be submitted in four parts that build upon each other to form a final report. Feedback provided by the TA should be incorporated into each subsequent draft, as points are allocated for the revised content. The expectation is that the final report conforms with publication standards for an ACS journal and incorporates all feedback. The first two reports and drafts should each be a minimum of five pages long (12 point, double spaced, standard 1 inch margins) excluding figures, supplementary materials and attachments. All reports should contain the fruits of your reading about the techniques used and be fully referenced. Failure to reference appropriately is plagiarism and will result in an automatic "F" in the course.

**Your final report on the multi-step synthesis** should be at least 10 pages long excluding supplementary materials and attachments. In this paper, you will outline the purpose of the experiments, your results, your conclusions as it relates to the underlying theory and provide the underlying data characterizing the materials you have prepared. The goal here is to be both succinct and comprehensive.

**The remainder of the points (200 points) will be assessed based on:**

- 1) level of preparation for the lab.
- 2) effort and attitude (if your lab partner does all the work, expect a low grade!).
- 3) success in your laboratory work (yield, purity, number of times a reaction was repeated).
- 4) Responsiveness to feedback in written reports.
- 5) Quality of your lab notebook and whether clear instructions were left for your partner.

**Writing Intensive:**

Attached to this syllabus is a "writing rubric" that will be used to evaluate the reports you will be submitting.

The general format for a full paper in Journal of Organic Chemistry is to be followed. A laboratory report has a brief *Introduction* into the problem; a *Results* section which documents measurements and calculations; a *Discussion* section outlining what was learned from performing the experiment and placing the results in context; an *Experimental* section describing how the experiments were performed in sufficient detail that somebody could reproduce your results. *Figures* should be referenced in the text in order of appearance and have *Legends*, brief descriptions of what the figure is purported to show. Explain any symbols used if not standard abbreviations. *Schemes* should also be numbered in order of appearance in the text and have brief *Headers*, brief descriptions of what the scheme is about. Finally, *References* should list the material that you have consulted. References should be numbered consecutively in the text using a consistent format: denote references by superscript numbers. In a separate reference section list these references. Please follow American Chemical Society format outlined in the ACS style guide (e.g., Williams, P. G.; Dickinson, C. J. *Irreproduc. Res.* **2009**, *10*, 176-178.)

**Code of Conduct:**

Academic honesty policies can be found at the following website: <http://www.studentaffairs.manoa.hawaii.edu/policies/>. Students are expected to familiarize themselves with these rules. **Any student caught violating the policies on plagiarism or cheating will receive a grade of an "F" in the course.**

**Disabilities:**

The University of Hawaii is an equal opportunity/affirmative action institution, dedicated to teaching all students and reaching all learners. It is our commitment to make our lectures and classrooms accessible to all students. If you have, or think you might have, a disability and have not voluntarily disclosed its nature and the support you need, you are invited to contact the UH KOKUA Program (<http://www.hawaii.edu/kokua/> or (808) 956-7511), or talk with the instructor in order to get any accommodation you might need to

take the course. This information will be kept confidential. Please do this as early in the course as possible.

**COVID disclaimer**

The syllabus and course policies may be modified in the event of any unforeseen shutdowns or issues related to COVID that impact the class. These modifications including but are not limited to changing due date, assign new on-line assignments, etc. Students shall be notified in writing and in advance of any such changes.

**Acceptable Resources:** Students may use any note provided during the lecture or lab, any organic chemistry textbook (need to cite), or any primary literature sources (need to cite), such as journal articles and peer-reviewed books. Use of or providing other students with any non-approved resource is considered a violation of the student of conduct.