

## CHEMISTRY 216: Synthesis and Characterization of Organic Compounds

### Course Syllabus

Fall 2019

**Instructor:** Dr. Patrick Lutz, [lutzp@umich.edu](mailto:lutzp@umich.edu)  
(please include "CHEM 216" in subject line of emails!)

**Office Hours:** Friday, 2–3pm in CHEM 2744

**Administrative GSI:** Virginia Larson, [vlarson@umich.edu](mailto:vlarson@umich.edu)

**GSI Office Hours** in the Science Learning Center: <http://www.lsa.umich.edu/slc/resources/gsiofficehours>

#### Course Description:

CHEM 216 builds on the experimental approach started in CHEM 211. Students use microscale equipment, which requires them to develop manual dexterity and care in working in the laboratory. They also evaluate the results of their experiments by checking for identity and purity using various chromatographic and spectroscopic methods. Students will be expected to keep a laboratory notebook that will serve as the basis for their laboratory reports. Students will work in small groups on synthetic projects throughout the term. For each group project, students will formulate hypotheses that they will test using experiments that they design and implement with faculty and GSI guidance.

#### Required Materials:

The *Chem 216 Coursepack* (ISBN # 9781533918055). This can be purchased via the Internet directly through the UMich/Barnes & Noble online bookstore.

#### Recommended Materials:

1. A *calculator* that's not a cell phone. Any kind will do (it can be a scientific/graphing calculator but doesn't have to be). We don't want you risking contamination of your phone in lab.
2. The *Organic Chem Lab Survival Manual: A Student's Guide to Techniques* by James Zubrick (ISBN # 9780470494370). This is a good resource for more info on lab techniques. Any edition is fine and inexpensive used copies are usually available online.
3. Chemistry 210/215 *Organic Chemistry* text by Ege (any edition). Desk copies are available at the Science Learning Center.

#### Canvas: (<http://umich.instructure.com>)

The CHEM 216 Canvas site is used by your instructor to post course-related material, including supplemental information about quizzes, assignments, and lecture notes. *You should check Canvas often, and you should read the e-mail messages that come from the Canvas system.*

#### Lab Safety:

Your safety is very important to us! We require that you wear proper lab attire, including safety goggles and clothing that covers you from shoulder to foot. Tops with sleeves and pants that extend to the ankle are required, as are footwear that fully cover the foot. If you arrive for lab dressed inappropriately, you will be asked to go home and change before being allowed entry to the lab.

**Attendance:**

Attendance at lab sessions is critical. Students are expected to come to the lab each session and complete all experiments. There is not a regular make up lab session scheduled. *An unexcused absence will result in a maximum score of 50% of possible points for the experiment.*

If you are not feeling well and will miss a scheduled lab session, you should contact the instructor and your GSI by email BEFORE the scheduled lab session. A doctor's note must be provided within 48 h of the absence for it to be excused. If you need to miss a lab due to a religious holiday or because of a sporting event (for student athletes only), please contact the instructor at least two weeks in advance of the anticipated date.

**Coursework:**

Course grades will be based on participation points, quizzes, and lab notebook assignments. **A schedule of due dates for all assignments is posted on Canvas and attached to this Syllabus.** Your GSI and course instructor will post reminder emails often and make announcements in class; however *it is your responsibility to keep track of upcoming assignments and due dates.*

1. Participation points will be awarded for (a) participation that will be assessed by your GSI during each lab session and (b) participation during group experiments that will be assessed by other members of your group.
  - (a) The purpose of GSI-assigned participation points is to ensure that all students come to lab prepared and follow safety rules and guidelines. **All students may receive a maximum of 2 points for each lab session, but 1–2 points will be deducted for safety infractions, failure to complete the prelab assignment, or arriving late to the lab session.**
  - (b) Group participation points will be assessed by your group members for group experiments using the following rating system: 0 = didn't contribute, 1 = minimal contribution, 2 = below average contribution, 3 = average contribution, 4 = above average contribution, 5 = outstanding contribution.
2. Quizzes. Two quizzes will be administered in lab on the dates indicated on the schedule. Quiz 1 will focus on calculations, IR spectroscopy, and techniques/experiments related to the first two experiments. Quiz 2 will be primarily focused on NMR spectroscopy (but may include other topics). The coursepack contains quizzes from prior semesters that you can use to strengthen your problem-solving skills and to prepare you for the quizzes.
3. Lab Notebook. Throughout the term you will be required to maintain a lab notebook, which should be a complete record of your experiments. Specific guidelines for writing in your notebook will be available on Canvas. You will not be graded on how successful your experiment was or penalized for procedural mistakes (with the possible exception of safety violations as reflected in the participation points) but rather for the correctness and completeness of your notebook's records.

*Note: some of the writing you do in your lab notebook must be completed prior to the start of each experiment. You will not be allowed to proceed with a new experiment if this portion is not complete and you will lose GSI participation points for coming to lab unprepared.*

Notebook pages and copies of characterization data (i.e., IR/NMR spectra) are due to Canvas as a **single scanned pdf** (as in CHEM 211) on the dates indicated on the schedule – typically 1 week after a lab is completed. However, the vast majority of your lab notebook work should be completed during your lab session!! The extra time is allotted so that you will have time to receive and annotate the results from any submitted NMR/GC samples.

**Policy on Late Assignments** Any assignment that is turned in late will be penalized according to the following scale:

- 1 minute late to end of day (12 midnight) = 10% penalty
- 1 day late (day following due date) = 25% penalty
- 2 days late = 50% penalty
- 3 or more days late = 100% penalty (no credit given for assignment)

**Grading Policy:**

Your final course grade will be assigned in one of two ways (whichever gives you the higher grade):

(a) scaled based on the average score in your lab section, with that score set as the A-/B+ border; OR

- (b) assigned based on a fixed scale where  $\geq 90\%$  = A+/A/A-; 80–89.99% = B+/B/B-; 70–79.99% = C+/C/C-;  $< 70\%$  = < C-.

Your semester grade will be based on the point scheme below:

Assignment Type	Details	Points
Participation Points	(a) GSI points: 11 x 2 pts (b) Group participation: 3 x 5 pts	37 pts
Quizzes	2 quizzes x 50 pts	100 pts
Lab Notebook	6 experiments x 50 pts	300 pts
		<b>TOTAL: 437 pts</b>

**Note:** Departmental policy indicates that the first step in inquiring about the accuracy of a final grade should be directed to the lead instructor of the course. The initial inquiry should take place within the first fifteen University business days of the first full term following the term in which the disputed grade was issued. If, after this inquiry, the student is not satisfied with the instructor's response, the student may choose to initiate a formal grade grievance. To initiate a formal grade grievance, the student should contact the Associate Chair of Undergraduate Studies (ACUS) of the home department of the course in question before the end of the fifth week of classes in the first full term following the term in which the disputed grade was issued.

**Academic Integrity**

Collaboration in the laboratory setting is encouraged; however the majority of assignments and written work are to be completed individually. If an assignment is to be completed as a group effort it will be clearly stated in the assignment description. Sharing of data is ok on these assignments, *but the short-answer portions of assignments should be written in your own words, not copied from your partner(s)*. Unauthorized collaboration on individual assignments will result in a zero for the assignment. *If you are unclear about whether something should be completed individually please check with your GSI or the course instructor.* Academic misconduct will result in a grade of zero on the assignment for which it takes place. Cheating on a quiz may result in failing the course. For more information please read the information at the LSA Site for Academic Integrity for examples of academic misconduct and other information.

**Accommodations for Students with Disabilities**

If you need an accommodation for a disability, please contact the [Services for Students with Disabilities Office](#) (SSD). Once your eligibility for an accommodation has been determined you will be issued a verified individual services accommodation (VISA) form. ***Please email this form to the instructor at the beginning of the term, or at least two weeks prior to the need for the accommodation, so that there is enough time for the appropriate arrangements to be made.***

**Mental Health**

If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact [Counseling and Psychological Services](#) (CAPS) at (734) 764-8312. You may also consult [University Health Service](#) (UHS) at (734) 764-8320. Resources [for alcohol or drug concerns](#) and [other mental health resources](#) are also available.

**Student Sexual Misconduct Policy**

Title IX prohibits discrimination on the basis of sex, which includes sexual misconduct — including harassment, domestic and dating violence, sexual assault, and stalking. We understand that sexual violence can undermine students' academic success and we encourage anyone dealing with sexual misconduct to talk to someone about their experience, so they can get the support they need. Confidential support and academic advocacy can be found with the [Sexual Assault Prevention and Awareness Center](#) (SAPAC) on their 24-hour crisis line, at (734) 936-3333. Alleged violations can be non-confidentially reported to the [Office for Institutional Equity](#) (OIE).

Week	Lab (T/W/Th @ 1pm)	Lecture (Th @ noon)	Assignments Due (your lab day @ 11pm)
Sep 2–6	no labs	Acetylation	
Sep 9–13	Check-in & Acetylation (part 1)	IR spectroscopy	
Sep 16–20	Acetylation (part 2)	Reduction	
Sep 23–27	Reduction (part 1)	NMR lecture 1	Acetylation notebook pages
Sep 30–Oct 4	Reduction (part 2)	Introduce spectroscopy lab & Open Q&A for Quiz 1	
Oct 7–11	<b>Quiz 1</b> & Spectroscopic unknown	NMR lecture 2	Reduction notebook pages
Oct 14–18	<b>Fall Break</b> no labs	Wittig	
Oct 21–25	Wittig (part 1)	NMR lecture 3	
Oct 28–Nov 1	Wittig (Part 2)	Polymer lecture 1	Spectroscopic unknown notebook pages
Nov 4–8	PLLA (part 1)	Polymer lecture 2	Wittig notebook pages
Nov 11–15	PLLA (part 2)	NMR review/ Open Q&A for Quiz 2	
Nov 18–22	<b>Quiz 2</b> & PLLA (part 3)	Diels–Alder	
Nov 25–29	<b>Thanksgiving Break</b> no labs or lecture		
Dec 2–6	Diels–Alder & Check-out	no lecture	PLLA notebook pages
Dec 9–13	<b>Classes End</b> no labs or lecture		Diels–Alder notebook pages