

Experimental Physical Chemistry Chemistry 313

Instructor A. Loh 4016 Cowley Hall
Loh.adri@uwlax.edu 785-8275
http://www.uwlax.edu/faculty/loh/ Office Hours: W 11, Th 10

Please feel free to stop by my office outside of office hours. Whenever my door is open I will do my best to make time for you.

About the Course The primary goal of this course is to teach, illustrate, and strengthen basic concepts in physical chemistry. In the process I hope that you will also develop two of the essential tools in any professional scientist's toolbox: skill in the laboratory, and excellence in scientific communication.

In Chem313 you will learn experimental applications of error analysis, thermodynamics, kinetics, and spectroscopy. In the second half of the semester you be conducting an independent project of your choosing based on your experience with the experiments conducted during the first half of the semester.

You will also work on both the written and oral aspects of scientific communication. Quality scientific writing takes significant effort and time to achieve; therefore Chem313 has been designated a **writing emphasis** course.

Required Texts

- A. P. Loh, *Experimental Physical Chemistry Manual*
- D. P. Shoemaker, C. W. Garland, and J. W. Nibler, *Experiments in Physical Chemistry*, 6th Ed.
- P. W. Atkins, *Quanta*, 2nd Ed.

On Reserve

- R. J. Sime, *Physical Chemistry*
- J. S. Dodd, *The ACS Style Guide*
- R. Moore, *Writing to Learn Science*
- Xerox copies of sample laboratory reports and notebook records (in lab)
- *Journal of Physical Chemistry Lab*, v.1-5 (on course web page)

Required Supplies

- Bound notebook with duplicate numbered pages
- Safety goggles
- 3.5" high-density floppy diskettes, zip disks, or CD's as needed

Grading Policy Final grades will be determined based on the number of points earned out of a total of 100 possible points. Lab reports are due in class on the designated day. Late reports will be penalized 5 points/hr, up to a maximum of 20 points/day.

Lab Reports: (8 ea.)	48 %	(Expt. 5: 4 pts. Oral, 4 pts. Report)
Midterm:	8 %	
Independent Project:	36 %	
• Project Plan	4	
• Oral Quiz	8	
• Peer Review	8	
• Final Paper	16	
Final Exam:	8 %	

Letter grades will be awarded according to the following percentage scale:

A 85-100; **AB** 80-84; **B** 73-79; **BC** 67-72; **C** 60-66; **D** 50-59; **F** <50

Experimental Physical Chemistry

Laboratory Experiments

Error Analysis:

1. Linear Least Squares and Differential Error Analyses of Sample Kinetic Data

Thermodynamics:

2. Determination of the Resonance Energy of Benzene from Bomb Calorimetry
4. Equilibrium Thermodynamics of a Keto-Enol Equilibrium Reaction

Kinetics:

3. The Acid-Catalyzed Bromination of Acetone

Spectroscopy:

5. Simulation of the Temperature-Dependent IR Spectrum of HCl
6. Extraction of Molecular Constants from the Vibronic Spectrum of I₂

Independent Project

During the second half of the semester, you will be given the opportunity to research and conduct an independent project. These projects will use the skills that you have developed in the first part of the course, and should be projects that can be completed (researched, conducted and written up) in 3-4 weeks. In some cases, projects may be continuations of investigations from previous semesters (see the *Journal of Physical Chemistry Lab* on the course web page). Some projects may be new projects or extensions to existing physical chemistry experiments. Some suggestions will be given near the middle of the semester - however, I strongly suggest that you download some of the previous articles on independent projects to help you start thinking about possibilities.

Safety

Goggles must be worn as directed by the instructor, and you must not work alone in the lab. Unsafe or careless behavior will be grounds for immediate expulsion from the lab. You will have an opportunity to work with state-of-the-art instrumentation for most experiments in this course. Please treat the equipment with the care and respect that it deserves.

Computer Facility

The computer facility in Cowley 457/455 contains several Mac computers, several Windows-based computers, a Deskjet printer and a LaserJet printer. As with the other equipment in the lab, you are expected to treat the computers with maturity and responsibility. **Do not download any software onto any computers.** Failure to abide by this policy will result in revocation of internet access for all users. The facility will be open 24 hours per day to authorized users.