Physical Chemistry Laboratory - Spring 2018
CHEM 417
Room CSL-222

Instructor:

Section 01: TTh 8:00-10:40	Section 02: TTh 2:00-4:40	Section 03: TTh 11:00-1:40
Dr. Karen Peterson	Dr. David Pullman	Patrick Smith
Office: CSL-309	Office: CSL-301	Office: CSL-312
Hours: TBA	Hours: TBA	Hours: TBA
kpeterson@mail.sdsu.edu	dpullman@mail.sdsu.edu	pcsmith@sdsu.edu

Text: "Physical Chemistry Laboratory Manual"; purchase this in the SDSU bookstore
Other texts, such as those used for Chem 410A, 410B, and 251 may also be useful as references on theory and introductory laboratory techniques.
Required Lab Notebook: You will need a lab notebook with duplicate pages. This is available in the bookstore. The lab notebook will remain in the lab at all times.

Catalog Description
CHEM 417. Advanced Physical Chemistry Laboratory
Six hours of laboratory.
Prerequisites: Chemistry 251, 410A, and credit or concurrent registration in Chemistry 410B
Experimental physical chemistry. Emphasis on interpretation and statistical evaluation of instrument-derived results, record keeping, report writing and individual initiative in observing results.

PROJECTS (700 total possible points):

This course focuses on quantitatively measuring the physical and chemical properties of compounds and understanding the limits of accuracy and precision in these measurements. There is also a strong writing component, with regard to both the laboratory notebook and written reports. There will be seven experimental projects, an introductory assignment, and a final assignment. The following point distribution applies to each experimental project:

Prelab quiz: **5 pts** A quiz will be given at the beginning of lab on the first day of each project. More details will be given in class.

Notebook/lab work: **30 pts** Requirements and expectations for your lab notebook and lab work are given at the beginning of the lab manual.

Report: **55-65 pts** The lab reports must be typed, with figures and tables embedded. The manual contains more details about how to write the report. Hand in a printed version of the report at the beginning of class. If you are having problems with printing, send the reports electronically to the instructor prior to class, and hand in a printed version by the next lab period.

1 point for each day late will be subtracted for reports submitted after the deadline (the <u>beginning</u> of class, one week after the last lab period for the relevant project).

<u>Grading scheme</u>

There will be seven experimental projects in addition to introductory and final assignments. The introductory assignment will take place the second and third lab periods. Each of the seven experimental projects is composed of a specific experiment. All seven experiments will be going on at the same time during the lab period, each assigned to a different team consisting of two people. Therefore, "Project 1", "Project 2", etc. will vary for each student. The first five reports will focus on the results and discussion sections. The last two reports will include an introduction and experimental section.

<u>Introductory assignment</u>: This assignment focusses on using the notebook and on error analysis. For the parts that involve lab work, the notebook will be graded.

Total of 25 pts

<u>Project 1 – 5</u>: No introduction or experimental section is required. The results section must be complete, with text used to present and explain the results. Tables, graphs, sample calculations and final results must be included. The discussion section will require writing of well-formed paragraphs.

5 pts Prelab quiz
30 pts Notebook/lab
45 pts Results
10 pts Discussion

90 pts for each report

<u>Project 6 and 7</u>: These reports should be complete. The introduction and experimental sections are now required. The results section now must be complete with text used to present and explain the results. As before, tables, graphs, sample calculations and final results must be included. The discussion section will require writing of well-formed paragraphs.

5 pts Prelab quiz
10 pts Introduction/Experimental
30 pts Notebook/lab
45 pts Results
10 pts Discussion

100 pts for each report

<u>Final Assignment: Temperature Dependence of keto-enol equilibrium</u>.
A worksheet will be given with NMR results collected during the semester (each group obtained data at a specific temperature). This project will not require a full report.

Total of 25 pts

Attendance and Punctuality

Attendance is mandatory: **10** points will be subtracted if you miss a lab period, unless you are completely finished with the lab work **<u>and the analysis of the data</u>**. Although you will be able to use your partner's data for any missed days, you will need to do a make-up lab to get those 10 points back. This involves a trial lab of the instructors choice which will take no more than a total of three hours. Only two labs can be made up in this way.

If you are late to lab by more than 10 minutes, 5 points will be deducted; more than 5 points may be deducted for egregious violation of punctuality.

The grading scheme for the course will be as follows:

A	89-100%	C	59-66%
A-	85-89%	C-	55-59%
B+	81-85%	D+	51-55%
B	74-81%	D	43-51%
B-	70-74%	D-	40-43%
C+	66-70%	F	< 40%

Total points = 25 + 5(90) + 2(100) + 25 = 700

List of Projects

- Kinetics of Bimolecular Quenching of $Ru(bipy)_3^{2+}$ by Oxygen
- Fluorescence spectroscopy
- Solution Properties Determined by Surface Tension Measurements
- Prediction and Measurement of Infrared and Raman Spectra
- Silver Nanoparticle Aggregation
- NMR Determination of Keto-Enol Equilibrium Constants
- Interpretation of the Visible Spectra of Polymethine Dyes

LEARNING OUTCOMES

At the end of this course, we expect that you will be able to

- Write clear and concise reports, including the preparation of tables and graphs
- Record results and observations in a notebook in a complete and clear manner
- Clearly present numerical results and estimate uncertainties in those results
- Develop a working knowledge of a variety of spectrometers (e.g., NMR, IR, Raman, Fluorescence, UV-Visible)
- Be able to analyze raw data to determine specific properties of compounds and molecules

Add/Drop Procedure: The add/drop deadline is January 30, 2018. For details, see http://arweb.sdsu.edu/es/registrar/schedule_adjustment.html

Students with Disabilities:
If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Course Schedule (tentative – updates will be posted on blackboard) Spring 2018

Week of:	Tuesday	Thursday
Jan 15	Classes start on Wed., Jan. 17	Introduction First day of class
Jan 22	Introductory project. Meet in CSL-222	Introductory project. Meet in CSL-222
Jan 29	Project #1 *Last day to add/drop*	Project #1
Feb 5	Project #1	Results and Discussion sections; construction of tables and figures. Meet in GMCS-245A.
Feb 12	Project #2	Project #2 **Project #1 report due**
Feb 20	Project #2	Project #3
Feb 26	Project #3 **Project #2 report due**	Project #3
Mar 5	Project #4	Project #4 **Project #3 report due**
Mar 12	Project #4	Project #5
Mar 19	Project #5 **Project #4 report due** *ACS conference*	Project #5 *ACS conference*
Mar 26	SPRING BREAK	SPRING BREAK
Apr 2	Project #6	Project #6
Apr 9	Project #6 **Project #5 report due**	Free day
Apr 16	Project #7	Project #7
Apr 23	Project #7 **Project #6 report due**	Make-up day
Apr 30	**Project #7 report due** **Final assignment in computer lab***	Make-up day *Last day of classes, May 3*
May 7		Reports not accepted after May 8
***Final assignment (25 pts): Temperature dependence of keto-enol equilibrium*		