

## Physical Chemistry Laboratory - Spring 2020

CHEM 417  
Room CSL-222

### Instructors:

Section 01: TTh 8:00-10:40

Dr. Karen Peterson

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Section 02: TTh 2:00-4:40

Dr. David Pullman

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**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 in addition to 1-3 short assignments. One of the latter will take place the second lab period and will focus on using the notebook and on error analysis. The other assignments will be announced during class.

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.

Each project is worth 100 points, divided as follows:

**Prelab:** At the beginning of class on the first day of the project, you will write a paragraph in your notebook summarizing the project you will be doing (without notes); include the purpose, the measurements to be made, and the major equipment to be used. Also, a question regarding sample preparation will be given (for example, you may be asked to calculate the amount of compound required to prepare a solution).  
**5pts**

**Notebook/lab work:** Requirements and expectations for your lab notebook and lab work are given at the beginning of the lab manual. Some points will be given for the quality of the results.  
**30 pts**

**Report:** The lab reports must be typed and turned in within 5 minutes of the beginning of class, one week after the third day of the project (see schedule at the end of this syllabus). 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. The reports will contain these sections: introduction, experimental, results and discussion. The introduction and experimental parts should be brief, with a 150-word limit for each. The written part of the results section should not include tables and graphs – these will be put at the end of the report, in order, as an appendix, and referred to in the results and discussion sections. The report will be returned if this format is not used. All of the text in the report should be constructed of well-formed sentences and paragraphs. The points for the report are divided as follows:

10 pts Introduction/Experimental

45 pts Results

10 pts Discussion

The manual contains more details about how to write the report.

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

You must write your own reports, and we expect all of the figures and tables to be done by the person writing the report. Therefore, do not send figures or tables to anyone else, including your partner; although the data might be the same, the figures should be your own creation. Also, do not let other people see your report, because it may be too tempting for them to use your ideas. If two reports are too similar to each other, then both will lose points.

### **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. 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 up to 10 points back (the number of points depends on the quality of the notebook – it will be graded for that day). The make-up labs are done at the end of the semester; they usually involve testing new experiments, and will take no more than a total of three hours. Only two labs can be made up in this way.

Although you are not required to come to lab after the experimental work is complete, we strongly recommend that you attend every day for the entire lab period. The analysis is time consuming and sometimes difficult, and it is useful to be able to ask questions while you are doing it. We will only have time outside of class for additional help if you have made full use of the time in class.

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. These points cannot be made up.

### Grading scheme

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 = 7(100) + 25 = 725

### List of Projects

- ◆ Kinetics of Bimolecular Quenching of Ru(bipy)<sub>3</sub><sup>2+</sup> by Oxygen
- ◆ Fluorescence spectroscopy
- ◆ Solution Properties Determined by Surface Tension Measurements
- ◆ Prediction and Measurement of Infrared and Raman Spectra
- ◆ Kinetics of Silver Nanoparticle Aggregation
- ◆ NMR Determination of Keto-Enol Equilibrium Constants
- ◆ Determination of the Diffusion Constant of an Ionic Compound

### **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 their uncertainties
- 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 February 4, 2020. For details, see [http://arweb.sdsu.edu/es/registrar/schedule\\_adjustment.html](http://arweb.sdsu.edu/es/registrar/schedule_adjustment.html)

**Accommodations:** If you are a student with a disability and are in need of accommodations for this class, please contact Student Ability Success Center at (619) 594-6473 as soon as possible. Please know accommodations are not retroactive, and we cannot provide accommodations based upon disability until we have received an accommodation letter from Student Ability Success Center.

**Religious observances:** Notify the instructor of planned absences for religious observances by the end of the second week of classes.

**Academic Honesty:** The University adheres to a strict policy prohibiting cheating and plagiarism. Examples of academic dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;

- *obtaining copies of a test, an examination, or other course material without the permission of the instructor;*
- *collaborating with another or others in work to be presented without the permission of the instructor;*
- *falsifying records, laboratory work, or other course data;*
- *submitting work previously presented in another course, if contrary to the rules of the course;*
- *altering or interfering with grading procedures;*
- *assisting another student in any of the above;*
- *using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);*
- *copying and pasting work from an online or offline source directly and calling it your own;*
- *using information you find from an online or offline source without giving the author credit;*
- *replacing words or phrases from another source and inserting your own words or phrases.*

*The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities..*

***Resources for students:*** *A complete list of all academic support services--including the Writing Center and Math Learning Center--is available on the Student Affairs' Academic Success website. Counseling and Psychological Services (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at [http://go.sdsu.edu/student\\_affairs/cps/therapist-consultation.aspx](http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx) between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.*

***Classroom Conduct Standards:*** *SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Prohibited conduct includes:*

- *Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.*
- *Participating in an activity that substantially and materially disrupts the normal operations of the University, or infringes on the rights of members of the University community.*
- *Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.*
- *Conduct that threatens or endangers the health or safety of any person within or related to the University community, including*
  1. *physical abuse, threats, intimidation, or harassment.*
  2. *sexual misconduct.*

*Violation of these standards will result in referral to appropriate campus authorities.*

***Medical-related absences:*** *Contact the instructor in the event they need to miss class, etc. due to an illness, injury or emergency. We will try to accommodate valid reasons for absence.*

***SDSU Economic Crisis Response Team:*** *If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit [sdsu.edu/ecrt](http://sdsu.edu/ecrt), email [ecrt@sdsu.edu](mailto:ecrt@sdsu.edu), or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.*

**Course Schedule (tentative – updates will be posted on blackboard) Spring 2020**

Week of:	Tuesday	Thursday
Jan 20	No class	Introduction First day of class
Jan 27	Introductory project. Meet in CSL-222	NMR workshop Meet in GMCS-245
Feb 3	Project #1 <i>Last day to add/drop</i>	Project #1
Feb 10	Project #1	Writing reports; construction of tables and figures. Meet in GMCS-245
Feb 17	Project #2	Project #2 <b>Project #1 report due</b>
Feb 24	Project #2	Project #3
Mar 2	Project #3 <b>Project #2 report due</b>	Project #3
Mar 9	Project #4	Project #4 <b>Project #3 report due</b>
Mar 16	Project #4	Project #5
Mar 23	Project #5 <b>Project #4 report due</b>	Project #5
Mar 30	SPRING BREAK <i>ACS conference</i>	SPRING BREAK <i>ACS conference</i>
Apr 6	Project #6	Project #6 <b>Project #5 report due</b>
Apr 13	Project #6	Project #7
Apr 20	Project #7 <b>Project #6 report due</b>	Project #7
Apr 27	Make-up day	Make-up day <b>Project #7 report due</b>
May 4	Free day	<i>Last day of classes, May 7</i> <b>Reports not accepted after May 7</b>
May 11		