CHEM 302L: Physical Chemistry Lab
Spring 2022 Syllabus

Instructor	Day	Email	Office Hours
Nathan Kidwell (he/him) *TA: Grace DeSalvo*	Monday	nmkidwell@wm.edu	T, 10 – 11 am
Kristin Wustholz* (she/her) *TA: Lyndi Kiple*	Thursday	kwustholz@wm.edu	W, 2 – 3 pm
Tyler Meldrum (he/him) *TA: Henry Cardwell*	Wednesday	tkmeldrum@wm.edu	W, 9:30 – 10:30 am

*Additional appointments are available – please email your instructor to inquire. *Prof. Wustholz is responsible for course administration, including Blackboard and grade keeping.*

Course Description
By measuring physical properties and processes, thoughtfully interpreting data, and developing communication skills, you will put the concepts of physical chemistry into practice. The course is organized around three main units: *Data*, *Theory*, and *Synthesis*. In *Data*, you will explore and analyze data, considering sources of error and the limitations of your conclusions. In *Theory*, you will explore the behavior of matter from the microscopic (quantum) to the macroscopic (thermodynamic) realm. In *Synthesis*, you will put it all together, exploring uncertainty in speed of sound measurements, as well as analyzing fluorescence intensity as a protein is denatured. During the lab periods, we will obtain, discuss, and analyze data, evaluate models, create compelling figures, and practice scientific writing.

Learning Objectives
At the end of this course, as active participants in the learning and communicating process, you will be able to:

- Understand and apply fundamental concepts in physical chemistry.
- Examine a chemical problem and develop an approach to address it.
- Identify sources of error and limitations of data.
- Evaluate uncertainty in order to draw reasonable conclusions.
- Design effective plots and figures in order to illustrate experimental findings.
- Compose written reports that effectively describe and evaluate experimental findings.
- Create a coherent product that accurately communicates your conclusions.

Grading
Your grade in CHEM 302L comprises the following components:

Lab reports/worksheets (80% total):

You will submit 8 reports/worksheets during the semester. You will work with a lab partner to complete the experiments. Reports and worksheets will be completed individually and submitted on Blackboard. Each assignment will be slightly different, and the specific requirements are detailed in the lab manual. The reports/worksheets are:

- *(5%) Lab 1. Working with Data* (worksheet due week of 2/7)
- *(15%) Lab 2. Quantifying Barriers to Hindered Rotation* (report due week of 2/28)
- *(25%) Labs 4-7. Electronic, Vibrational, and Rotational Coupling* (draft report due week of 3/21, final report due week of 3/28)
- *(10%) Lab 8. Energy-Level Populations & Speed of Sound* (worksheet due week of 4/11)
- *(5%) Lab 9. Differential Scanning Calorimetry* (worksheet due week of 4/18)
- *(20%) Lab 10. FRET & Conformational Stability of Proteins* (draft report due week of 4/25, final report due week of 5/2)

Students must submit all reports, worksheets, and peer reviews to pass this course. Instructors are prepared to be flexible with this policy to a reasonable degree if students are significantly impacted by extenuating circumstances.

Peer-review (5%):

Two lab reports will be peer-reviewed by class members. Your participation in reviewing others' work and the quality of your assessment will contribute a total of 5% to your overall course grade.

Participation (15%):

The course instructors will assign a score to each student based on lab citizenship. Good lab citizenship includes coming to lab each week on time and prepared with the appropriate materials readily accessible, having completed any assigned work before the start of lab, participating in class discussion and group work, effective communication and collaboration with your lab partners, as well as turning in any work and cleaning up your workspace at the end of lab.

Lab notebooks:

Lab notebooks are strongly encouraged, though not required. Instead, students may annotate their lab manuals or record notes in the Excel spreadsheets we will work with nearly every week. Taking good notes is especially important for the final lab write-ups, where your observations during discussion and data analysis can play a key role in justifying conclusions or future work.

Policies

Students must complete all labs and submit all assignments to pass this class. Exceptions to these policies will be at the instructor's discretion in consultation with the Dean of Students Office (757-221-2510, deanofstudents@wm.edu).

Late Work

Each lab report must be successfully uploaded to Blackboard by 1 pm EST on the specified due date. Because group work is permitted and only 5 lab reports are required, each day (or portion thereof) that your reports are received late will receive a 20% penalty. For example, a lab report that was due at 1 pm on February 28, 2022 and received at 8 pm on March 1, 2022 will receive a 40% reduction. Instructors are prepared to be flexible with this policy to a reasonable degree if

students are significantly impacted by significant extenuating circumstances (e.g., a student is absent due to illness and will make up the experiment later).

Student Absences
You are required to participate in lab every week. If there are extenuating circumstances that will affect your ability to attend lab in-person, we are able to work with you; however, you will need to communicate with your instructor in a timely manner. If you are sick, please notify your instructor as soon as possible. In addition, you should not abandon your lab partner in their time of need. If you know you will miss lab for a legitimate reason, please inform your section instructor as early as possible so we can make arrangements for you and your partner. If you must be absent from a lab, your section instructor will work with you to develop a plan to complete the missed lab (e.g., during the scheduled make-up week during the week of 4/11). Significant extenuating circumstances that would lead to multiple absences from lab and require further policy exceptions should also be communicated to the Dean of Students. If a sufficiently high proportion of the section is unable to attend lab in person, we will meet remotely via Zoom.

Instructor Absences
If an instructor is unable to teach in-person, one of two possibilities will occur, depending on the circumstances: 1) we will meet on Zoom, or 2) another faculty member will teach that day. Any changes will be communicated to the class as soon as possible.

The *Honor Code* is a part of what makes William & Mary a special community and we expect you to honor it fully.

Computers
Modern physical chemistry requires computers and skill in using them. Please make sure that you bring a computer each week with relevant software installed (usually MS Office, but possibly other programs that you may wish to use for analysis) that is up-to-date.

Guidelines for Lab Partners
Team skills are an essential part of chemistry. The American Chemical Society (ACS) recommends learning how to interact effectively with a diverse group of peers to solve scientific problems. These team skills are as important as the chemistry content, laboratory techniques, and safety skills. Lab partners, faculty, and staff are expected to create an environment of mutual respect and cooperation. Everyone is expected to practice these team skills and maintain respect for others. If group work is imbalanced or ineffective, you are expected to communicate your concerns to your partner and, if necessary, the instructor.

SAS Statement
William & Mary accommodates students with disabilities in accordance with federal laws and university policy. Any student who feels they may need an accommodation based on the impact of a learning, psychiatric, physical, or chronic health diagnosis should contact Student Accessibility Services staff at 757-221-2512 or at sas@wm.edu to determine if accommodations are warranted and to obtain an official letter of accommodation. For more information, please see www.wm.edu/sas.

Writing Resources Center
The Writing Resources Center, located on the first floor of Swem Library, is a free service provided to W&M students. Trained consultants offer individual assistance with writing, presentation, and other communication assignments across disciplines and at any stage, from generating ideas to polishing a final product. To make an appointment, visit www.wm.edu/wrc.