

## PHYSICAL CHEMISTRY LABORATORY I (CHEM 336) SYLLABUS

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### Introduction

This course aims to teach you how to be an independent and capable researcher who can effectively communicate scientific information. Your role as a student will be to a) come to class prepared and ready to perform your experiment; b) perform the experiment with care and diligence; c) critically analyze your data; d) search the literature to compare your data to previously published data, e) write a report about your experiment, and; f) present your work to the class as an oral presentation.

The duration of the lab each week is 3 hrs and 50 mins. On average you can expect most experiments will require a full lab session to complete with some requiring a little less and some requiring a little more time than this. A full semester's work is considered to be the completion of 8 laboratory experiments. This ensures that you have ample time to complete experiments. If time permits, you may also wish to extend an existing experiment for extra credit. Consult with your instructor for this.

### Requirements

Personal Protective Equipment (PPE), including safety glasses, lab coats and gloves must be worn at all times in the laboratory. No food, drink, or smoking is allowed in the laboratory. Please turn your cell phones off.

A bound laboratory notebook is required for recording all data and observations (spiral bound is not acceptable!). All data are to be recorded in ink. Carbon copy lab notebooks are not necessary – a simple composition notebook is preferred. At the end of semester, your notebook will be collected and graded for clarity and completeness.

Laboratory reports are to be written up individually, regardless of whether the experiment was performed in a group and are to be submitted for grading within one week of completing an experiment. Penalties will be enforced for late submission. Lab reports more than 2 weeks late will not be graded and you will receive a score of zero for that report.

At the end of semester, you and your lab partner will be required to give an oral presentation on one experiment of your choice. The presentation should last about 15 mins, with 5 mins of questions from your classmates and instructor.

You can expect to spend at least the same amount of time working outside of laboratory hours on your report as you did in the laboratory making the measurements. This should include time spent on data analysis, background reading about the theory of the experiment, searching for literature values, and the time spent writing the report.

You will need to complete and submit an error analysis/linear regression worksheet prior to commencing any experiments. This will provide you with the tools necessary to analyze your laboratory data and critically comment on the reliability of your data.

This course fulfills the university's writing-intensive requirement for the chemistry major. It does so through 4 formal laboratory reports, each with an average of 5 standard **double-spaced pages**. With an average of 250 words per page, a total of 5000 words are written. Additionally, 4 informal laboratory reports will also be submitted.

**Note: Plagiarism** is an honor code violation and will lead to a serious consequence on the final grade of the student. For more information on plagiarism please refer to the link : <http://oai.gmu.edu/the-mason-honor-code-2/plagiarism/>  
For the purpose of checking plagiarism, you need to submit both the soft copy and the hard copy of your report. Please attach and send your soft copy to my Mason e-mail.

## **LIST OF EXPERIMENTS**

Expt 0 – Ideal and Non-Ideal Gases (Practice report)  
 Expt 1 – Properties of Gases  
 Expt 2a – Solution Calorimetry of Alkali Halides  
 Expt 2b – Bomb Calorimetry of Small PAH's  
 Expt 3 – Partial Molar Volume of Salt Solutions  
 Expt 4 – Thermodynamics of an Electrochemical Cell  
 Expt 5 – Vapor Pressure of a Pure Liquid  
 Expt 6 – Freezing Point Depression by 1,1-Electrolyte  
 Expt 7 – Intrinsic Viscosity of Mixtures  
 Expt 8 – Thermochromic Reaction  
 Expt 9 – Surface Tension by the Capillary Method

Experiments 0-4 will be performed by all students in the first five weeks of lab work. These labs are also **“informal” lab reports**. These lab reports will require you to perform the analysis of data that is expected in every lab, but without all the sections (Introduction, Experimental, etc.) expected of a formal lab report. Instead the informal report will guide you through a section or two from a formal report to help you through the formal writing process. Additionally, a practice report will be written at the start of the semester. This is not graded but in order to give you feedback on the lab report writing process prior to submitted assessed work. During the last four weeks of lab work, you can choose from the remaining experiments which ones you'd like to perform.

### Assessment

Item	Qty	# points each	Total Points	% age
Informal Lab Report	4	75	300	30
Formal Lab report	4	100	400	40
Oral Presentation	1	100	100	10
Final Exam	1	100	100	10
Recorded data (Notebook)	1	100	100	10
<b>Total</b>			<b>1000</b>	<b>100</b>

The final grade in this course will be based on a percentage of points earned relative to total possible points. The following is a tentative grade distribution and subjected to change: **A ≥ 90%; 80 ≤ B < 90; 70 ≤ C < 80; 60 ≤ D < 70; F < 60**

**Text: “Experiments in Physical Chemistry”, Garland, Nibler and Shoemaker, 7<sup>th</sup> or 8<sup>th</sup> edition.**