

CHEM 342
Physical Chemistry II
Spring 2025

INSTRUCTOR

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OFFICE HOURS

MWF: 10:00 – 11:00 am; Monday & Tuesday: 12:00 pm – 1:00 pm

LECTURES

MWF: 11:00 – 11:50 am, 153 Roddy Hall

LABORATORY

Section A Tuesday: 1:10 – 4:00 pm, 226 Caputo Hall

TEXTBOOK

Physical Chemistry, 3rd edition, by Thomas Engel & Philip Reid, Pearson/Benjamin Cummings, 2013; ISBN: 032181200X

SUPPLEMENTAL MATERIAL

Required for exams and homework: A calculator with root, logs and antilogs will be required for exams. Some cheap calculators that work well are the Casio FX250HC,

ON-LINE COMPONENTS

Posted on the Desire2Learn website you will find various assessment tools and discussions, as well as links to external websites. Please note the due dates for these components. *Late submissions will not be accepted under any circumstances.*

GRADING

Grading will be as follows, but the instructor reserves the right to shift the curve in favor of a higher number of students making higher letter grades. It is possible that everyone in this class will earn an A. It is possible that everyone will earn an F. I expect

Treat this course as yours. When you are in physical chemistry lab it is your own chemistry laboratory. Be ready to take instruction and criticism like you have in many other courses, but be ready to learn creatively, with instruments that extend your innate senses. Scoutmasters famously utter the scouting motto: *Be prepared*. This is a fitting motto for scientific lab courses as well. If you have not thought through what you are about to do in the lab, you will not be able to observe anything except confusion. Read the lab protocol well before the lab is to occur and ruminate on the experience to come. Reread the instructions and predict for yourself what might occur in the lab.

RECORD-KEEPING IN THE LABORATORY

To properly apply the scientific method, you must record all laboratory observations with *ink* in a bound notebook in great and graphic detail (pretend you are Leonardo da Vinci; mirror script is optional). Also, bear in mind that the lab notebook is a legal document that is regarded as the *primary source* of data, and it can be crucial in disputes over patent claims or first discovery. The notebook should have a table of contents at the beginning, containing the experiment title, the page on which each experiment begins, and the date(s) during which the experiment was performed. The pages should be numbered, and no pages should ever be removed from the notebook. At the beginning of a new experiment in the notebook, write a few sentences about the purpose of the experiment, the method used, where the procedure can be found, and any partners with whom you will work. Mistakes are indicated by a single line drawn through them, never by obliterating them beyond recognition, since experimenters often decide later that what was thought to be a mistake was not really a mistake.

Observations and data should be recorded directly into the notebook *as you are doing the experiment*. Do not write on paper towels or scrap paper and transfer to the notebook later. This defeats the purpose of the notebook as a primary data source. You should organize your notebook beforehand when possible by labeling and leaving blanks for experimental parameters that must be recorded, and by making tables for data ahead of time. If you are unsure whether a piece of information should go into the notebook, write it in there. You can never have too much information. If you have misgivings about the accuracy or precision of the data, or if something went wrong during the experiment, write that in the notebook as well. Later, you won't remember which data you trust and which you do not. Explanatory notes, units and labels are always important, as is legibility.

Experimenters sometimes work alone but more often work in small teams. You will be divided into teams of two or three people. The teammates that you have in this class are there to share ideas, data, and effort, but not papers. Each of you must ultimately compile your work individually into something that is publishable. This is how real labs work, and your university laboratory experience should emulate real-world laboratory experience. An experiment is not complete until the results are analyzed and the conclusions are presented in an original composition. You will write about each experiment as if it were original work without exact precedent. (Feel free to have fun with this anachronistic concept). The form, length and style are to be that consistent with papers to be submitted for publication in the peer-reviewed journals. See the Lab Report Style Guide posted on the elearning website. Also, take a look at the reports in *Chemical Physics Letters* or the *Journal of Physical Chemistry* or the *Journal of*

Chemical Physics. You will need to peruse these journals in the library for examples and the instructions to authors. You need only write lab reports for four of the experiments performed. I will let you know which four in class or on Desire2Learn.

EXPERIMENTS

The experiments for the course are listed below, along with experiment number from the lab manual. A full report should be written for four of these experiments. A style guide for lab reports will be posted on the Desire2Learn website. Due dates will be announced in class or on Desire2Learn. *Late penalties for lab reports will be severe, with a minimum 25% penalty.*

Tentative list of experiments

Kinetics A: Rate Constants and Activation Energy

filename on D2L

kinetics

