Chemistry 363: Fall 2000: Physical Chemistry I

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Class Meetings: MWF 10 am
Science 2132
Laboratory: Science 2202

Course Philosophy

This course is the first semester of a year long sequence in physical chemistry. We will start with an introduction to molecular motion of gases and quantum theory/spectroscopy. The emphasis here will be on concepts and applications; unlike elsewhere in the course where we will "derive" equations to describe physical phenomena we will focus in this part of the course more on manipulating and understanding the equations which describe atomic and molecular structure. We will then move from the molecular level to the macroscopic and begin a discussion of thermodynamics and equilibria. The remainder of the term will be devoted to chemical kinetics. In one term we cannot cover all aspects of physical chemistry so students choosing to take just chemistry 363 should view this course as an introduction to selected topics in physical chemistry, and not a reflection of the field. It is hard to draw lines between "physical" "organic" "analytical", since thermodynamics, equilibrium and kinetics are used in all aspects of chemistry. So there will be some old and some new in this course!

Texts:

Required Text: Peter Atkins *Physical Chemistry*, 6th ed Available at the bookstore.

Optional Text: *Solutions Manual for Physical Chemistry*. Available at the bookstore.

Atkins' text is chosen primarily because its treatment of topics is well suited for a one semester introduction to physical chemistry. You may find other texts to be useful for consultation or to give a different approach to the same material. Copies of several additional commonly used physical chemistry texts are available in the physical chemistry laboratory.

The *Solutions Manual* is highly recommended and contains answers to roughly half the problems in the back of the book. Students in prior years have commented on the usefulness of seeing more sample problems fully worked.

On reserve in the Science Library:

James R. Barrante *Applied Mathematics for Physical Chemistry*, 2nd ed

This book is recommended for students who feel they need a refresher in the required mathematics. It is not a mathematics textbook, nor does it try to teach new material, rather it serves as a review of mathematics which is commonly encountered in the physical chemistry

course. IF YOU HAVE DIFFICULTY WITH THE MATH SKILLS TEST IT IS HIGHLY RECOMMENDED THAT YOU WORK THROUGH PROBLEMS IN THIS BOOK EARLY IN THE SEMESTER.

Janet S. Dodd. *ACS Style Guide*, 2nd ed.

The *ACS Style Guide* by Janet S. Dodd is highly recommended for reference when writing lab reports and preparing the laboratory poster. As part of the chemistry research requirement you will also be expected to write a paper in "ACS format."

Resources:

Course Web Page: This will contain copies of problem sets, and handouts and lecture summaries as well as useful links to government and chemical literature.
http://www.grinnell.edu/courses/chm/F00/chm363-01/
In addition NEW this semester, is a discussion board that can be used to post questions of general interest and relevance on problem sets, class material and laboratories. You can link to it from the class web page or go directly from:
http://blackboard.grinnell.edu/bin/common/discussion_board_forum.pl?course_id=CHM363-01

Chemical Literature. We have several new chemical literature options available this year. Most notably is full text electronic access to all of the American Chemical Society Journals available through December 31. In addition an easy to use web based version of Chemical Abstracts is available. More details are available on the course web page.

Computer Programs. The use of computer programs to do problem sets and labs is expected. Several options are available. *MathCad* , a mathematical analysis program is available on both the MAC and PC systems; *Sigmplot* a scientific graphing program, is available on PC's. *Excel* is available on both platforms. You may check out manuals for these programs from me.

Examinations

There will be 3 in class examinations, and a cumulative final examination Friday December 15, 9 am). The examinations MAY also include 1-2 take home problems and multiple choice type questions. The final examination will feature a multiple choice section.

Problem Sets

Weekly problem sets and assigned computer exercises will be collected. Answers will be posted outside my office. Problem sets will be distributed on Friday and due the following Friday. Problem solving is a necessary part of learning physical chemistry, both for familiarization with the material and as a reflection of the quantitative nature of the subject. A

large number of problems can be found at the end of every chapter, and will make up the majority of the problems on the problem sets.

Computers provide a tool for rapid data analysis and enhanced problem solving skills, using programs like Excel and Mathcad. You are encouraged to work with one another and to employ computer analysis where appropriate when solving problems. Excel and Mathcad are merely recommended computer programs, feel free to use different methods.

Laboratory

The laboratory for this class meets weekly. Labs have been chosen to complement the material and lecture and also to illustrate important experimental techniques. A detailed schedule and description of the experiments can be found in the *Physical Chemistry I Laboratory Manual*. You should expect that some laboratories require shorter experimental time periods and more time consuming data analysis. You should expect to spend three hours in lab every week, either analyzing lab data or performing experiments.

Grading

Grading will be out of 1000 points and based on 3 exams (450), a final exam (200), Lab (250) and 10 problem sets (100).

The following is a *guideline* of how grades will be determined. This will allow you to keep up with your performance in the course. When computing your grade you should keep in mind that lab grades are generally higher than exam grades (your lab grade reflects your report **and** your in lab performance; you get some credit for attendance and participation in the laboratory) and the following guidelines are based on *all* aspects of the course material. You should *not* try to extrapolate these guidelines to your performance in any one aspect of the course.

850-1000	A
700-850	B
600-700	C
500-600	D