

SYLLABUS

Course: **CH 332 Physical Chemistry II**

Semester: Spring, 2006

Professor: **Carl Salter**

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Required Text: *Physical Chemistry: A Guided Inquiry: Atoms, Molecules, And Spectroscopy*
Moog, Spencer, and Farrell, Houghton Mifflin 2004

Optional Texts: P. W. Atkins, *Physical Chemistry*, 6th Ed. Freeman, 1998
Rodney J. Sime, *Physical Chemistry: Methods, Techniques, and Experiments*
Saunders College Publishing, 1990

Physical chemistry is the application of physics and mathematics to chemical systems. Physical chemistry is therefore a demanding interdisciplinary subject, requiring a working knowledge of calculus, mechanics, and chemistry.

Lecture

You will receive copies of my lecture notes throughout the course of the semester. These notes plus the textbook should allow you to solve homework problems on your own. Because you have already received the lecture notes, the lecture periods will usually be problem-solving sessions. Students will be chosen at random to work exercises from the textbook and lecture notes, as well as other problems chosen at the instructor's discretion. There will also be some assignments which will be worked on in class by small groups of students.

It is crucial that you keep up with assignments. If you have struggled with a problem and no solution is in sight, please call me or come by my office. It is much easier for both of us if you deal with these problems immediately. When I took physical chemistry, I saw my professor about twice each day. There is simply too much information to absorb by yourself; you need to "talk out" these new ideas with someone: if not me, then a classmate.

You should plan to work all the exercises and problems in *A Guided Inquiry*. The critical thinking questions are worked in class by your group. The textbook by Atkins has both exercises and problems at the end of each chapter. The exercises are relatively simple "plug and chug" calculations that are based directly on the text. The problems are more difficult. When you are studying the text, you should be working the exercises. You should read all the exercises at the end of each chapter because they closely follow the presentation of the text, and therefore aid comprehension of the material. You should attempt to work about half of the exercises at the end of the chapter.

Homework sets including computer projects will be due approximately each week. See the schedule of topics for assigned problems. By the way, these homework assignments are the problems at the end of each chapter, not the exercises. Many of the exercises, but not the problems, will be worked in class.

Tentative Schedule

Statistics Review -- Handout
Atomic and Molecular Energies
Electronic Structure of Atoms
Electronic Structure of Molecules
The Distribution of Energy States
Spectroscopy

Atkins Material
Quantum Theory Chapter 11 2,4,5,6,9,10,16
Quantum Theory Chapter 12 2,3,4,12,14,15
Atomic Structure Chapter 13 3,4,7,9,10,11,14
Molecular Structure Chapter 14 2,3,5,6,10,11,14

Evaluation

Twelve tests will be given; they will be given on the following Thursdays: January 26, February 2, 9, 16, and 23, March 2, 23, and 30, April 6, 13, 20, and 27. These quizzes are scheduled for every Thursday except the Thursday after Spring Break. **The two lowest test grades will be dropped from your average; you may only drop tests that you actually take. An unexcused absence from a test will result in a grade of zero which cannot be dropped.** Each test will contain a bonus question; points from the bonus question may be retained in your average even if the test grade is dropped. Tests can be picked up in Lou Ann's office on the day that it is taken. Return the tests to Lou Ann.

Homework sets including computer projects will be due each week. See the schedule of topics for assigned problems. By the way, these are the problems at the end of each chapter, not the exercises. You should attempt all the exercises at the end of each chapter because they closely follow the presentation of the text, and therefore aid comprehension of the material.

Class participation in problem-solving during the lecture will be evaluated and included in the homework grade. Naturally, chronic tardiness or absence will result in a poor grade. Lab reports for each lab experiment will be due one week after the completion the experiment. Lab reports are graded as pass/fail. Unacceptable lab reports must be rewritten.

The final grade will be determined as follows:

Comprehensive Final exam 20%

Homework and computer projects 15%

Tests 40%

Lab reports 25%

Laboratory

The laboratory course gives you the opportunity to measure physical and chemical constants. I will emphasize the importance of statistics in determining how precisely you have measured these constants. In fact, the early experiments are designed to teach you the use of statistics in evaluating experimental data.

Some form of eye protection, either plastic glasses or goggles, is required whenever you are in lab, except when you are working at the computer. There are no restrictions on the clothing you wear in lab. You may work in the lab at night, but you must not work alone! The person in the lab with you does not have to be a member of the physical chemistry class.

You will find that I do not provide detailed lab handouts that tell you exactly how to do an experiment. In the lab you will find general information about the goal of the experiment, but it is up to you to decide how to do your experiment. And it is [your experiment](#); you should have the pleasure of deciding how you want to do it. If I tell you how to do the experiment, [you won't have as much fun](#) because you'll be trying to get results that please me. All I care about is that you design an experiment that really measures what you want to measure, and that you estimate the precision of your measurement. Of course, I'll be there whenever you want to talk to me about your experiment. And in that regard, let me warn you that **I am very opinionated and hold very definite ideas about the way things should be done in the lab.** This is an inevitable consequence of spending fifteen years of my life doing chemical research. My job is to use my experience to help you avoid bad ideas and mistakes. [Nevertheless, if you believe an idea you have is right, don't drop it just because I say it's wrong. Stick with it until you understand why it is wrong, or until you can prove to me that it is right.](#)

You should keep some organized record of the work you do in lab, but I want you to decide how you want to do that; I am not going to grade your personal notebook. I will from time to time call you into my office and ask you to answer questions about your lab work; you can bring in your notebook and refer to it during these interviews. Therefore you need to record information in your notebook so that several weeks later you will be able to look at it and know what you did in the lab. By the way, you do not need to write down a detailed experimental procedure in the notebook; instead, refer to the lab textbook where you found the procedure. If you modify the procedure or apparatus, be sure to record that.

[Suggestions for writing Lab Reports and recommended outline](#)