

COURSE: Physical Chemistry, 3620 Lecture

Spring 2007

SECTION: Chem 3620-07
CREDIT: 3 hours
LOCATION: E303 Sundquist
TIMES: 11:15-12:10 MWF
PREREQUISITE: Math 1920, Chem 3610

INSTRUCTOR

Dr. Ron Robertson
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TEXT

Physical Chemistry, 7th edition, P.W. Atkins and Julio de Paula, W. H. Freeman Publishing, 2002 (available in APSU bookstore)

SUPPLEMENTARY MATERIALS

The student solutions manual is not available in the bookstore but you may be able to purchase it online. Use it very carefully – the solutions often do not follow from our treatment of the material. I grade homework on a logical development of a solution – you can lose points by blindly copying a solution!

The website for the text can be found at www.whfreeman.com/pchem7. From time to time additional readings may be required. These will be on reserve in the Chem library.

A scientific calculator is essential. Special function keys should include scientific notation, fractional roots, natural and common logarithms, and exponential functions (e^x and 10^x).

COURSE DESCRIPTION, CONTENT, AND OBJECTIVES

This course emphasizes and develops the general core areas of reasoning, scientific knowledge and numerical understanding. These areas involve the university's mission to develop skills of inquiry, abstract and logical thinking, and critical analysis; the ability to understand and use numbers and statistics; and an understanding of the scientific method.

Physical chemistry studies the underlying physical principles that govern the properties and behavior of chemical systems. In a sense all other chemists come back to physical chemistry to truly understand what is happening. Chemical systems can be studied from a microscopic or macroscopic viewpoint. The microscopic viewpoint makes explicit use of the concept of molecules. The macroscopic viewpoint studies large-scale properties of matter without the explicit use of the molecule concept. The first semester we used predominantly (but not always) the macroscopic view. This semester we emphasize the microscopic as well as macroscopic view.

There are five main areas in physical chemistry: thermodynamics, transport properties, quantum chemistry, statistical mechanics, and kinetics. The first semester is about

thermodynamics and kinetics. We covered some of the material in chapters 1-9 and 24 -25: ideal and real gases, 1st and 2nd laws of thermodynamics, phase equilibria, chemical equilibria, kinetic theory of gases, and simple kinetic rate laws. In 3620 we continue with our study of kinetics covering more rate laws, the Arrhenius equation and the steady state approximation (chapter 25). Then we apply this information to the kinetics of enzyme action, atmospheric processes and polymers (chapter 26). Next we look at molecular reaction dynamics (chapter 27), then on to electrochemistry (chapters 10 and 24), transport properties (chapter 24) and spectroscopy (chapter 11, 12, 13, 14, 16, 17, 18).

We continue to use calculus as an important tool, but at no higher level than 3610. Calculus 1920 is highly recommended but it is very possible to survive with only calculus 1910. Differentiation and integration (including the use of exponentials and logs) will be required. Some additional integration of elementary differential equations will be explained.

I encourage your active participation in class. We are a small but select group. Feel free to ask questions before, during and after class. I would hope to pull you "kicking and screaming" through this course. My definition of science is "organized curiosity", and I don't want you to lose your sense of curiosity as we explore together the complexities of Mother Nature. If you find yourself having difficulty, please come and see me before you get too far behind.

Since our time together in class is short, I will focus first on the presentation of ideas and concepts. My presentations will sometimes be summaries of the text's treatment, but at other times my presentation may approach the subject in a different way - a way that I think is clearer or easier. It is vital that you read the text and study the class notes to get the best understanding of the material. After you think that you have an understanding of the ideas and concepts presented (after you have the mental model) you should attempt the homework problems. Some problems will merely be review type questions, but others will allow you to "flex" your intellectual muscles.

ATTENDANCE

You must be present to win. I consider this class to be "you and me" against the physical chemistry book. Take advantage of class time and let me know if you can't be in class. I do reserve the right to reduce your final grade for excessive absences (more than 4). Each absence after 4 may reduce your final percentage grade by 3 percentage points. Also as explained below I do give pop quizzes and your grade may be affected by your absence (see evaluation below). Be there! Nuff said.

Students are expected to conduct themselves appropriately at all times. Academic and classroom misconduct will not be tolerated. Students must read the "Code of Student Conduct" in the new Student Handbook for an understanding of what will be expected of them within the academic setting.

EVALUATION PHILOSOPHY

My general philosophy is "A grade is an inadequate report of an inaccurate judgment by a biased and variable judge of the extent to which a student has attained an undefined level of mastery of an unknown proportion of an indefinite material" (Paul Dressel) Grades are not perfect or always fair, but I will pledge to be consistent. All of you will probably not be able to make A's but all of you can be successful in this course. I like the definition of success by John Wooden (former coach of UCLA's great basketball teams): "Success is peace of mind that is the direct result of self-satisfaction in knowing you did your best to become the best that you are capable of becoming". My pledge is to help you become the best you can be within your

situation and opportunities. I urge you to do all you can in the time you have with what you have in the place you are.

I will test for true understanding of ideas as well as recognition of facts. I will guarantee you the following cutoffs: **A 84.5%, B 71.5%, C 59.5%, D 49.5.**

My tests are layered in complexity. I evaluate in several areas: (1) a straightforward memorization of facts, (2) an understanding of ideas and concepts, and (3) an application of ideas to problem solving situations. Many types of questions are asked: short answer, mathematical problems, derivations of equations, essay and discussion. There are many equations in p chem, so to assist your work on our hour exams I will supply you on each exam with some of the basic equations. **You will be told what equations will be given to you the class period before an exam. These same equations will be available to you on the final exam.** My goal in evaluation is to obtain the most information possible about your progress in the course.

NUTS AND BOLTS OF EVALUATION

- a) Unless repeating either lecture or lab **you must be concurrently enrolled in both lecture and lab.** Lab is a very important part of this course and is probably worth more than the official 1 credit hour. As a result we will combine your lecture and lab grades so that you will receive the same semester grade for this course (lecture) as for lab. The grade will be 70% from lecture and 30% from lab.
- b) There will be five major exams during the term: four hour exams and a comprehensive final. I will announce in class at least a week in advance our hour exam test dates. The final will be:
Thursday, May 3 (Final Exam over all material) 8:00 – 10:00.
- c) Your grade will be based on your performance on about 550 possible points. Each exam will count 100 points and the Final will count 150 points. Your lowest exam grade (excluding the Final) will be dropped. The Final Exam must be taken. **If you miss an exam for any reason other than representation of the university in an official capacity, that exam will qualify as the exam to be dropped.** If you miss a 2nd exam, a doctor's note or other approved documentation for special circumstances (approved by the instructor on a case by case basis) is necessary for exam makeup. It is best to take every exam possible in order to allow for unforeseen circumstances. It is my usual practice to go over your marked exams in class and to collect and keep all exams after we review them in class. You are welcome to come and study your old exams during times mutually convenient to you and me. The thorough review of class notes and assigned problems is your best way to study for our exams.
- d) You can work with others on all out of class assignments (homework) unless specifically indicated (for example a problem set). Cheating on exams and quizzes will not be tolerated. A grade of zero will be assigned for that exam or quiz as a first step, and the matter will be referred to student affairs for further action.
- e) Extra credit may be given for participation in our *Kids and Chemistry* outreach program and for attendance at departmental seminars and other special departmental functions. There will be a limit of 5% total extra credit per semester. Details will be given for each event. Those who want extra credit for activities outside the university location will be required to complete a waiver of liability form.

- f) I do **love** to see your worked out solutions to the problems as well as supporting background information on essay questions. An answer alone to a mathematical problem may receive no credit. I want to see how the wheels are turning!
- g) If you have a condition that may affect your academic performance, I encourage you to make an appointment with me or with the coordinator of disability issues (telephone 221-6230, tty 221-6278; fax 221-7102) in order to discuss this matter.

DROP/ADD DATES

I truly hope that you will not want to or feel the need to drop this course, but if you do . . . the following dates are important.

Last day to drop without a record	January 29
Last day to drop with an automatic "W"	Feb. 27
Last day to drop with a "W", "F", or "FA"	April 6

OTHER COMMENTS

Minors (any non-student under the age of 18) accompanying staff, faculty, students, or visitors on campus are not permitted in the classroom. This is university policy.

I truly enjoy teaching chemistry and hope that we will have a profitable term. Please feel free to come by or call my office or to call me at home. Help with course material, discussion of career opportunities in chemistry, or "shooting the breeze" are all possible topics for discussion. Good luck!

Chem 3620 Spring 07

Date		Material covered	Reading	Questions and problems
Jan. 17	W	Syllabus		
19	F			
22	M			
24	W			
26	F			
29	M			
31	W			
Feb. 2	F			
5	M			
7	W			
9	F			
12	M			
14	W			
16	F			

19	M			
21	W			
23	F			
26	M			
28	W			
March 2	F			
5, 7, 9		Spring Break		
12	M			
14	W			
16	F			
19	M			
21	W			
23	F			
26	M			
28	W			
30	F			
April 2	M			
4	W			
6	F	Good Friday		
9	M			
11	W			
13	F			
16	M			
18	W			
20	F			
23	M			
25	W			
May 3	R	Final Exam 8:00 – 10:00		