

Physical Chemistry I

Instructor	Prof. William R. Simpson
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Class meeting	Monday, Wednesday, and Friday 10:30 - 11:30 AM, REIC 203
Office hours	After class; Monday, Wednesday and Friday 1:30 PM – 2:30 PM, and by appointment
Text	Physical Chemistry by Engel and Reid

Course Overview: Chemistry 331 is the first semester of a two-semester series in physical chemistry. You will cover much of the first half of the text.

Prerequisites: Chem 106- the standard one year sequence in general chemistry for science majors; Math 202 - the 3 semester sequence in differential and integral calculus, vector algebra, and partial differential equations; and Phys 104 or 212 - one year of science major general physics.

Course structure: The course follows your text in the order described on the attached schedule of topics. During Monday and Wednesday classes, I will lecture on the material in the book. Reading the book before the lectures will be important for following and understanding the lectures. The Friday classes are a combination of lecture and in-class quizzes. These Friday quizzes are a very important part of the course as they will help you to stay current with and to understand the material of the course.

Grading Structure (points): Your course grade will be based on the total points of the hour exams, the final exam, the quiz scores, reading questions, and possibly extra credit from attendance at and participation in demonstration laboratories and reading questions. Material assigned in readings, in lecture, or in homework problems may appear on an exam. The maximum number of points for each is given below:

Exercise	Points
Hour exams 100 pts each	300
Final exam	100
Quizzes	80
Reading questions	20
Total	500
XC: Demolabs	+10
XC: Reading questions	+10

Exams: The exams will be given during class, and will be one hour in length. You are permitted to use a calculator, a unit sheet (distributed with the exams), and a half sheet of paper (8.5"x5.5") containing only formulas. You should continually prepare this sheet as you study the material. Don't copy your friend's sheet. Preparing and organizing material is essential. I will look at the sheet during the exam and may collect the sheet. Chemistry Department regulations require that any student caught cheating on graded work will be assigned a course grade of F. Course drop forms will not be signed in these cases. Homework, quiz, and exam solutions will be **posted on the web in the Blackboard system.**

Make up exams: Make-up exams will be allowed if you have a good reason. If you anticipate an absence (work commitments, intercollegiate sports), talk to me **before** the exam to make arrangements. If the absence is unexpected (illness, family or personal difficulties), *talk with me at the earliest possible opportunity.*

Students with disabilities: Students with documented disabilities who may need reasonable academic accommodations should discuss these with me during the first two weeks of class. You will need to provide documentation of your disability to Disability Services in the Center for Health and Counseling, 474-7043, TTY 474-7045

Homework: Physical chemistry is a hard class. I see three ways that the class is hard: 1) Mechanically: It can be hard to calculate the correct answer because of algebra complexities or unit conversions. Some of your homework problems are designed to hone these skills. A solid mathematics background also helps. 2) Conceptually: You will have to find the right technique to solve a problem or identify the formula appropriate for the problem. 3) Theoretically: Many of the central concepts of physical chemistry reappear throughout the class. Therefore, seeing parallels between what at first appear to be different problems assists you in mastering the material of physical chemistry. This is the true power of physical chemistry. For example, in general chemistry, you learned about equilibrium constants and also about vapor pressures of gases. In this class, you will discover that both processes are described by the same theory.

Homework and in-class quizzes are critical aspects of learning these three parts of physical chemistry. Every week you will be assigned 3 to 6 homework exercises. These homework exercises are not graded, but you will be provided with homework keys (posted on the web). If you attempt a problem but don't get an answer, see me for help. A few of these exercises are selected to improve your mechanical skills and also help you to find the right formula to apply to a problem. Many of the problems will be conceptual in nature. These questions address the theoretical connections between various physical chemistry problems.

Quizzes: The quizzes will be given during class, and will be about 15 minutes in length. You are permitted to use a calculator, and a formula / unit sheet (distributed with the quiz). The formula / unit sheet will have all appropriate formulae as well as numerical values for constants and unit conversions. The quizzes will be on all Fridays except on the Friday during the week of an hour exam. See the calendar for exact dates. The purpose of the quiz is to provide a frequent check on learning progress. Doing the homework diligently is the best way to assure good grades on the quizzes, and past experience has shown that good quiz grades translate to good course grades. There will be no makeup quizzes, but your two lowest quiz grades will be dropped. Answers to the quizzes will be posted on the website.

Working in groups: While working on your homework and/or preparation for Friday quizzes, you may work in groups. In fact, working in groups usually results in faster and deeper learning. Whether you work in a group or alone, you must take the exams and quizzes alone. Copying the solution of another student is not working in a group and will lead to a hole in your understanding that will appear in your exam and quiz performance. My advice is to work the homework and study in groups but don't cheat yourself.

Reading Assignments and Reading Questions: I will assign the reading (on the order of 10 pages) for the next class through the blackboard web system within a couple hours of completion of a class. Doing this reading as preparation for the class is critical to being able to follow the material in the class, and allows the lecture to reinforce your reading. Following the lecture, the problem sets then further the learning, and the weekly quiz provides frequent checks. At most classes, I will start the class with a brief (2-minute) daily question on the reading that you completed in preparation for the class. There will be 30 of these questions, each graded as one point. Twenty of these points will count towards the normal point total, and up to 10 points will be extra credit to reward you for careful reading of the book. Therefore, I list 20 points as in the normal points and 10 points of extra credit for the total 30 points of reading questions.

Demonstration Laboratories: As a part of this course, I am interested in trying out a set of demonstration laboratories that will help you to see physical examples of the concepts you are learning in class. These laboratories will be held during a time to be arranged approximately five times in the semester. Attendance at these sections is optional, but if you attend and participate, you will receive extra credit points (up to 10 points). Additionally, I feel that attending these sections will help you to ground the often theoretical material discussed in the lecture and discussion problems. Input on these demonstration laboratories would be very helpful to future generations of this class.

The exams will be given on the following dates: see the calendar for more detailed information. Exams are generally on Wednesday, and quizzes are on Friday.

<u>Exam</u>	<u>Material Included</u>	<u>Date</u>
1	weeks 0-3	1 Oct (Wed)
2	weeks 4-7	29 Oct (Wed)
3	weeks 8-10	19 Nov (Wed)
Final	40% weeks 11-14, 60% cumulative	17 Dec (Wed)

Tentative Grade Scale (If you get at least 90%, you are guaranteed an "A". I may elect to set the grade cutoffs lower, but we will not set them higher.) I will not be using +/- grading.

Grade	<u>Percentage</u>
A	90 %
B	80 %
C	70 %
D	60 %

Important dates:

Last day for 100% of tuition and fee refund Friday, Sept. 12
Last day for drops (course does not appear on record), 50% tuition refund Friday, Sept. 19
Last day for withdrawals (W appears on academic record) Friday, Oct. 31
Final Exam (10:15-12:15)..... Wednesday, Dec. 17

Summary of Resources:

Faculty—Bill Simpson, NSF 186, 474-7235, ffwrs@ uaf.edu

Chem331 home page: log into the blackboard system: <http://classes.uaf.edu/> —syllabus, sample exams and solutions, solutions to quizzes, homework solutions, email to faculty, links to other sites.

Tentative Schedule of topics (see blackboard website for detailed reading assignments):

Week	Chapter	Topic
0	0	Introduction
1	1	Fundamentals of Thermodynamics
2	2	Heat, Work, Internal Energy, Enthalpy, and the First law
3	2, 3	First law and State functions
4	3, 4	Heat capacities and Thermochemistry
5	4,5	Thermochemistry and Entropy
6	5	The 2nd and 3rd laws
7	6	Chemical Equilibrium
8	6,7	Equilibria and Real gases
9	8,9	Phase diagrams, Solutions
10	10	Solutions, Electrochemistry
11	34	Kinetic theory of gases
12	35	Transport Phenomena
13	35,36	Transport and Chemical Kinetics
14	36	Chemical Kinetics

Calendar Chem 331f08

Week	Sun	Mon	Tues	Wed	Thur	Fri	Sat
0					4-Sep	5 First Day of Class	6
1	7	8	9	10	11	12 Quiz 1 last day 100% refund	13
2	14	15	16	17	18	19 Quiz 2 last day to drop, 50% tuition refund	20
3	21	22	23	24	25	26 Quiz 3	27
4	28	29	30	1-Oct Exam 1	2	3 no quiz	4
5	5	6	7	8	9	10 Quiz 4	11
6	12	13	14	15	16	17 Quiz 5	18
7	19	20	21	22	23	24 Quiz 6	25
8	26	27	28	29 Exam 2	30	31 no quiz last day to withdraw (W on transcript)	1-Nov

9	2	3	4	5	6	7 Quiz 7	8
10	9	10	11	12	13	14 Quiz 8	15
11	16	17	18	19 Exam 3	20	21 no quiz	22
12	23	24	25	26	27 Thanksgivings	28 Thanksgivings	29
13	30	1-Dec	2	3	4	5 Quiz 9	6
14	7	8	9	10	11	12 Quiz 10	13
15	14	15	16	17 Final Exam 10:15— 12:15	18	19	20