

Chemistry 311, Physical Chemistry I

Fall, 2003-2004

Syllabus

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DESCRIPTION:

In this two-semester physical chemistry course, you will study again many of the topics that were introduced in the first two years of college chemistry as well as some new topics. All of the topics will be approached more mathematically and more theoretically than in earlier courses, and we will apply the techniques of physics and mathematics as well as those studied up to now in chemistry courses. In Chemistry 311, we will study thermodynamics and its application to chemical systems, gas kinetic theory, and the theory of transport processes. In Chemistry 312, we will study reaction kinetics, quantum mechanics, spectroscopy, and statistical mechanics.

GOALS:

- 1. Mastery of Factual Knowledge.** In this course, you should expand your knowledge of the properties of elements, compounds and more complicated systems, and continue the organization of this knowledge into a coherent whole.
- 2. Understanding of Underlying Theories.** In this course, you should begin to understand the physical theories that underlie all of chemistry.
- 3. Integration and Synthesis of Knowledge.** In this course, you should begin to integrate chemistry, physics, and mathematics into a unified body of knowledge.
- 4. Problem-Solving.** In this course, you should continue to develop proficiency in analyzing chemical problems, designing problem-solving strategies, and using calculus and other mathematical tools to carry out the solutions.

TEXT:

Robert G. Mortimer, *Physical Chemistry*, 2nd ed., Academic Press, San Diego, CA, 2000 (required)

Robert G. Mortimer, *Mathematics for Physical Chemistry*, Academic Press, San Diego, CA, 1999 (optional)

EVALUATION:

Homework: There will be at least one homework set assigned for each chapter, with a specified due date. The instructor's solutions to the problems will be placed in the Chemistry Library on the due date for the set. When you are finished with the set, you will grade your own homework, assigning a maximum of 2 points to each problem. You will write your grade on the paper and turn it in to the instructor for recording of the grade. You may not consult the instructor's solutions until you are ready to grade your paper.

Examinations and quizzes: There will be four examinations during the course and a final examination at the end of the semester. There will also be some unannounced quizzes. The examinations will be given outside of the regular lecture periods. There

will be at least one oral examination. The final examination will cover the entire semester.

Grades: Each examination during the semester will count 100 points, and the final examination will count 200 points. The homework will count 100 points. Each unannounced quiz will count 5 to 10 points. The final grade will be determined by the percentage of the total points, approximately as follows:

A	85 - 100
A-	80 - 84
B+	75 - 79
B	70 - 74
B-	65 - 69
C+	60 - 64
C	55 - 59
C-	50 - 54

POLICIES:

Attendance at every class meeting is expected. You should plan to read each chapter at least twice, and the first reading of the textbook's treatment of any subject should be prior to the class period at which that subject is discussed. You should bring a calculator to class.

If you must miss a regular class meeting, please notify the instructor in advance if possible. If you must miss an examination, you must arrange a time for a make-up examination with the instructor.

The Rhodes College Honor System governs your work in this course. It is required that examination and quiz papers are completely your own work. You must sign a pledge on every examination or quiz paper, certifying that you have not cheated, have not witnessed any cheating, and have not assisted anyone else in cheating. The following policies apply to the homework in this course: You must first attempt every homework problem individually. After this initial effort, you may work together in pairs or groups on specific homework problems, and you may ask the instructor for help. Generally, if you have not decided how to work a problem within 30 minutes, it is best to consult with other students or with the instructor. Copying a homework solution from another student's paper or from the instructor's solutions is not permitted. A penalty may be applied to late homework papers.

TENTATIVE SCHEDULE:

Period	Date	Chapter/Topic
1	Aug. 27	Ch. 1. Systems and States
2	Aug. 29	Ch. 2. Gases and Liquids
	Sept. 1	Labor Day Holiday
3	Sept. 3	Ch. 2
4	Sept. 5	Ch. 3. The 1st Law of Thermodynamics
5	Sept. 8	Ch. 3
6	Sept. 10	Ch. 3
7	Sept. 12	Ch. 3
		Examination 1 - Chapters 1-3
8	Sept. 15	Ch. 4. The 2nd and 3rd Laws of Thermodynamics
9	Sept. 17	Ch. 4

TENTATIVE SCHEDULE (continued):

Period	Date	Chapter/Topic
10	Sept. 19	Ch. 4
11	Sept. 22	Ch. 4
12	Sept. 24	Ch. 5. The Thermodynamics of Real Systems
13	Sept. 26	Ch. 5
14	Sept. 29	Ch. 5
15	Oct. 1	Ch. 5
		Examination 2 - Chapters 4 and 5
16	Oct. 3	Ch. 6. Phase Equilibrium
17	Oct. 6	Ch. 6
18	Oct. 8	Ch. 6
19	Oct. 10	Ch. 6
20	Oct. 13	Ch. 7. Multicomponent Systems
21	Oct. 15	Ch. 7
22	Oct. 17	Ch. 7
	Oct. 20	Fall Recess
23	Oct. 22	Ch. 7
24	Oct. 24	Ch. 7
		Examination 3 - Chapters 6 and 7
25	Oct. 27	Ch. 8. Chemical Equilibrium
26	Oct. 29	Ch. 8
27	Oct. 31	Ch. 8
28	Nov. 3	Ch. 8
29	Nov. 5	Ch. 9. Electrochemical Systems
30	Nov. 7	Ch. 9
31	Nov. 10	Ch. 9
32	Nov. 12	Ch. 9
		Examination 4 - Chapters 8 and 9
33	Nov. 14	Ch. 10. Gas Kinetic Theory
34	Nov. 17	Ch. 10
35	Nov. 19	Ch. 10
36	Nov. 21	Ch. 10
37	Nov. 24	Ch. 10
	Nov. 26	Thanksgiving recess
	Nov. 28	Thanksgiving recess
38	Dec. 1	Ch. 11. Transport Processes
39	Dec. 3	Ch. 11
40	Dec. 5	Ch. 11
41	Dec. 8	Ch. 11
42	Dec. 10	review for final examination (or a fifth exam)
	Dec. 16	Final examination, 1:00 p.m. One alternate time can be scheduled if needed.

GETTING HELP:

The instructor will be available for individual consultation whenever he is in his office (211K). If you have a question that probably has a quick answer, you can ask it by e-mail.