Chemistry 110B Winter 2003

Instructor: Daniel Neuhauser

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Class meetings (Tentative): The class will meet four times a week, in room 1044 Young Hall, from 10:00 to 10:50 a.m; MWF for lectures, and Tuesdays for discussions with the TA, Pep Charusanti. **Note that thursdays is also reserved for the class, and from time to time I'll give a lecture or tutorial then. (See class for announcement.)**

Office hours: Mon. 11-12:30, room 3049 Young Hall.
VOH: will NOT be used.

Teaching Assistant: Pep Charusanti, 3085b Young Hall. pep@chem.ucla.edu

Course description: An introduction to kinetic theory, transport phenomena, statistical thermodynamics, and chemical kinetics.

Text: (Required) *Physical Chemistry*, by P. W. Atkins. Either the 7'th (preferably) or the 6'th or the 5'th editions would be fine. I would assign homeworks based on the 7'th edition, and you should copy the relevant HW pages if you own a previous edition. Also, I give below two separate reading lists – one for the 7'th and one for the 6'th editions.

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(Required) *Lecture-Notes for 110B -- Daniel Neuhauser* . (Available from Course Reader, 1141Westwood Blvd.)
The notes contain also old exam and H.W. questions.

(Optional) *Solutions Manual for Physical Chemistry*, P. W. Atkins.

Prerequisites: Satisfactory performance in Chemistry 110A, 113A, or comparable courses in chemical thermodynamics and quantum mechanics, and Math 32B or the equivalent.

Homework: You will be **required to turn in**, *at the start of the Wed. class*, solutions to a few problems that will have been handed out the previous week. The quality of your solutions will be reflected in your course grade (see below); they will be judged on your approach and your insight, not merely on some numerical answer. Try to think critically and to display your reasoning clearly. Answers should be circled or highlighted. Points will be deducted for improper use of units or significant figures. Some hints to these problems, as well as previous problems, will be discussed, as needed, on Mondays.

Collaboration on homework is encouraged.

Exams: Two **closed-notes 'hour exams'** (50 minutes long) will be given. They are currently scheduled for: **Monday, Jan. 27 and Monday Feb. 24.**

Any changes in these dates will be announced will in advance. **No makeup exams** will be given. The only thing allowed in the exam will be pencils. No calculators, no notes, and no books allowed!

Final exam: Friday March 21, 3-6 pm.

Active student participation ("Friday cards"): You are expected to take an *active* role in this course. To help you clarify your ideas and to help us monitor your progress, you are to hand in, at the start of class each Friday, a 3x5 card *headed with your name and the date* and containing either a thoughtful question or a comment germane to the material being covered at the time. It might address something that you do not understand from the lectures or the assignments; if you feel that you have a good understanding of the material, we will welcome relevant comments (*e.g.,* about other applications).

Grading: Your final course grade will be made up approximately as follows;

Two hour exams	42 percent
homework	9 percent
participation(Wednesday cards, office hours)	4 percent
Final exam	45 percent

In order to help those who earn poor grades on one of the hour exams, the weight of the better of the two will be twice that of the other hour exam. (So one would weight 14% and the other 28%.)

Course Outline

Chemistry 110B is concerned with the following topics, the interrelations of which (and the relation to earlier material that you have studied) will become apparent as the quarter progresses.

I. Probabilities; Kinetic theory of gases and transport properties in gases. (about 2 weeks)

II. Statistical thermodynamics. (about 4 weeks)

III. Chemical kinetics, molecular reaction dynamics, and surfaces (about 4 weeks)

Because an understanding of the second topic, statistical thermodynamics, depends upon a firm foundation in macroscopic thermodynamics, it is essential that you *review 110A material.*.

Mathematical Requirements: Unlike 110A, mathematical derivations will be our "bread and butter" throughout this course. You will be required both to follow the derivations and to be able to use them.

Lecture Notes: They are designed thelp you follow the derivations and to give you access to old home work and exam questions. They are NOT, however, a substitute for class attendance or reading the textbook.

Weekly Reading Assignments based on Atkins 7'th edition (see below for 6'th edition)

week 1.	(Jan. 6-10)	Atkins Sections 24.1-24.3, and Lecture Notes, Parts 1. Probabilities. Kinetic theory of gases, pressure, Maxwell Boltzman distributions, mean free path; collisions.
week 2.	(Jan. 13-17)	Atkins Sections 24.4, 24.10. Transport properties of gases heat transfer, viscosity, diffusion. Part 2 of Lecture Notes
week 3.	(Jan. 22-24)	Chapter 19. Fundamentals of statistical mechanics, and handouts on statistical mechanics. Start Part 3 of Lecture Notes.

Monday, Jan. 27: One-Hour Exam. Closed notes: kinetic theory, transport, diffusion, viscosity, heat flux. (And if we have enough time, also: Statistical Mechanics - fundamentals..)

week 4.	(Jan. 27-Feb. 31)	Chapter 19 - remainder, and pages 1054-1055. Lecture Notes -- Continue Part 3.
week 5.	(Feb. 3-7)	Start Chapter 20. Using statistical mechanics. Finish Lecture Notes Part 3.
week 6.	(Feb. 10-14)	Chapter 20 - remainder. Start Chapter 25: Rates of chemical reactions. Lecture Notes: Part 4
week 7.	(Feb. 19-21)	Chapter 25 - remainder. Start Chapter 26 (only Sections 26.1-26.7). Chain reactions, polymerizations, catalysis.

Monday, Feb. 24: One-Hour Exam. Closed notes: Statistical Mechanics. Rates of reactions.

week 8.	(Feb. 24-Feb. 28)	Chapter 26 - remainder. Start Chapter 27. Molecular reaction dynamics. Lecture Notes: Part 5.
week 9.	(March 3-7)	Chapter 27 - remainder.
week 10.	(March 10-14)	Chapter 28 - Surfaces.

Final Exam: Friday, March 21, 3-6.

Weekly Reading Assignments based on Atkins 6'th edition

week 1.	(Jan. 6-10)	Atkins Section 1.3, and Lecture Notes, Parts 1,2. Probabilities. Kinetic theory of gases, pressure, Maxwell Boltzman distributions, mean free path; collisions.
week 2.	(Jan. 13-17)	Chapter 24 Sections 24.1-24.4, 24.11-13). Transport properties of gases heat transfer, viscosity, diffusion. Part 2 of Lecture Notes
week 3.	(Jan. 22-24)	Chapter 19. Fundamentals of statistical mechanics, and handouts on statistical mechanics. Start Part 3 of Lecture Notes.

Monday Jan. 27: One-Hour Exam. Closed notes: kinetic theory, transport, diffusion, viscosity, heat flux. (and possibly fundamentals of stat. mech.)

week 4.	(Jan. 27-Feb. 31)	Chapter 19 - remainder, and pages 909-910. Lecture Notes -- Continue Part 3.
week 5.	(Feb. 3-7)	Start Chapter 20. Using statistical mechanics. Finish Lecture Notes Part 3.
week 6.	(Feb. 10-14)	Chapter 21 - remainder. Start Chapter 25: Rates of chemical reactions. Lecture Notes: Part 4
week 7.	(Feb. 19-21)	Chapter 25 - remainder. Start Chapter 26 (only Sections 26.1-26.7). Chain reactions, polymerizations, catalysis.

Monday, Feb. 24: One-Hour Exam. Closed notes: Statistical Mechanics. Rates of reactions.

week 8.	(Feb. 24-Feb. 28)	Chapter 26 - remainder. Start Chapter 27. Molecular reaction dynamics. Lecture Notes: Part 5.
week 9.	(March 3-7)	Chapter 27 - remainder.
week 10.	(March 10-14)	Chapter 28 - Surfaces (only Sections 28.8-28.14).

Final Exam: Friday, March 21, 3-6.