

Chemistry 110A

Fall 2005

Instructor: D. Neuhauser
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Office: 3049 Young

Information: Available on the bulletin board outside near the 2nd floor elevators in Young Hall. Check it for announcements, homework solutions, TA office hours, etc.

Lectures: M, W, F 9:00-9:50 a.m. 2200 Young Hall

Discussion Session: Tu. 9:00-9:50 a.m. 2200 Young Hall

On **Thursdays**, we'll occasionally have tutorials or review sessions (but most Thursdays there wont be a class).

Teaching Assistant: Pep Charusanti
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Office Hours: DN's: Wed, 3-5 p.m., 3049 Young Hall.
TA's: To be announced.

Texts:

Required: *Physical Chemistry* by Ira N. Levine, 5th edition (4th edition is also OK)
McGraw Hill. Available from ASUCLA.

Required: *Lecture Notes*. Available from 20/20 Copy (Course Reader), 1141 Westwood Blvd., Westwood Village.

Prerequisites:

1. Chemistry 20AB at UCLA or the equivalent. This includes stoichiometry, properties of ideal gases, phase changes, concentration units, concepts and equations of chemical equilibrium, electrochemistry, thermochemistry and an introduction to the concepts and terminology of chemical thermodynamics.
2. Working knowledge of calculus, including partial differentiation.

Outline:

Chemistry 110A is fundamentally a course in chemical thermodynamics. Topics covered include properties of ideal and real gases, the fundamentals of thermodynamics applied to chemical systems including chemical equilibria and phase equilibria, thermodynamics of solutions and equilibrium electrochemistry. This material is covered mostly in Chapters 1-7, 9, 11-12 of the text.

Homework:

Homework problems should be turned in on **Fridays**, at the end of class. You are encouraged to work with other students on the assignments.

Exams:

Two "midterms" (50 minutes long) will be given. They are currently scheduled for:

1st midterm

Friday, Oct. 28

2nd midterm

Tuesday, Nov. 22

The date and time of the final exam will be announced later.

Make full use of the office hours, mine and the TA's. We are here to help you!

Grading: Your final course grade will be made up as: 7%, homework; 30% for the one midterm where you get the better score, and 20% for the second midterm. The final exam will count for 43%. The homework score will be composed of the 9 sets where you got the best score out of the 10 total sets (e.g., in case you miss one set).

The exams: closed books, no notes allowed. I will expect you to be able both to solve problems and to repeat proofs done during the class. This will require you, therefore, to take the course very seriously from the beginning. You need to read the book and the notes daily in order to keep pace with the lectures, and answer all questions assigned.

Chemistry 110A, Fall 2005.**Weekly Topics and Readings Assignments**

(This list is tentative. You should also read the lecture notes.)

Sept. 30, Oct. 3 - Oct. 7	Chapter 1: background, ideal and non-ideal gases, mathematical preliminaries, differential calculus. Chapter 2: The First Law, pages 34-48. (work, heat)
Oct. 10 - Oct. 14	Chapter 2: continued, pages 49-69. Application of the first law. ΔH . Working with partial derivatives. Relations between C_V and C_f . Adiabatic expansions.
Oct. 17 - Oct. 21	Chapter 3: the Second Law (skim section 3.7; omit 3.8). Entropy, the second law, efficiency of engines. Reversible and irreversible changes.
Oct. 24 - Oct. 27	Chapter 4: material equilibrium (pages 102-132). Implications of the 2 nd law. Gibbs function, maximum work, thermodynamic relations. Chemical potentials and phase equilibrium.
Oct. 28 (Friday)	1st midterm (Chapters 1-3)
Oct. 31 – Nov. 4	Chapter 5: standard functions of reactions (omit Section 5.10).
Nov. 7- Nov. 10	Chapter 6: reaction equilibrium in ideal gas mixtures. Derivation and application of K_P ; Le Chateliere's principle; variation of K_P with T.
Nov. 14 – Nov. 18	Chapter 7: One component phase equilibrium (go fast over 7.5). The phase rule; the Clausius-Clapeyron equation. Chapter 9: solutions. Partial molar quantities.
Nov. 21 – Nov.23	Chapter 9: solutions. Ideal and ideally dilute solutions. Raul's law.
Nov. 22 (Tuesday)	2nd midterm (see in-class announcement for scope of material covered).
Nov. 28 – Dec. 2	Chapter 12: Multicomponent phase equilibrium (go fast over 12.8-12.9; omit 12.11). Colligative properties; phase diagrams for a mixture of two ideal solutions (L + g) or two partially miscible liquids.
Dec. 5 – Dec. 9	(Tentative; we may not be able to get there: Chapters 10-11: Reactions in non-equilibrium systems. Readings: sections 10.1, 10.2, 10.3, 11.1, 11.2, 11.9. Review (pre-exam).
Dec. 12.	Final, 3pm-6pm.