

Chem 184 – Thermodynamics and Introduction to Statistical Thermodynamics
Fall 2007
MWF, 10:00 AM – 10:50 AM, PE 010

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Office hours: by appointment.

Course Goals: By the end of the course students should be able to:

- Apply concepts of statistical thermodynamics to solve practical problems in other fields such as gas-phase chemistry or biochemistry.
- Manipulate freely formal statistical mechanical and thermodynamic identities.
- Recognize what assumptions need to be made and identities need to be applied to solve a particular problem.

Participation: Students are responsible for the material in the reading assignments, in the lecture notes posted on the <https://blackboard.unc.edu/> web page, and the material presented and discussed in class. Although these three sources of information are overlapping, it is highly recommended not to skip any single source. Students are encouraged to actively participate in class discussions. In case of a borderline grade at the end of the semester, active participation in class discussions will break the tie to a higher grade.

Grading: To the total number of **500 pts**, homework contributes **100 pts**, two midterm exams contribute **100 pts each**, and the final exam contributes **200 pts**. No make-up exam will be given. If an exam is missed without a valid (**written**) excuse, they will be graded as 0. Valid excuses include participation in sports events, sickness, and family emergency. If a valid excuse is provided, then the maximum number of points will be scaled back appropriately.

Home Works: Exercises and problems will be assigned regularly and collected. It is virtually impossible to master statistical mechanics and thermodynamics (and to pass the exams) without working extensively on exercises.

Textbook: "Statistical Mechanics : A Concise Introduction for Chemists" by B. Widom (2002)

Suggested Readings: "A Modern Course in Statistical Physics" by L. E. Reichl, 2nd edition (1998); "Basic Concepts for Simple and Complex Liquids" by J.-L. Barrat and J.-P. Hansen (2003)

Course Outline

Date	Topic
8/22, 8/24, 8/27, 8/29	Probability Concepts
8/31, 9/5, 9/7, 9/10, 9/12	Partition Functions
9/14, 9/17, 9/19, 9/21, 9/24, 9/26	Statistical Mechanical Basis of Thermodynamics
9/28, 10/1, 10/3	Statistical Ensembles
10/5	Exam I
10/8, 10/10, 10/15, 10/17, 10/22, 10/24, 10/26	Ideal Gases, Harmonic Crystals, and the Ising Model
10/29, 10/31	Quantum Ideal Gases
11/2, 11/5, 11/7, 11/9	Chemical Equilibrium
11/12	Exam II
11/14, 11/16, 11/19, 11/26, 11/28	Non-Ideal Gases & Phase Transitions
11/30, 12/3, 12/5	Effective Theories of Liquids
12/14	Final Exam at 8:00 AM

Honor Code: (Policy adopted by the faculty of the Department of Chemistry on September 9, 1977) Since all graded work (including homework to be collected, quizzes, papers, mid-term examinations, final examinations, research proposals, laboratory results and reports, etc.) may be used in the determination of academic progress, no collaboration on this work is permitted unless the instructor explicitly indicates that some specific degree of collaboration is allowed. This statement is not intended to discourage students from studying together or working together on assignments which are not to be collected.