Physics 112 - Fall 2006 Syllabus

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Office – 209 Physics
Office Hours – Tu 1-2 and Th 12-1

Text – The second draft of a textbook I am writing will be available on our website (at http://my.ucdavis.edu/)
Additional References at the same level as this class: *Thermal Physics* by Kittel and Kroemer, *Statistical Physics* by Mandl, *Statistical Mechanics and Thermodynamics* by Garrod, and *Introductory Statistical Mechanics* by Bowley and Sanchez.

Schedule –
We will cover all 7 chapters. Chap's 1 through 5 form the theoretical basis of the subject and the last two chapters discuss some very important examples that are not fully discussed in earlier chapters. There will be two short computer assignments. There will be two midterms. They will be given on Oct. 26 and Nov. 21. The final exam will be Monday Dec. 11, 8:00-10:00 AM.

What I hope you will learn –
Thermodynamics (about 4 weeks of the class) –
1) Understand the following terms; equilibrium, state variable, state function, temperature, adiabatic process, isothermal process, quasi-static process, reversible process, internal energy, enthalpy, Helmholtz free energy, Gibbs free energy, entropy, heat capacity.
2) Use Legendre transformations to change variables.
3) (**Most important**) Given equations relating state variables of a material find work done, heat added, changes in state variables, and response functions for a given process.
4) Understand how state variables change in phase transitions.

Statistical Mechanics (about 6 weeks of the class) –
1) Know which state variables are held constant for the microcanonical ensemble, the canonical ensemble, and the grand canonical ensemble.
2) (**Most important**) Use each of the ensembles mentioned above to calculate the appropriate partition function for a model system. Thus, for an ideal gas system (either classical or quantum) find the appropriate single particle distribution function.
3) **(Very important)** Use the partition functions to calculate state functions. For an ideal gas problem use the appropriate single particle distribution function to calculate the state functions.
4) Understand and use mean field theory to find approximate equations of state.

Grading –
Homework (20% of grade) – There will be 9 homework assignments (1 due each week).
Computer Problems (10% of grade) – Two computer problems will be given to you early in the quarter.
Other 70% of grade is highest of the following:
1) Midterms (40% of grade) + Final (30% of grade)
2) Midterms (20% of grade) + Final (50% of grade)
Extra Credit (4%) - You will be asked questions in class. Correct answers will give you full credit and incorrect answers will give you half credit.