Syllabus

Course #/name: PH432/532, statistical thermodynamics,

Course Description: Through this course students will learn the basic concepts in statistical mechanics and modern thermodynamics, including thermodynamics laws, and the concepts of ensemble, entropy, equilibrium physics (energy and state). Students will also learn several classical and modern applications of statistical mechanics such as ideal gas, phase transition, etc

Learning Objectives:

1. Basic laws in thermodynamics
2. Basic statistical concepts and methods: heat, work, energy, temperature and the kinetic theory of matter; entropy, ensemble, partition function, etc
3. Macroscopic parameter of a system versus its microscopic statistics.
4. Have a good grasp of the basic thermodynamic interactions and process: adiabatic, isothermal, etc
5. Have some basic understanding of other statistical concepts (such as, central limit theory, quantum statistics, etc), and know where to look up for more detail if in the future if encounter related problems to solve

Textbook: Frederick Reif
Fundamentals of Statistical and Thermal Physics

- **Hardcover:** 651 pages
- **Publisher:** McGraw-Hill Science/Engineering/Math; 1 edition (June 1, 1965)
- **ISBN-10:** 0070518009
- **ISBN-13:** 978-0070518001

Instructor: Xujing Wang (934-8186, xujingw@uab.edu)

Office: CH303, Shelby 1203 (same phone #).

Course duration: 01/07/09-5/05/09

Course meet at: TR: 3:30-4:45pm, in CH304

Office hour: TR, 1:30-2:30, or whenever the door is open, CH303 (or Shelby 1203, MW)

Grading Scheme:
Course grades will be determined based on four midterm exams (20% each), comprehensive final exam (30%), and homework (30%). A general guideline of the letter grades is given in Table. The borderline may be adjusted depending on the difficulty of exams.

In both homework and exams, adequate amount of detail is required to demonstrate the reasoning and problem solving steps.

Grading Scheme

Grade	
A	85+
B	75+
C	60+
D	50+
E	otherwise
F	

Other course policies, attendance, make up exams

To do well on the tests & exams, you should attend and stay focused at the lectures, do the reading assignments of notes and textbook before class, and personally work all of the homework problems when they are assigned (every Friday, due next Friday). Homework can be emailed directly (the department fax machine in the mailroom can email scanned doc) to xujingw@uab.edu, or leave at my mailbox. Late homework will be penalized. There will be no make-up tests & exams except for the most extraordinary circumstances (documented illness, etc.).

Course schedule

week	date	Topics	reference
1			
	01/07	Introduction Basic concept of probability, random walk	1.1-1.2
2	01/12	Probability distribution	1.3-1.6
	01/14	Generalization	1.7-1.9
3	01/19	Statistical formulation, ensemble	2.1-2.2
	01/21	Basic postulates	2.3-2.5
4	01/26	Thermo-Interaction	2.6-2.8
	01/28	Quasi-static process	2.9-2.11
5	02/02	Equilibrium conditions	3.1-3.2
	02/04	Thermal interaction	3.3-3.6
6	02/09	Basic statistical relationships	3.8-3.12
	02/11	Exam 1	
7	02/16	Macroscopic measures: Work heat, energy, temperature	4.1-4.3
	02/18	Heat transfer, energy	4.4-4.5
8	02/23	Entropy. Ideal gas	4.6-5.1
	02/25	Ideal gas	5.1-5.4
9	03/02	Maxwell relations	5.5-5.8
	03/04	Free expansion	5.9-5.11
10	03/09	Ensemble representation	6.1-6.3
	03/11	Canonical ensemble	6.4-6.6
11	03/16	Spring break	
	03/18	Spring break	
12	03/23	Approximation methods	6.7-6.10
	03/25	Partition function	7.1-7.2
13	03/30	Exam 2	
	04/01	Gibbs paradox	7.3-7.4
14	04/06	Equi-partition	7.5-7.8
	04/08	Kinetics of dilute gas	7.9-7.13
15	04/13	General equilibrium	8.1-8.4
	04/15	Phase transformation	8.5-8.6
16	04/20	Chemical equilibrium	8.7-8.10
	04/22	Advanced topics	
17	04/27	Advanced topics, non-equilibrium thermodynamics	
	04/29	Review for final	
18	05/01	Final exam (ch 1-8)	