PHYS 813 – Spring 2009

Statistical Mechanics and Thermodynamics

Lecture course outline

Lecture hours:	Tue. & Thur.: 11:00 AM – 12:15 PM
Lecture room:	103 SHL
Instructor:	Krzysztof Szalewicz, 121 Sharp, phone: 831 6579, szalewic@udel.edu
Course web page:	http://www.physics.udel.edu/∼szalewic/teach/813
Office hours:	Tue. & Thur., one hour after class
Main Text:	*Thermodynamics and Statistical Mechanics* by Walter Greiner, Ludwig Neise, and Horst Stöcker, Springer, 1995
Suppl. texts:	*Thermodynamics and an Introduction to Thermostatistics* by Herbert B. Callen Wiley 1966. Second edition, 1985 *Statistical Mechanics* by R.K. Pathria, Butterworth-Heinemann, 2nd edition, 1996
Prerequisites:	PHYS 616 (Kinetic Theory and Thermodynamics) PHYS 811 (Quantum Mechanics II), although formally not a prerequisite, is strongly recommended

Exams:

Exam 1 (75 minutes)	Mar. 26
Exam 2 (75 minutes)	May 05
Final exam (2 hours)	after May 21

Homework: A few problems each week. Normally assigned on Thursday, due the next Thursday, returned by the following Thursday. Homework will be graded only fail or pass.

Grading:

Homework:	10%
Exam 1:	25%
Exam 2:	25%
Final exam:	40%

All exam problems will be graded on a scale 0 to 10. Exams will consists of problems similar to those given as homework and related to the subjects covered in class. Exams 1 and 2 will deal with the course material covered in the weeks preceding the exam (exam 2 will not repeat subjects contained in exam 1). The final exam will embrace the whole course with emphasis on the subjects not covered by exams 1 and 2. All exams will be closed book. Each exam will contribute to your final grade as the ratio of the number of points earned to the maximum number of points, weighted as listed above. Grades will be assigned as follows: 0.75 or more is A, then in even steps down (including plus/minus grades), such that 0.35 and below is F. Homework will be collected and I will skim through your solutions. The problems will assigned only a pass/fail rating. Pass will be given for any solutions, even wrong ones, if these solutions show sufficient effort. Do not assume that a solution graded "pass" is correct. Detailed solutions to homework and exam problems will be put on reserve in the physics library. It is your duty to compare your and my solutions.

Lecture Plan

- Historical perspective
- Postulates of thermodynamics
- Equilibria
- Formal relations
- Reversible processes
- Legendre transformations
- Maxwell's relations
- Statistical basis of thermodynamics
- Microcanonical ensemble
- Canonical ensemble
- Grand canonical ensemble
- Quantum statistics
- Bose systems
- Fermi systems
- Molecular simulations