PHYSICS 307: Thermal Physics

Spring 2012

Instructor: Peter A. Becker, RB1 room 269, x-3619, pbecker@gmu.edu

Website: http://mason.gmu.edu/∼pbecker/phys307.html

Office Hours: I am generally available MW 1:00pm-2:00pm, but you should send me an email or call for an appointment to be sure I will be there.

Text: "Fundamentals of Statistical and Thermal Physics" by Reif

Grades will be based on two semester exams (20% midterm 1, 20% midterm 2), the final exam (30%), and weekly homework (30%).

Lecture 1: (1/24/12) Microscopic vs. macroscopic behaviors (Chap. 1)

Lecture 2: (1/26/12) Phase space; states; quantization (Chap. 2)

Lecture 3: (1/31/12) Systems and ensembles (Chap. 1)

Lecture 4: (2/2/12) Ensemble averaging; mean values (Chap. 1)

Lecture 5: (2/7/12) Binomial coefficient and binomial distribution (Chap. 1)

Lecture 6: (2/9/12) Mean and variance; discrete random walk (Chap. 2)

Lecture 7: (2/14/12) Gaussian distribution; Poisson distribution (Chap. 1)

Lecture 8: (2/16/12) Interacting systems; approach to equilibium (Chap. 2)

Lecture 9: (2/21/12) Boltzmann's H-theorem; energy equipartition (Chap. 2)

Lecture 10: (2/23/12) **EXAM 1**

Lecture 11: (2/28/12) First Law of Thermodynamics (Chap. 2)

Lecture 12: (3/1/12) Exact and inexact differentials (Chap. 2)

Lecture 13: (3/6/12) Reversible and irreversible processes (Chap. 3)

Lecture 14: (3/8/12) Interacting systems (Chap. 3)

Lecture 15: (3/13/12) **SPRING BREAK**

Lecture 16: (3/15/12) **SPRING BREAK**

Lecture 17: (3/20/12) Temperature; heat flow (Chap. 3)

Lecture 18: (3/22/12) Second Law of Thermodynamics (Chap. 3)

Lecture 19: (3/27/12) Heat Reservoirs (Chap. 3)

Lecture 20: (3/29/12) Thermodynamic relations; ideal gas (Chap. 3)

Lecture 21: (4/3/12) Third law of Thermodynamics; heat capacity (Chap. 4)

Lecture 22: (4/5/12) **EXAM 2**

Lecture 23: (4/10/12) Adiabatic processes (Chap. 5)

Lecture 24: (4/12/12) Specific heats (Chap. 5)

Lecture 25: (4/17/12) Entropy and adiabatic processes (Chap. 5)

Lecture 26: (4/19/12) State variables; Maxwell's relations (Chap. 5)

Lecture 27: (4/24/12) Joule-Thompson process (Chap. 5)

Lecture 28: (4/26/12) Engines and refrigerators (Chap. 5)

Lecture 29: (5/1/12) Boltzmann factor; canonical distribution (Chap. 6)

Lecture 30: (5/3/12) Partition functions; Maxwell velocity distribution (Chap. 7)

FINAL EXAM: Tuesday, 5/15/12, 1:30pm-4:15pm