Phys 455: "Thermal Physics"--- Spring 2010

Course Information:

Instructor: Dr. L. Gan
Office: DL Rm. #202
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Classes meet: Tue and Thur at 12:30pm-1:45pm
DL Rm. # 213

Office hours: Wed 12:00pm-5:00pm
Other hours by appointment

Course web site: http://people.uncw.edu/ganl/phy455/index.htm

Course Description:

Thermal physics is an advanced undergraduate course. It connects the world of everyday systems, of astronomical objects, and of chemical and biological processes with the world of molecular, atomic, and electronics systems. The course will be introduced through a unified approach to the equilibrium thermal properties of large systems based on the quantum viewpoint and statistical probability. The laws of thermodynamics and the concepts of entropy, temperature, chemical potential, free energy, and thermodynamic potential will be covered. The heat transfer, phase transition, and classical kinetic theory will be discussed.

Required Text:

"Thermal Physics", by C. Kittel and H. Kroemer
(W.H. Freeman and Company)

Supplementary Readings:

- "Fundamentals of Statistical and Thermal Physics", by F. Reif
- "Introduction to Statistical Mechanics and Thermodynamics", by K. Stowe
- "Statistical Physics" by F. Mandl
- "A Modern Course in Statistical Physics" by L.E. Reichl

Important!!!

Read ahead of the lecture and solve the weekly homework problems assigned. Weekly reading assignment is given below in the course outline. Even if you only read the assigned sections for about 30 minutes before each class, you will be much better prepared. Look through each chapter before we begin them. The

course will move at a fast but steady pace and it is your responsibility to keep up with the lectures.

Homework:

Approximately 3-7 problems will be assigned every week. Homework will be collected on Thursday during the class in one week after each assignment is announced. Show all works clearly. **Late homework will not be accepted**. It is absolutely essential that you work out the assigned problems.

Examinations:

There will be two tests during the semester and a three-hour comprehensive final exam. The exams will consist of a mixture of multiple choice, conceptual questions, and selected problems. The tentative dates of these exams are given below in the course outline. Do not miss any of the exams.

Make-up Exams:

There will be no make-up exams. In case of evidence of extraordinary circumstance, each case will be discussed and evaluated on an individual basis. No general policy will apply to the class as a whole.

Grading:

Homework	25%
Two tests	40%
Final examination	35%

Grading scale:

90 -100 ……. …… A
80 - 89 ……...…. .B
70 - 79 …….....C
60 - 69 …….. D
Below 60 ..……. F

Attendance:

YOU ARE EXPECTED TO ATTEND ALL OF THE LECTURES! Your final grade will be dropped by **half a letter grade** if you have more than five absences. No absences can be excused. Attendance will be taken at the beginning of each class and will be closed 15 minutes after the class starts. Please do not be late!

Academic Integrity:

All members of UNCW's community are expected to follow the academic Honor Code. Please read the UNCW Honor Code carefully (as covered in the UNCW Student Handbook). Academic dishonesty in **any** form will not be tolerated in this class.

Disability Services:

Students with diagnosed disabilities should contact the Office of Disability Services (962-7555). Please give me a copy of the letter you receive from Office of Disability Services detailing class accommodations you may need. If you require accommodation for test-taking please make sure I have the referral letter no less than three days before the test.

Violence and Harassment:

UNCW practices a zero tolerance policy for any kind of violent or harassing behavior. If you are experiencing an emergency of this type contact the police at 911 or UNCW CARE at 962-2273. Resources for individuals concerned with a violent or harassing situation can be located at http://www.uncw.edu/wsrc/crisis.html.

Phys 455: "Thermal Physics" – Course Outline:

Date	**Topic**	**Text Reference**
Jan. 7	Introduction to Thermal Physics	
Jan 12, Jan 14	States of a Model System	Chapter 1
Jan 19, Jan 21	Entropy and Temperature	Chapter 2
Jan 26, Jan 28, Feb 2	Boltzmann Distribution and Helmholtz Free Energy	Chapter 3
Feb 4, Feb 9, Feb 11	Thermal Radiation and Planck Distribution	Chapter 4
Feb 16	**Exam #1**	Chapter 1-4
Feb 18, Feb 23, Feb 25	Chemical Potential and Gibbs Distribution	Chapter 5
Mar 2, Mar 4	Ideal Gas	Chapter 6
Mar. 16, Mar 18	Fermi and Bose Gases	Chapter 7
Mar 23	**Exam # 2**	Chapter 5-7
Mar 25, Mar 30, April 6	Heat and Work	Chapter 8
April 8, April 13	Gibbs Free Energy and Chemical Reactions	Chapter 9
April 15, April 20	Phase Transformation	Chapter 10
April 22	Kinetic Theory okf the Ideal Gas Law	Chapter 14
April 29	**Final exam (11:30-2:30)**	All

This schedule is subject to change.