

Phys.526 Statistical Physics--Spring 2012

Class Hours:10:00-10:50AM MWF; Class Room: BRK 103

Instructor: Huey W. Huang

Office Hours: MTu 2-5 or by appointment at Rm 252 Brockman Hall

Email: hwhuang@rice.edu with subject: Phys526

Website: www.ruf.rice.edu/~hwhuang/Phys526.pdf

Textbook: Equilibrium and Non-Equilibrium Statistical Thermodynamics

by M. Le Bellac, F. Mortessagne, and G. G. Batrouni

(Cambridge University Press, 2004; ISBN 0-521-82143-6)

This course extends the undergraduate thermal physics to a more advanced level so as to prepare the graduate students for the research literature on the subjects of modern statistical physics. Students who take Phys. 526 should already understand thermodynamics and the Maxwellian kinetic theory of gases. We will use the textbook “Equilibrium and Non-Equilibrium Statistical Thermodynamics” by Le Bellac, Mortessagne, and Batrouni. We will cover topics related to the first five chapters, namely, the equilibrium statistical mechanics, including the introductory-level renormalization group theory, quantum Hall effect, and quantum phase transitions. The remaining chapters that we will have no time to cover include excellent introductions to the following subjects: Chapter 6, derivations to hydrodynamic equations, dynamics in the long-wavelength/low-frequency limits. Chapter 7, an introduction to the methods of numerical simulations. Chapter 8, the Boltzmann transport equation. Chapter 9, the linear response theory.

One reason for choosing this textbook is that it contains a large number of exercises and problems. There is no better way of testing your comprehension by trying out these problems. I will assign homework on the website www.ruf.rice.edu/~hwhuang/HW526.pdf at least a week ahead of the due time (for pledged homework, one week). One set of homework will be due every Wednesday (unless specified otherwise). You are asked to turn in your homework at the beginning of the Wednesday class. We will then discuss the homework solutions—no printed solutions will be distributed. Unless you have a legitimate excuse, late homework is not acceptable.

It is impossible to overemphasize the importance of homework. You learn the most from doing the problems yourself, including making and correcting mistakes. You are allowed to discuss homework (except for the pledged ones) with fellow students and with me, but **ONLY** after you have tried the problems yourself. Note: the first step of the solution is usually the key; the rest is usually straightforward. If you habitually rely on others to give you the first step, you probably have not learned the subject.

The course grade will be determined by the pledged homework (20%), non-pledged homework (50%), and a final (30%).

* Any student with a documented disability needing academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All discussions will remain confidential. Students with disabilities should also contact Disability Support Services in the Ley Student Center.