PHYS 425 - Statistical and Thermal Physics Fall, 2015

Meets:	1pm - 2:15pm. TTh, BRK 103
Instructor:	Prof. Qimiao Si (BRK 307, $\times$ 5204, qmsi@rice.edu)
Graders:	TBD
Office Hours:	1:30pm - 2:30pm Wednesday;
	other times, you are encouraged to stop by my office or to make an appointment with me
Grades:	homeworks 40%; 2 mid-terms, 15% each; final 30%
Textbook:	*Fundamentals of Statistical and Thermal Physics*, by F. Reif
	(also on reserve: *Thermal Physics*, by C. Kittel and H. Kroemer)

General:

1) This course is primarily designed for physics undergraduate seniors. It is assumed that the students: a) have been exposed to the basic notions of quantum states, and b) have taken or are taking quantum mechanics concurrently.

2) We will discuss the classic topics of thermal and statistical physics using Reif. We will not aim at covering the entire book. Instead, each week I will specify the sections of the book most relevant to the lectures. These sections should be the focus of your reading.

3) In addition, we will also introduce some more modern topics of statistical mechanics that have emerged since the book was written. Supplementary materials will be provided as handouts; they should be treated as important as the textbook.

4) There will be about 11 homework sets. Each homework assignment will have a due date; it should be turned in at the time we meet on the specified date.

5) Discussions on homeworks are allowed – and encouraged. However, identical copies of solutions will not be accepted.

Disability based accommodations:

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.

Course Outline: The following is a tentative list of topics we intend to cover. We will tailor the list as we go along.

0. Introduction: What is statistical & thermal physics? Why is it important?

1. Basics of statistics (Chap. 1)

2. Concepts of statistical mechanics (Chap. 2)

3. Concepts of statistical thermodynamics (Chaps. 3 and 4)

4. Formulation and applications of thermodynamics (Chap. 5)

5. Formulation of statistical mechanics (Chap. 6)

6. Statistical mechanics of classical particles (Chap. 7)

7. Statistical mechanics of quantum particles (Chap. 9)

8. Thermodynamics of phase equilibrium (Chap. 8)

9. Statistical mechanics of phase transitions (mostly supplementary materials)

10. Correlations and fluctuations; aspects of non-equilibrium statistical physics (mostly supplementary materials; time permitting)