Statistical Mechanics
PHYS611

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David Rittenhouse Laboratory 2N3A
Course Times: MWF 12-1, R11-12 in Room 2C6

♦ **Description**: This is an introductory graduate course on statistical mechanics starting with ensemble theory and ending with an introduction to critical phenomena.

♦ **Books**: "Statistical Mechanics", R.K. Pathria (required) *This book is on backorder at the University Bookstore. Therefore, please purchase the photocopied coursepacket from Wharton Reprographics, 3620 Locust Walk, Steinberg Hall, Suite 400.*
"Statistical Mechanics", K. Huang (on reserve);
"Quantum and Statistical FieldTheory ", M. le Bellac (on reserve),; "Fundamentals of Statistical and Thermal Physics", Reif, (on reserve, useful undergrad text)
"Statistical Physics", Landau & Lifshitz (on reserve, excellent classic)

♦ **Homework and Exams:** There will be several homework assignments. They will be due at the end of class one week after they are assigned. Late homeworks will not be accepted unless there is an appropriate excuse (e.g. sickness). There will be one exam at the end of the term. It will be handed out on Dec. 9 (Friday, last day of classes) and will be due back by noon on Monday, Dec 11. Late exams will not be accepted.

♦ **Participation:** Attendance is required. Students are encouraged to participate actively – it's more fun for everyone if people ask questions! Since we are working from a textbook, you will benefit greatly from reading the textbook in advance.

♦ **Grades:** Homework: 70%
1 exam: 25%
Attendance & participation: 5%
Since homework counts for 70% steady effort throughout the course will reap rewards.

♦ **Grader**: Klaus Larjo

♦ **Other Policies:** I do not discuss grades over email. Late assignments not accepted.

♦ **University Holidays:** Oct 15 – 18, November 24 – Nov. 27.

PLAN

1. Thermodynamics and Statistical Mechanics (Ch.1)
2. Ensemble Theory (Ch.2)
3. Canonical Ensemble (Ch. 3)
4. Grand Canonical Ensemble (Ch.4)
5. Quantum Statistics (Ch. 5)
6. Ideal Gases (Ch 6)
7. Ideal Bose Systems (Ch. 7)
8. Ideal Fermi Systems (Ch. 8)
9. Introduction to phase transitions (Ch. 11, parts of 12,13)

We will not cover all the material in the indicated chapters. The core syllabus is Ch. 1 – 8. Time permitting, we will occasionally explore some topics in information theory, a subject with close connections to statistical mechanics.