Physics 219 Spring 2006

Statistical Mechanics

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Location:	231 ISB
Times:	Mondays and Wednesdays, 2:00–3:45 pm.

This summary and additional information about the class is available at my web page

`http://apyoung.com/219/`

TOPICS

This is a graduate level course in statistical mechanics. The course will start with basic principles at an elementary level and then proceed to discuss applications in condensed matter physics. Topics to be included are: basic principles, canonical and grand canonical ensembles, the significance of the chemical potential; ideal gas and virial expansion; degenerate fermi gas and bose condensation; theory of fluctuations, linear response theory and fluctuation-dissipation theorem; Boltzmann equation; phase transitions including the mean field approximation, Landau theory, an introduction to fluctuation effects and scaling theory.

BOOKS

The course will not follow closely any one book.

The recommended text (which treats modern topics and is fairly inexpensive) is

Equilibrium Statistical Mechanics by **M. Plischke** and **B. Bergesen**.

In my view, the best elementary introduction to statistical mechanics is chapters 1–8, and 22–23, and appendix F of

Thermal Physics by **C. Kittel** (1st. Edition).

Unfortunately this is no longer in print. (I bought a second hand copy from Amazon.) A reasonable alternative, though with some of the the good bits watered down, is the second edition:

Thermal Physics by **C. Kittel** and **H. Kroemer** (2nd. Edition).

No serious student of statistical mechanics should be without

Statistical Physics by **L. D. Landau** and **E. M. Lifshitz**.

Good traditional texts are

Statistical Physics by **G. Wannier**,
Statistical Mechanics, by **R. K. Pathria**,
Fundamentals of Statistical and Thermal Physics by **Reif**.

Another good book, though with a rather original style is

Statistical Mechanics by **S.-K. Ma**.

All these books are on reserve in the Science Library. The book by Plischke should be in the book-store.

PREREQUISITES

The course requires prior knowledge of quantum mechanics and thermodynamics. No prior knowledge of statistical mechanics is will be assumed.

GRADES

The grades for the course will be decided on the basis of homework, 50%, and a final exam, 50%. To pass the course you must receive a satisfactory score in **both** parts.

OFFICE HOURS

The time of my office hour will be decided at the first class.