

Syllabus

Lecturer: Prof. Xing, Xiangjun 邢向军 教授,

Office: 包玉刚图书馆525

Class time and place: Monday and Thursday, 10:00 -11.40am, 下院102.

Office Hours: Monday and Thursday, 8:00 - 10:00, or by appointment.

Content: An introduction to thermodynamics and statistical mechanics. Most of the lectures will be based on the following three books. Beside, I will send out pdf file of lecture notes to all students regularly.

Reference books:

1. Brian Cowan: Topics in statistical mechanics. Imperial College Press (2005)
2. Mehran Kardar: Statistical physics of particles. purchase it online.
3. James P. Sethna: Statistical mechanics, entropy, order parameters, and complexity. download pdf version at: www.physics.cornell.edu/sethna/StatMech/ lots of interesting examples and applications

Topics to be covered:

1. Thermodynamics: macroscopic systems and microscopic systems, thermodynamic variables, equation of state, temperature, entropy, basic laws of thermodynamics, reversible and irreversible processes, ideal gas, ideal heat engine, Maxwell relations, phase transitions, kinetic theory, non-equilibrium thermodynamics
2. Statistical mechanics: Gibbs Boltzmann distribution, statistical theory of ideal gas, heat capacity, ensemble theory, partition function, relation between statistical mechanics and thermodynamics, theory of black body radiation, phase transitions, quantum statistical mechanics, Bose-Einstein statistics, Fermi-Dirac statistics, Bose-Einstein condensation; non-some topics in equilibrium statistical mechanics

Home works and grades:

One homework every two weeks. Late homework will incur 20% penalty. No homework will be accepted if it is more than one week overdue.

One final written exam. One final oral exam.

Your course grade consists of 1) 40% home works; 2) 40% written exam, 3) 20% oral exam.

You can also obtain up to 10% extra credits by writing an essay on a list of chosen topics, to be handled out later.