PH202 Jan 3:0

Statistical Mechanics

Instructor

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Teaching Assistant

Email:

Department: Physics

Course Time: 10 am to 11:30 am

Lecture venue: Auditorium, New Physical Sciences Building

Detailed Course Page:

Announcements

Brief description of the course

An intermediate course for any student who is interested in majoring in Physics. It is usually taken by 3rd year UG and 1st year Int-Phd students.

Prerequisites

Basic thermal Physics, basic Quantum mechanics, basic Classical mechanics and basic electodynamics

Syllabus

Basic principles of statistical mechanics and its application to simple systems. Probability theory, fundamental postulate, phase space, Liouvilleâ€™s theorem, ergodicity, micro-canonical ensemble, connection with thermodynamics, canonical ensemble, classical ideal gas, harmonic oscillators, paramagnetism, Ising model, physical applications to polymers, biophysics. Grand canonical ensemble, thermodynamic potentials, Maxwell relations, Legendre transformation. Introduction to quantum statistical mechanics, Fermi, Bose and Boltzmann distribution, Bose condensation, photons and phonons,

Fermi gas, classical gases with internal degrees of freedom.

Course outcomes

Students learn how to evaluate macroscopic thermal properties of matter (specific heat, magnetic susceptibility, etc) from microscopic dynamics. The course begins with first using classical dynamics and then using quantum dynamics as the microscopic principles. The notion of an ensemble is introduced to the students for the first time.

Grading policy

30%, Assignment, 30% Mid Sem, 40% End Sem

Assignments

Resources

Statistical Physics of Particles by M. Kardar