

**Advanced Physical Sciences**

Electrodynamics, Advanced Statistical Mechanics (Ergodic Hypothesis, Ensembles, Distributions, Ising Model, Lattice Model of Proteins), Transport Phenomena

## Proforma for course plan (I am giving only the stat mech part)

Course Name: Advance Physical Science  
Course Code: IT 413  
Credit: 3  
Course offered to: M.Sc (Sem-III)

**Course description:** This course aims to provide an elementary introduction to statistical mechanics and connecting it to problems in physical and life science.

### Pre-requisites:

**Course Outcome(s) (CO):** At the end of the course, the students should be able to

1. Explain the basics of statistical mechanics.
2. Can apply to simple discrete systems.

### Tentative plan:

Week number	Lecture topic	CO met
1-2	A test will be conducted to check students' knowledge of basic physics and maths (to decide the level of teaching). Review of basic thermodynamics, application. Need for statistical mechanics. Examples	CO-1
3-6	Concept of ensemble, distribution. Ideal gas example. Non-interacting system – harmonic oscillator. Connecting harmonic oscillator to molecular vibration. Interacting system.  Examples in physical and biological sciences.  Concept of transport phenomena. Evolution of PDF. Derivation of Einstein-Stokes equation for diffusion. Examples.	CO-1 and CO-2.

### Text Books and References

- (1) Statistical Physics (Berkeley lecture series – volume 5) by F. Reif. McGraw-Hill
- (2) Some parts from D. A. McQuarrie, Statistical Mechanics (Harper Collins).

Related articles from journals and Related topics from authentic sources