

TCIS Hyderabad

Course : Advance Statistical Mechanics
Credits : 4
Coordinates : Wednesday 14.00 - 15.30 hrs. & Friday 11.00 - 12.30 hrs.
Contact Hours : 48 hrs.
Instructor/s : Smarajit Karmakar

Syllabus

- A quick summary of different ensembles. Non-interacting Classical Systems - magnetic systems, ideal gas and Harmonic oscillator, Statistical mechanics for interacting systems: Cluster expansion.
- Interacting Magnetic Systems, Ising and Heisenberg Model, Mean Field Theory, Transfer Matrix Method, Phase Transitions: Order Parameter, First and Second Order Phase Transitions, Landau-Ginzburg Theory, Scaling, Critical exponents and Universality class, Generalized Homogeneous function, Hyper Scaling relation, Kadanoff Construction, Renormalization Group Transformation, Momentum Space RG.
- Dynamical systems, Linear Response, Fluctuation-Dissipation Theorem, Brownian Motion, Langevin Equation, Fokker-Planck Equation.

Text / References Books

- Chaikin P M and Lubensky T C: Principles of Condensed Matter Physics (Cambridge University Press)
- Plischke M and Bergersen B.: Equilibrium Statistical Mechanics (World Scientific)
- Landau L D and Lifshitz E M: Statistical Physics (Pergamon Press)
- Huang K: Statistical Mechanics (Wiley)
- Ma S K : Modern Theory of Critical Phenomena
- Goldenfeld N: Lectures on Phase Transition and the Renormalization Group
- Pathria R K : Statistical Mechanics