TCIS, Hyderabad

Course: Statistical Mechanics – II

Start Date: 8th August, 2017

Coordinates (Preferred): Tuesday and Thursday between 11.30 am and 01.00 pm

Instructor: Dr. 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.
- Linear Response, Fluctuation-Dissipation Theorem, Brownian Motion, Langevin Equation, Fokker-Planck Equation.

Primary Text / Reference Books:

1. Pathria and Beale, Statistical Mechanics
2. Chaikin and Lubensky, Principles of Condensed Matter Physics
3. H.E. Stanley, Introduction to Phase Transitions and Critical Phenomena
4. S.K. Ma, Statistical Mechanics
5. Nigel Goldenfeld , Lectures on Phase Transition and The Renormalization Group

Evaluation Method (Weightage for Internal Assessment, Mid Term / Term End exams, Presentations etc.):

Assignments: 30
Mid term presentation: 30
Final term: 40