

Course: Phy613 Advanced Statistical Mechanics:

Pre-requisite: Phy412 Statistical Physics

Books Recommended:

1. Nigel Goldenfeld: Lectures On Phase Transitions And The Renormalization Group
2. Chaikin and Lubensky: Principles of condensed matter physics
3. Quantum phase transitions: Subir Sachdev

Course Content: (in parenthesis, approximate number of lectures are shown.)_

1. Brief recapitulation of Ising model, symmetry breaking, Landau theory and its applications. [6]
2. An introduction to scaling and renormalization group theory. Both real and momentum space renormalization group are to be discussed. [8]
3. Critical dynamics and different models, nucleation, spinodal decomposition and its applications. [6]
4. An introduction to quantum phase transitions and topological systems. [8]

This is a tentative plan which however outlines the main theme. The content will evolve as the course progresses following the interaction with the students. Sometimes, new topics are brought in based on the request of the majority of students. Reading materials and books (those not mentioned above) will be provided after each lecture.