

# Syllabus for Physics 217: phase transitions and RG

Spring 2014, Physics Department, UCSD

INSTRUCTOR: Congjun Wu (5430 MH) Email: wucj@physics.ucsd.edu

Time/Place: 11:00a-12:20p WF, MHA 5301.

Office hour: Friday: 1:00 pm - 2:00pm

Books:

1. Igor Herbut, *A Modern Approach to Critical Phenomena* Cambridge University Press, 2010
2. N. Goldenfeld, *Lectures on Phase Transitions and the Renormalization group*.
3. J. J. Binney, et al, *The Theory of Critical Phenomena*, Oxford press.

Grade:

We will decide the policy during the first class. Basically it will depend on your homework, and the final project. Homework 50%, and final project 50%.

Homework Assignments:

Homework will be assigned every one or two weeks.

## Class Schedule

1. Chapter 1. Ising model and phase transitions
2. Chapter 2. Mean-field theory and critical exponents
3. Chapter 3. Real space renormalization group
4. Chapter 4. Momentum space renormalization group,  $\epsilon$  expansion
5. Chapter 5. Lower critical dimensions, non-linear  $\sigma$  model
6. Chapter 6. KT transition, Coulomb gases
7. Chapter 7. RG for fermion systems: Fermi liquid, superconductivity, etc.