



**PH325 August 3:0**

## **Advanced Statistical Physics**

### **Instructor**

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### **Teaching Assistant**

Email:

**Department: Physics**

Course Time:

Lecture venue:

Detailed Course Page:

## **Announcements**

### **Brief description of the course**

Advanced Statistical Physics (basically the statistical physics of interacting classical and quantum systems) for PhD students and for senior undergraduates.

### **Prerequisites**

Elementary Statistical Physics (basically the statistical physics of non-interacting classical and quantum systems and elements of mean-field theory)

### **Syllabus**

Overview of experiments on phases, phase transitions, and critical phenomena; models; rigorous results (e.g., the existence of the thermodynamic limit); some exactly solvable models; mean-field theory;

Landau-Ginzburg theory; perturbation methods (e.g., series expansions); numerical methods (e.g., Monte Carlo simulations); finite-size scaling; real- and momentum-space renormalization groups; elements of dynamical critical phenomena.

### **Course outcomes**

Students would get a good grasp of modern statistical mechanics of interacting, classical and quantum systems

and learn the techniques mentioned in the syllabus. A good grasp of this subject is essential to understand recent developments in large parts of condensed-matter science.

### **Grading policy**

40 % for assignments; 30 % for the mid-term examination; 30 % for the final examination.

### **Assignments**

### **Resources**

Various standard texts on advanced statistical mechanics and lecture notes.