SI2510 Statistical Mechanics 7.5 credits

Statistisk mekanik

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SI2510 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Physics

Specific prerequisites

Recommended prerequisites: Statistical physics corresponding to SI1161 (5A1340).

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The aim is to give additional knowledge in thermodynamics and statistical physics to what is given in the compulsory courses for F3. The main contents of the course is theory for phase transitions. After finished course the student should be able to:

- Describe, use and develop mean field theory for first and second order phase transitions.
- Realize the limitations of mean field theory.
- Realize the importance and strength of scaling arguments and be able to use such arguments.
- Be able to perform real space renormalization for simple models.
- Have knowledge about and be able to use the fundamental concepts in the theory of classical fluids.
- Ha knowledge about the structure of the solutions to a small number of analytically solvable models.

Course contents

Formal background of statistical mechanics. Classical simple fluids. Integral equation for correlation functions. Phase transitions. Mean field theory. The Ising model. Analytical solutions. Renormalization theory. Percolation and disorder.

Course literature

M. Plischke & B. Bergersen: Equilibrium Statistical Physics, 3rd edition, World Scientific, 2006.

Examination

- INL1 - Assignment, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

One written exam (TEN1; 6 university credits)
Home exercises to hand in (INL1; 1,5 university credits)

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.