FSI3075 Non-Equilibrium Statistical Mechanics 7.5 credits

Statistisk mekanik för icke-jämviktssytem

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

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

Establishment

Course syllabus for FSI3075 valid from Spring 2009

Grading scale

Education cycle

Third cycle

Specific prerequisites

Introductory thermodynamics and statistical physics, and some quantum mechanics.

Language of instruction

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

Intended learning outcomes

After completed course, the PhD student should be able to:

- have a broad overview of concepts, methods and approaches within non-equilibrium statistical mechanics.
- be able to model new physical situations using the methods exemplified in the course.
- be able to generalize and apply the methods to new problems.
- have gained insights into more advanced methods which touch upon modern research.

Course contents

Irreversibility and the second law. Brownian motion: random walks, Langevin equation, Fokker-Planck equation, functional integrals. Stochastic processes in physics: master equations, generating functions, Doi formalism. The Boltzmann equation: the H-theorem and irreversibility. conservation laws and hydrodynamics. Linear response theory: Kubo formula, fluctuation-dissipation theorem, Onsager relations.

Course literature

Lecture notes will be made available.

Examination

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.

Other requirements for final grade

Solution of exercises, which are to be discussed with the examiner. PhD students will have an oral exam.

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.