SI2520 Nonequilibrium Statistical Mechanics 7.5 credits

Statistisk mekanik för icke-jämviktssystem

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

Establishment

Grading scale

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

Education cycle

Second cycle

Main field of study

Physics

Specific prerequisites

English B / English 6

Intended learning outcomes

After the course you shall

- 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 of thermodynamics.
- Brownian motion, random walks, the Langevin equation, the Fokker-Planck equation.
- Stochastic processes in physics, master equations, one-step processes.
- The Boltzmann equation, the H-theorem and irreversibility, conservation laws and hydrodynamics.
- Open quantum systems and the Lindblad equation.
- Quantum thermalization, quantum quenching, random matrix theory, the eigenstate thermalization hypothesis (ETH).

Examination

- TEN1 - Examination, 7.5 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

The examination consists of written assignments, where the students' proposed written solutions are presented orally to the examiner.

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.