SI1155 Theoretical Physics 6.0 credits

Teoretisk fysik

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

Establishment

The course plan is valid from VT 2025 according to the decision of the head of basic education: S-2024-1728 Date of decision: 2024-10-16

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Active participation in SH1014 Modern Physics or SH1017 Physics for Engineering Mathematics.

Language of instruction

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

Intended learning outcomes

After completing the course the student shall be able to

- Describe the areas, problems and methods of theoretical physics.
- Set up important models in quantum physics and statistical physics and describe applications where the models apply.
- Formulate and solve physical problems with methods that are covered in the course.
- Use approximate methods and numerical methods to solve quantum mechanical problems and assess their advantages, disadvantages and accuracy.
- Perform derivations of important results in the course.

Course contents

- Overview of theoretical physics areas, problems, applications and unifying concepts.
- Analytical mechanics and the connection to quantum mechanics.
- Postulates of quantum mechanics and probability interpretation.
- Analysis of important problems with solution of the Schrödinger equation.
- Mathematical formulation of quantum mechanics.
- Approximate methods with examples.
- Numerical solutions.
- Many-particle systems, fermions and bosons.
- Introduction to statistical mechanics.
- Applications in nanostructures, quantum computers, etc.

Examination

- TEN1 - Examination, 5.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboration, 1.0 credits, grading scale: P, 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

A-E grade on TEN1 and Pass LAB1

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.