



SI2360 Analytical Mechanics and Classical Field Theory 7.5 credits

Analytisk mekanik och klassisk fältteori

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

Knowledge of mechanics corresponding to SG1113 Mechanics, Continuation Course and knowledge of physics corresponding to SI1200 Mathematical Methods in Physics.

Intended learning outcomes

After completion of the course you should be able to:

- use the formalisms of Lagrange and Hamilton in specific examples.
- analyze important equations in classical physics.
- solve a larger variety of problems using methods in analytical mechanics than before.
- apply the mathematical tools that have been developed during the course.
- analyze and apply equations in classical field theory.

Course contents

Analytical mechanics: Lagrangian formalism and equations of motion, Noether's theorem in Lagrangian formalism, effective potentials, applications. Hamiltonian formalism and equations of motion, Poisson brackets, canonical transformations, Noether's theorem in Hamiltonian formalism.

Mathematical tools: Introduction to group theory and differential geometry. Symplectic geometry.

Physical applications: Examples in non-relativistic and relativistic mechanics.

Classical field theory: Strings and membranes. The Klein-Gordon field. Maxwell's equations.

Examination

- TENT - Written 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.

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.