SI2215 Symmetries in Physics 7.5 credits

Symmetrier i fysiken

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

The course syllabus is valid from Autumn 2023 according to the school principal's decision: S-2022-1507 Decision date: 2022-10-10

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 in physics corresponding to SI1155 Theoretical physics.

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, a student should be able to:

1. Analyze physical systems using group theory and symmetry considerations
2. Using symmetry arguments to limit the form of various physical quantities
3. Use Lie groups and Lie algebras and construct root and weight diagrams
4. Analyze the properties of physical systems under space-time transformations and apply it to quantum field theory and gauge theory

Course contents

Introductory group theory, examples of important symmetries in physics, discrete groups, homomorphisms, isomorphisms, representation theory, Lie groups and Lie algebras, representations of simple Lie algebras, unitary and orthogonal groups, roots, weights and Dynkin diagrams, tensor methods, Young tables, selected examples where symmetries are used in physics, applications of group theory in physics.

Examination

- TENA - Written exam, 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.

The course is examined through an examination (TENA) which can be written or oral.

TENA - exam/examination, 7.5 credits, grading scale: A, B, C, D, E, Fx, F

Transitional regulations

If a student has passed previous course modules in the course, these can be used to reduce the student's examination requirements for the TENA course module. The examiner decides in each individual case how the reduction of the examination requirements can take place. The transitional provisions apply until VT 2025.

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.