



FSI3110 Group and Representation Theory 7.5 credits

Grupp- och representationsteori, allmän kurs

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 FSI3110 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Language of instruction

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

Intended learning outcomes

Upon completing the course the student should:

- Be able to recount the basic definitions within group and representation theory and give examples of how these are applied to different physical systems.
- Be able to use group theory to draw conclusions regarding the behaviour of physical systems.

- Use representation theory within the framework of particle physics and quantum field theory.

Course contents

The course covers group and representation theory. The focus is on Lie groups and their applications in particle physics and quantum field theory.

Group theory, definitions and examples of groups. Homomorphism, isomorphism, Permutation groups.

Group representation: reducibility, equivalence, Schur's lemma.

Lie groups and Lie algebra's. Representations of simple Lie algebras, $SO(n)$, Lorentz group.

Symmetries in physical systems.

Specific prerequisites

The course is intended for doctoral students in physics. Basic knowledge in algebra and quantum mechanics is required.

Course literature

M. Hammermesh, Group Theory and its Application to Physical Problems; W.-K. Tung, Group Theory in Physics; J.F. Cornwell, Group Theory in Physics (vol. 1 and 2); Z.-Q. Ma, Group Theory for Physicists; H. Georgi, Lie Algebras in Particle Physics

Examination

- INL1 - Assignment, 2.0 credits, grading scale: P, F
- INL2 - Assignment, 3.0 credits, grading scale: P, F
- INL3 - Assignment, 2.5 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.

Other requirements for final grade

Approved solutions to all homework sets.

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.