



UMEÅ UNIVERSITY

Representation theory

Credit: 7.5 ECTS

Course coordinator:

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Course Period:

November – December 2023

Main field of study and progress level:

Mathematics, PhD

Grading scale:

Pass/Fail

Prerequisites:

Students should have a good background in multilinear algebra and multivariable calculus, and a basic understanding of group theory.

Objective

This course aims to introduce the foundations of representation theory of finite groups, Lie groups and Lie algebras in a mathematically rigorous way. The course is intended to be accessible to graduate students in mathematics, and mathematically proficient students in fields where representation theory is commonly applied, e.g., theoretical physics and chemistry.

Contents:

The course initially covers the theoretical foundations of representation theory starting with basic definitions in the case of finite groups, Shur's lemma, characters, and applications to common finite groups. Lie groups and Lie algebras are subsequently introduced and their properties and classification discussed, before the representation theory of several of the classical Lie algebras is developed in detail. The course will also feature guest lectures from researchers in mathematics and/or the natural sciences to give a flavour of current research and the broad applicability of representation theory.

Form of instruction:

The teaching consists of lectures and discussion sessions.

Examination:

The examination consists of compulsory assignments for which written reports and complete solutions are to be submitted.

Literature:

W. Fulton and J. Harris, Representation Theory – A First Course, Springer, 2004.