FSF3604 Lie Algebras 7.5 credits

Liealgebror

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 FSF3604 valid from Autumn 2015

Grading scale

Education cycle

Third cycle

Specific prerequisites

Master's or Master's degree with at least 30 credits in mathematics.

Suitable prerequisites are courses in differential geometry and representation theory. Very good knowledge of linear algebra.

Language of instruction

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

Intended learning outcomes

Students will learn how to utilise various techniques for working with Lie algebras, and they will gain an understanding of parts of a major classification result.

Course contents

Definition of Lie algebras, small-dimensional examples, some classical groups and their Lie algebras (treated informally). Ideals, subalgebras, homomorphisms, modules. Nilpotent algebras, Engel's theorem; soluble algebras, Lie's theorem. Semisimple algebras and Killing form, Cartan's criteria for solubility and semisimplicity, Weyl's theorem on complete reducibility of representations of semisimple Lie algebras. The root space decomposition of a Lie algebra; root systems, Cartan matrices and Dynkin diagrams. Discussion of classification of irreducible root systems, and semisimple Lie algebras.

Disposition

Weekly seminar where participants take turns in presenting sections of the textbook, and oral examination.

Course literature

Brian C. Hall, "Lie Groups, Lie Algebras, and Representations: An Elementary Introduction "(Graduate Texts in Mathematics) 2nd ed. 2015 Edition.

See
http://www.amazon.com/Lie-Groups-Algebras-Representations-Introduction/dp/3319134663/ref=sr_1_1?ie=UTF8&qid=1460893363&sr=8-1&keywords=lie+groups+hall

Examination

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.

Oral examination

Other requirements for final grade

Continuous oral examination

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.