LOG220   Proof theory, 7.5 credits

Bevisteori, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Philosophy, Linguistics and Theory of Science on 2016-05-27 to be valid from 2017-01-16, spring semester of 2017.

Field of education: Science 100%

Department: Department of Philosophy, Linguistics and Theory of Science

Position in the educational system

The course is included in the degree programme Logic, Master's programme, 120 credits (H2LOG), and can also be offered as a freestanding course or contract education.

The course can be part of the following programme: 1) Logic, Master's Programme (H2LOG)

Main field of studies	*Specialization*
Logic	A1F, Second cycle, has second-cycle course/s as entry requirements

Entry requirements

For admission to the course successful completion of at least 7.5 credits of Logical theory (LOG110), or equivalent skills and knowledge, is required.

Learning outcomes

On successful completion of the course the student will be able to:

Knowledge and understanding
- describe central concepts, methods and constructions in proof theory,

- contrast proof theory with other disciplines in logic,
- describe the relationship between natural deduction and sequent calculus,
- contrast structural systems with non-structural ones,
- demonstrate knowledge of proof theoretic semantics,

Competence and skills
- formulate and present proofs of the most important results in the course- in particular cut elimination and normalisation- as well as of lemmas that are used in the proofs,
- carry out advanced derivations in the formal proof systems that are introduced in the course,

Judgement and approach
- critically discuss, analyse and evaluate results in the course as well as their applications,
- show awareness of the relationships between on the one hand proof theory and constructive mathematics, and on the other hand proof theory and semantics.

Course content
The course treats derivations and proofs as mathematical objects, and study these from a formal, syntactic point of view, unlike model theory that can be saidto be the semantic theory of the corresponding phenomena.

Among the many proof formalisms that have been constructued, studied and implemented we focus on two central classes of systems: natural deduction and sequent calculus. The most fundamental theorems, whose proofs are implemented in detail are cut elimination and normalisation for propositional logic and predicate logic, but also for stronger systems, such as formalised arithmetic.

Philosophical and linguistic aspects of proof theory, as its connection with semantics and anti-realism, will also be addressed.

Form of teaching
Teaching is given in the form of lectures, seminars, exercises, individual assignments and group assignments. Compulsory attendance can apply to certain course components, which is indicated in the course schedule.

Language of instruction: English

Assessment

The course is examined individually in written form. In addition to the final written examination, there may also be compulsory home work assignments during the course.

If a student, who has failed the same examinationt twice, wishes to change examiner for the next examination, a written application shall be sent to the department responsible for the course and it shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22, Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student will normally be guaranteed at least three opportunities to take the examination (including the ordinary examination) during a period of at least one year, based on the earlier structure of the course.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

Course evaluation

Students who are currently taking the course or have completed it will be given the opportunity to express their views and share their experiences in an anonymous course evaluation. A compilation of the course evaluation and the course coordinator's reflections on it will be made available to the students within reasonable time after the end of the course. The next time the course is taught the compilation and any measures based on it will be presented to the students.