LOG121   Set theory, 7.5 credits

Mängdteori, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Philosophy, Linguistics and Theory of Science on 2020-01-13 and was last revised on 2022-12-22 to be valid from 2023-01-16, spring semester of 2023.

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 (120 credits) programme (H2LOG) and can also be given as a freestanding course.

Main field of studies	*Specialization*
Logic	A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

Admission to the course requires successful completion of

- at least 60 credits in total in the subject areas mathematics, logic, computer science or formal linguistics, or
- at least 90 credits in philosophy or linguistics, and at least 30 credits in total in the subject areas mathematics, logic, computer science or formal linguistics,

or equivalent knowledge.

English 6 or equivalent is also required.

Learning outcomes

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

Knowledge and understanding
- describe and demonstrate an understanding of the central concepts, methods and constructions in set theory,
- describe the various types of set theoretical objects that can be constructed using the axioms,
- demonstrate an understanding of set theory as a sub-area of logic and contrast it with other areas of logic,
- demonstrate an understanding of the axioms of set theory from a cumulative/iterative perspective,
- at a general level account for the historical development of axiomatic set theory,

Competence and skills
- formulate and present set theoretical constructions of number systems including the natural and real numbers, as well as verify their most central properties using the axioms of set theory,
- formulate, derive and apply basic arithmetic for cardinal and ordinal numbers,
- formulate and present proofs of the most important results in the course as well as of lemmas that are used in the proofs,

Judgement and approach
- critically discuss, analyse and evaluate results in the course as well as their applications,
- show awareness of the relationship between set theory and mathematics.

Course content

Set theory is the formal axiomatic study of sets and is often used as the foundation for mathematics. The course treats Zermelo-Fraenkel set theory, ZF, formulated in first-order logic, beginning with a set theoretical construction of the natural and real number systems. Ordinal and cardinal numbers are presented and strong emphasis is placed on the cumulative hierarchy and on the role of the axiom of choice in the axiomatization of the concept of set.

Form of teaching

Teaching is given in the form of lectures, seminars, exercises, individual assignments and group assignments.

Language of instruction: English

Assessment

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

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

If a student has received a recommendation from the University of Gothenburg regarding pedagogical support for students with disabilities, the examiner may decide, in the case where this is compatible with the learning outcomes for the course, and provided no unreasonable resources are required, to give the student an adjusted examination or an alternative form of examination.

In the case where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination sessions (including the regular examination session) during a period of at least one year on the basis of the course's former structure.

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.

Additional information
The course requires access to a computer (or the equivalent) with Internet connection.

The course may not be included in a degree together with the course LOG120.