LOG011 Introduction to set theory, 7.5 credits

Introduktion till mängdteori, 7,5 högskolepoäng

First Cycle

___

Confirmation

This course syllabus was confirmed by Department of Philosophy, Linguistics and Theory of Science on 2021-11-08 to be valid from 2022-01-17, spring semester of 2022.

Field of education: Science 100%

Department: Department of Philosophy, Linguistics and Theory of Science

Position in the educational system

The course is offered as a freestanding course.

Main field of studies	*Specialization*
-	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

For admission to the course successful completion of at least 7.5 credits in logic or mathematics, or the equivalent, is required.

Learning outcomes

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

Knowledge and understanding

- describe and demonstrate a basic 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 set theoretic axioms,

• at a general level account for the historical development of axiomatic set theory,

Competence and skills
- formulate and present set theoretical constructions of the natural numbers as well as verify their most central properties by means of the axioms of set theory,
- formulate and derive basic properties concerning cardinality and well-orderings,
- formulate and present proof of the most important results in the course,

Judgement and approach
- show awareness of the relationship between set theory and mathematics.

Course content

The course treats Zermelo-Fraenkel's set theory, ZFC, formulated in first-order logic and take its starting point in the set theoretical construction of the natural numbers and how set theory can constitute a foundation for mathematics. Furthermore, properties of infinite sets are treated, with a focus on cardinality and properties of well-orderings. The cumulative hierarchy is discussed as well as the role of the axiom of choice in the axiomatisation of the concept of set.

Sub-courses
1. **Starting the axiomatization** *(De första axiomen),* 1 credits
   Grading scale: Pass (G) and Fail (U)

2. **Continuing the axiomatization** *(Ytterligare axiom),* 1 credits
   Grading scale: Pass (G) and Fail (U)

3. **Finishing the axiomatization** *(De sista axiomen),* 1 credits
   Grading scale: Pass (G) and Fail (U)

4. **Cardinals** *(Kardinaltal),* 1 credits
   Grading scale: Pass (G) and Fail (U)

5. **Well-orderings and ordinals** *(Välordningar och ordinaltal),* 1 credits
   Grading scale: Pass (G) and Fail (U)

6. **Oral examination** *(Muntlig tentamen),* 2.5 credits
   Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)

Form of teaching

The course is a distance course. Recorded lectures are made available during the course and followed up to mandatory quizzes in the form of digital tests.

Language of instruction: English

Assessment
The course is assessed individually with written home assignments and an oral individual examination.

If a student, has failed twice on the same course component and 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, 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.

Should a course be discontinued or has undergone signifigant changes, the student is guaranteed at least three examinations (including the ordinary examination) during a period of at least one year up to two years after the course has been discontinued/changed. The same applies to placements and professional placements (VFU), although this is restricted to just one additional examination session.

Grades
The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
For the grade Pass with distinction on the whole course, Pass with distinction on the oral examination is required and the grade Pass on the rest.

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 LOG010.