Department of Mathematics (incl. Math. Statistics)

Stockholm University

Syllabus

for course at advanced level

Logic II
Logik II

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	MM7022
Valid from:	Spring 2017
Date of approval:	2017-03-13
Department	Department of Mathematics (incl. Math. Statistics)
Main field:	Mathematics/Applied Mathematics
Specialisation:	A1N - Second cycle, has only first-cycle course/s as entry requirements

Decision

This syllabus was approved by the Board of the Faculty of Science at Stockholm University 2017-03-13.

Prerequisites and special admittance requirements

For admission to the course, knowledge corresponding to 60 hp in mathematics is required. Moreover the course Mathematics III - Logic, 7.5 ECTS (MM5024) or the two courses Metalogic: Completeness, 7.5 ECTS (FILOG3) and Metalogic: Incompleteness and undecidability, 7.5 ECTS (FILOG4), or equivalent.

Course structure

Examination code	Name	Higher Education Credits
HELA	Logic II	7.5

Course content

The course covers:
• Foundations and set theory: Zermelo-Fraenkel-axioms for set theory, elementary theory of cardinal and ordinal numbers.
Equivalent formulations of the axiom of choice and its applications in analysis and algebra.
• Structures and models: Isomorphisms and embeddings, complete theories, elementary equivalence and elementary embedding, the theorems of Löwenheim-Skolem, categoricity, applications of algebraic theories and non-standard analysis.
• Computability and incompleteness: models of computation, classes of computable functions, decidable and undecidable problems, Gödel's encoding and Gödel's incompleteness theorem.

Learning outcomes

After taking this course, the student is expected to be able to:
• Define basic concepts within the theory of computation and models, and be able to derive simple properties.
• Present and prove theorems about (un)decidability, and apply these to problems in mathematics.

Education

Instruction consist of lectures, computer laborations and exercises.

Forms of examination

a. The course is examined the following manner: Knowledge assessment takes the form of written

examination.

b. Grades are assigned according to a 7-point scale related to the learning objectives of the course:

A = Excellent
B = Very good
C = Good
D = Satisfactory
E = Sufficient
Fx = Fail, some more work required.
F = Fail, much more work required.

c. The grading criteria will be handed out at the beginning of the course.

d. To pass, a grade of at least E is required.

e. Students who fail an ordinary examination are entitled to take additional examinations as long as the course is offered. There is no restriction on the number of examinations. Examinations also include other obligatory elements of the course. Students who have passed an examination may not retake it in order to achieve a higher grade. Students who have failed on two occasions are entitled to request the appointment of a different examiner for the next examination, unless there are special reasons against this. Any such request must be made to the departmental board.

The course has at least two examinations for each academic year in the years in which instruction is provided. Intervening years include at least one examination.

f. Students awarded the grade Fx are given the opportunity to improve their grade to E. The examiner decides the supplementary assignments to be performed and the pass mark criteria. The supplementary assignments will take place before the next examination session.

Interim
Students may request that the examination be conducted in accordance with this course plan even after it has ceased to be valid. However, this may not take place more than three times over a two year period after course instruction has ended. Requests must be made to the departmental board. The provision also applies in the case of revisions to the course plan.

Limitations
The course may not be included in a degree together with the course Metamathematics and proof theory (MM8028) or equivalent.

Misc
The course is part of the Master's programme in Mathematics, but can also be taken as an individual course.

Required reading
Course literature is decided by the departmental board and published on the web site of the Department of Mathematics by the latest 2 months before the course begins.