



SF2700 Analysis, Basic Course

9.0 credits

Analys, grundkurs

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SF2700 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mathematics

Specific prerequisites

Analysis corresponding to SF1602 and SF1603 and preferably also complex analysis, differential equations and transforms corresponding to SF1628 and SF1629.

Language of instruction

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

Intended learning outcomes

The course provides basic knowledge for studies in more advanced mathematics and for studies in related fields.

By the end of the course the student should be able to solve problems on the different topics of the course. In particular the student should be able to

- Understand and be able to apply basic topological concepts. Be able to state the theorems of Heine-Borel and Bolzano-Weierstrass.
- Understand and be able to apply the concepts of continuity, convergence and derivative for functions between metric spaces. Be able to state Arzelà-Ascoli's theorem and Weierstrass' approximation theorem.
- Be able to state the Hahn-Banach theorem and the separation theorems.
- Know the basic definitions and be able to prove properties of Banach and Hilbert spaces.
- Understand definitions of linear functionals and dual spaces and be able to prove Riesz' representation theorem.
- Understand and be able to state the theorems of Baire, Banach-Steinhaus and the theorems of closed graph and open mapping.
- Know the definitions and be able to prove fundamental properties of linear operators, in particular properties of adjoints, compact operators, projections and unitary operators.

Course contents

Real numbers. Metric spaces. Basic topological concepts (compact and connected sets, completeness). Convergence. Continuity.

Banach's fixed point theorem. Inverse mapping theorem.

Normed spaces. Linear functionals, Hahn-Banach theorem, Dual spaces.

Baire's category theorem. Theorems of open mapping and closed graph. Theorem of uniform boundness.

Bounded operators. Adjoints and spectra of operators.

Hilbert space. Selfadjoint and compact operators. Integral equations.

Course literature

To be announced at course start.

Examination

- TEN1 - Examination, 9.0 credits, grading scale: A, B, C, D, E, FX, F

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.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Written examination. Possibly partial examination (optional) during the course.

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.