



# FSF3626 Mathematical Analysis for PhD - Students 7.5 credits

Matematisk analys för doktorander

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

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

## Establishment

Course syllabus for FSF3626 valid from Spring 2019

## Grading scale

G

## Education cycle

Third cycle

## Specific prerequisites

A Master degree including at least 30 university credits (hp) in Mathematics (Calculus, Linear algebra, Differential equations).

## Language of instruction

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

## Intended learning outcomes

After completion of the course the student should:

- Have a good understanding of the basic concepts of modern mathematical analysis; specifically
  - 1) abstract spaces, both finite and infinite dimensional and know the difference between those
  - 2) the concept of duality and its uses
  - 3) Different conceptions of convergence, including the difference of convergence in different metrics and the difference between weak and strong convergence
  - 4) different conceptions of integration (Riemann, Lebesgue et.c.)
  - 5) different conceptions of derivatives (classical derivatives, weak derivatives et.c.)
- Be able to motivate the necessity of modern abstract methods in analysis. Specifically being able to explain how modern analysis have grown out of natural concrete problems.
- Be able to explain the relation between integrals and derivatives.
- Be able to explain elementary theory of Banach spaces.

## Course contents

This course will contain integration theory, Banach spaces and modern theories of derivation.

The course will also focus on the spirit of analysis and methods of approaching problems in analysis. This means that concrete problems, that might vary from year to year, will be included in the course. These concrete problems could be: differential equations, calculus of variations, Fourier series, distributions, singular integrals or such.

## Disposition

The plan of the course will be decided by the examiner, in accordance with his/her opinion on how to best present the material, at the latest four weeks before the course start. The course might contain lectures (possibly student led), seminars or discussions.

## Course literature

Will be announced at least four weeks before the course start.

## Examination

- INL1 - Assignment, 3.0 credits, grading scale: P, F
- TENM - Oral exam, 4.5 credits, grading scale: P, 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.

The course can be examined by

- Assignments
- Written Examination

## Other requirements for final grade

The examination parts for the course (homework and/or written examination) must be passed in order to finish 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.