



Course syllabus

Faculty of Technology

Department of Mathematics

4MA415 Funktionalanalys, 7,5 högskolepoäng

Functional analysis, 7.5 credits

Main field of study

Mathematics

Subject Group

Mathematics

Level of classification

Second Level

Progression

A1N

Date of Ratification

Approved 2014-10-03

Revised 2021-09-30 by Faculty of Technology. Revision of prerequisites and literature. Examination and course evaluation are adapted to local rules.

The course syllabus is valid from autumn semester 2022

Prerequisites

General entry requirements for secondcycle studies and specific entry requirements:

- 60 credits mathematics
- 2MA402 Calculus Advanced Course 7.5 credits or equivalent.

Objectives

After completing the course, the student should be able to

- independently and with adequate techniques solve problems, perform calculations, and conduct lines of reasoning within the part of mathematics that is covered by the course, and to clearly communicate these solutions, calculations, and reasonings in writing
- describe terminology and definitions, along with formulating, proving and analyzing theorems that are central to the course.

Content

Nowhere dense sets, Baire's theorem for complete metric spaces, topological vector spaces, locally convex spaces, dual spaces, Hahn-Banach's Theorem, weak topologies, Banach's theorem about inverse operators, other criteria of invertability, spectral theory of operators in Banach and Hilbert spaces, adjoint operators, self-adjoint operators in Hilbert spaces, Spectral theorem for bounded and unbounded operators in Hilbert spaces.

Type of Instruction

Lectures and seminars.

Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

The student's knowledge is assessed in the form of an oral exam.

Repeat examination is offered in accordance with Local regulations for courses and examination at the first and second-cycle level at Linnaeus University.

If the university has decided that a student is entitled to special pedagogical support due to a disability, the examiner has the right to give a customised exam or to have the student conduct the exam in an alternative way.

Course Evaluation

During the implementation of the course or in close conjunction with the course, a course evaluation is to be carried out. Results and analysis of the course evaluation are to be promptly presented as feedback to the students who have completed the course. Students who participate during the next course instance receive feedback at the start of the course. The course evaluation is to be carried out anonymously.

Credit Overlap

The course cannot be included in a degree along with the following courses of which the content fully, or partly, corresponds to the content of this course: 4MA115
Functional analysis, 7.5 credits

Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material

Sergey Fomin and Andrei Kolmogorov: *Introductory Real Analysis*, Dover Publication, INC, New York, latest edition. 403 pages