

SYLLABUS

Functional Analysis 7.5 credits M7010M

Funktionalanalys

Course syllabus admitted: Autumn 2024 Sp 1 - Present

**DECISION DATE
2024-02-15**

Functional Analysis 7.5 credits M7010M

Funktionalanalys

Second cycle, M7010M

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Matematik	Mathematics

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and the courses Differential calculus (M0047M), Linear algebra and Calculus (M0048), Linear algebra and Differential Equations (M0049M), Multivariable Calculus (M0055M) or their equivalents. Principles of Mathematical Analysis (M7026) or an equivalent is recommended but not a requirement.

Selection

The selection is based on 30-285 credits

Course Aim

After completed course, the students should be able to:

- define and carefully explain topological properties for different kinds of metric spaces.
- define and carefully explain for Banach and Hilbert spaces.
- formulate and prove basic theorems as the Hahn-Banach theorem, open mapping theorem, the Banach-Steinhaus theorem and the closed graph theorem.
- be able to use and apply central concepts within the course such as reflexivity, strong and weak topology, linear operators, adjoint operators and compact operators.
- account for some fixed-point theorems.
- account for basic spectral theory.

Contents

Metric, normed and inner product spaces. Bounded operators. Dual spaces. The Hahn-Banach theorem, the Banach-Steinhaus theorem, open mapping theorem and the closed graph theorem. Strong and weak topology. Spectral theory. Fixed-point theorems with applications.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Self-study with guidance. Examination tasks.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Examination tasks. Grading according to the scale U 3 4 5.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course M7010M is equal to MAM218

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Examination tasks	G U 3 4 5	7.5	Mandatory	A24	

Last revised

by Nils Almqvist, Head of Undergraduate Education 2024-02-15

Syllabus established

Kursplanen är fastställd av institutionen för matematik att gälla från H07.