

*Course syllabus*

# Mathematical Structures Matematiska strukturer

**FMAN65, 6.0 credits, A (Second Cycle)**

**Valid for:** 2025/26

**Faculty:** Faculty of Engineering LTH

**Decided by:** PLED F/Pi

**Date of Decision:** 2025-04-10

**Effective:** 2025-05-05

## General Information

**Main field:** Technology **Depth of study relative to the degree requirements:** Second cycle, in-depth level of the course cannot be classified

**Mandatory for:** Pi3

**Elective for:** D4, F4, F4-mtm

**Language of instruction:** The course will be given in Swedish

## Aim

Besides mere knowledge imparting, the course aims to give training in theorem proving, and to bring out the possibilities of a more abstract representation of mathematical concepts and the connections between them. The intention is to give an overall view elucidating the foundations of the mathematical theories in the basic courses.

## Learning outcomes

### *Knowledge and understanding*

For a passing grade the student must

- be familiar with and in his or her own words be able to explain the concepts within analysis, algebra and geometry touched upon in the course.
- be able to give examples of how these concepts are abstractions of concepts in the basic courses, and show understanding for how the abstractions serve to simplify and clarify the theory.

- in his/her own word be able to describe the logical connections between the concepts (theorems and proofs).

### *Competences and skills*

For a passing grade the student must

- be able to demonstrate ability to identify problems which can be modelled with the concepts introduced.
- in the context of problem solving be able to demonstrate ability to, in simple situations, develop the theory further.
- with proper terminology, in a well-structured manner, and with clear logic be able to explain the connections between various concepts in the course.
- with proper terminology, suitable notation, in a well-structured manner and with clear logic be able to explain the solution to a problem or the proof of a theorem.
- have developed his or her ability to independently read and judge mathematical text at a high level.

## Contents

Sets. Real numbers. Metric spaces. Linear spaces. Banach spaces and Hilbert spaces with applications.

## Examination details

**Grading scale:** TH - (U, 3, 4, 5) - (Fail, Three, Four, Five)

**Assessment:** Take-home exam followed by an oral exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

### **Modules**

**Code:** 0117. **Name:** Mathematical Structures.

**Credits:** 6.0. **Grading scale:** TH - (U, 3, 4, 5).

## Admission

**Assumed prior knowledge:** FMAF01 Mathematics - Analytic Functions and FMAF05 Mathematics - Systems and Transforms.

**The number of participants is limited to:** No

**Kursen överlappar följande kurser:** FMA111 FMA110

## Reading list

- Kaplansky, I: Set Theory and Metric Spaces. American Mathematical Society, 2001, ISBN: 9780821826942.

## Contact

**Course coordinator:** Studierektor Anders Holst,  
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**Course homepage:** <https://canvas.education.lu.se/courses/20374>