

**SYLLABUS**

# **Linear Analysis 7.5 credits**

## **M0018M**

**Linjär analys**

**Course syllabus admitted: Autumn 2024 Sp 1 - Present**

DECISION DATE  
**2024-02-15**

# Linear Analysis 7.5 credits M0018M

## Linjär analys

### First cycle, M0018M

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

### Main field of study

Engineering Physics and Electrical Engineering

## 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 M0047M, M0048M, M0049M, or equivalent.

## Selection

The selection is based on 1-165 credits.

## Course Aim

After completing the course, the student expects be able to:

### Knowledge and Understanding

- Explain, exemplify, and illustrate the concepts of:
  - Convergent and divergent series
  - Power series
  - Fourier series
  - Series solutions of differential equations
  - Generalised functions (distributions)
  - Integral transforms
  - The fundamental matrix and exponentials of matrices
- Determine formulas for common integral transforms
- Assess which tools are most suitable for solving a given system of ordinary differential equations

### Competence and skills

- Compute, for a variety of elementary functions:
  - Power series and Fourier series
  - Fourier transforms
  - Laplace transforms
- Apply formulas to calculate integral transform of combinations of functions
- Work with distributions
- Solve ordinary differential equations using a variety of tools, including:
  - integral transforms
  - series
  - the eigenvalue/eigenvector method
  - variation of parameters

## Contents

- Convergence and divergence of series
- Power series
- Fourier series
- Fourier transforms
- Laplace transforms
- Introduction to distributions
- Solving linear ordinary differential equations using series and transforms
- Solving linear homogenous systems of differential equations using the eigenvalue/eigenvector method.
- Matrix exponential
- Solving linear homogenous systems of differential equations using the variation of parameters.

## Realization

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

The course is of theoretical nature, and teaching are lectures and tutorials. The student assumes to be an active participant, and work with the prescribed problems. If the number of participants are too small the course will be given as a reading course.

## 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.

Knowledge and understanding including skills and abilities are examined by a written exam. The grade scale is U (failed), 3, 4 and 5 which is the highest grade.

## 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.

## Remarks

The preparation before this course is approximately half a year up to a year of studies in mathematics and for future use the course is a good and sometimes necessary preparation for many other subjects as eg. mathematics, electronics, control theory, signal processing, image processing, mechanics, and mechanics of materials.

## Overlap

The course M0018M is equal to MAM243

## Course offered by

Department of Engineering Sciences and Mathematics

## Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Written exam	G U 3 4 5	7.5	Mandatory	A21	

## Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

## Last revised

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

## Syllabus established

The syllabus was approved by the department of mathematics and is valid from H07.