



# LTH

FACULTY OF  
ENGINEERING

*Course syllabus*

## Endimensionell analys A2 Calculus in One Variable A2

**FMAB50, 5 credits, G1 (First Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED F/Pi

**Date of Decision:** 2023-04-18

### General Information

**Main field:** Technology.

**Compulsory for:** BME1, M1, MD1

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

### Aim

The aim of the course is to give a basic introduction to calculus in one variable. Particular emphasis is put on the role that the subject plays in applications in different areas of technology, in order to give the future engineer a good foundation for further studies in mathematics as well as in other subjects. The aim is also to develop the student's ability to solve problems, to assimilate mathematical text and to communicate mathematics.

### Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- within the framework of the course with confidence be able to handle elementary functions of one variable, including limits and derivatives of them.
- be familiar with the complex numbers and their properties.
- be able to give a general account of how derivatives may be used to study mathematical models in the applications.
- be able to account for the contents of definitions, theorems and proofs.

*Competences and skills*

For a passing grade the student must

- without difficulties be able to calculate with complex numbers.

- in the context of problem solving be able to integrate knowledge from different parts of the course.
- be able to demonstrate an ability to explain mathematical reasoning in a structured and logically clear way.

## Contents

Limits with applications: asymptotes, the number  $e$ , series. Continuous functions. Derivatives: definition and properties, applications. Derivatives of the elementary functions. Properties of differentiable functions: the mean value theorem with applications. Curve sketching. Local extrema. Optimization. Some simple mathematical models. Complex numbers and polynomials. The Taylor and Maclaurin formulae. Expansions of the elementary functions. Understanding the remainder term. Applications of Maclaurin expansions. Problem solving within the above areas.

## Examination details

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

**Assessment:** Written test comprising theory and problem solving. Computer quizzes. ONLY STUDENTS WHO PASSED THE COMPUTER QUIZZES MAY PARTICIPATE IN THE WRITTEN TEST.

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.

### Parts

**Code:** 0121. **Name:** Written Examination.

**Credits:** 5. **Grading scale:** TH. **Assessment:** Written test comprising theory and problem solving. The computer quizzes must be passed before the examination.

**Code:** 0221. **Name:** Computer Quizzes.

**Credits:** 0. **Grading scale:** UG.

## Admission

**Assumed prior knowledge:** FMAB45 Calculus in One Variable A1

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

**The course overlaps following course/s:** FMAB65, FMAB70, FMA410, FMA415, FMA645, FMAA05, FMAA01, FMAA50

## Reading list

- Månsson, J. och Nordbeck, P.: Endimensionell analys. Studentlitteratur, 2011, ISBN: 9789144056104.
- Övningar i endimensionell analys. Studentlitteratur, 2018, ISBN: 9789144127187.

## Contact and other information

**Course coordinator:** Studierektor Anders Holst, Studierektor@math.lth.se

**Course administrator:** Studerandeexpeditionen, expedition@math.lth.se

**Teacher:** Pelle Pettersson, Pelle.Pettersson@math.lth.se

**Course homepage:** <https://canvas.education.lu.se/courses/20302>

**Further information:** Calculus in One Variable is taught and examined in three different variants for the Master of Science in Engineering programmes, Track A (the courses Calculus in One Variable A1-A3), Track B (the courses Calculus in One Variable B1-B2) and Track Beta (Calculus in One Variable Beta 1 and B2), depending on the study programme. In case a student changes study programme the different

tracks are considered exchangeable. Before the written retake exams it will be possible to retake the computer test or the assignment, if needed.