Endimensionell analys B2
Calculus in One Variable B2

FMAB70, 7,5 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: B1, C2, D1, E1, F1, I1, K1, L1, N1, Pi1, V1, W1, R1, BR1
Language of instruction: The course will be given in Swedish

Aim

The aim of the course is to give a basic introduction to calculus 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 as 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 integrals of them .
- be able to set up and solve some types of linear and separable differential equations that are important in the applications.
- be able to give a general account of and illustrate the meaning of mathematical concepts in calculus in one variable that are used to construct and study mathematical models in the applications.
- in simple cases be able to use Taylor's formula with remainder to draw conclusions about the local behaviour of a function

- be able to account for the contents of definitions, theorems and proofs.

Competences and skills
For a passing grade the student must

- be able to demonstrate a good algebraic computational ability and without difficulties be able to calculate with complex numbers.
- in the context of problem solving be able to demonstrate an ability to independently choose and use mathematical concepts and methods in one-dimensional analysis, and to construct and analyse simple mathematical models.
- in the context of problem solving be able to integrate knowledge from different parts of the course.
- be able to show capability to explain mathematical reasoning in a structured and logically clear way.

Contents

Complex numbers and polynomials. The concept of primitive function. Simple integration methods: partial integration and change of variable. Partial fractions. Definition of the Riemann integral. Riemann sums. Geometrical and other applications of integrals. Improper integrals. Differential equations of first order: linear and with separable variables. Linear differential equations with constant coefficients. Solution of homogeneous and certain inhomogeneous equations. Applications. 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 ON 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: 7,5. **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: FMAB65 Calculus in One Variable B1.
The number of participants is limited to: No
The course overlaps following course/s: FMAB50, FMAB60, FMA410, FMA415, FMA645, FMAA01, FMAA05

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
Course homepage: https://canvas.education.lu.se/courses/20330
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.