Course syllabus

Endimensionell analys B1
Calculus in One Variable B1

FMAB65, 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, I1, K1, L1, N1, 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 limits and derivatives of them .
- be able to discuss the logical structure of mathematics, in the way it appears e.g. in plane geometry.
- 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

- be able to demonstrate a good algebraic computational ability
- 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

The number concept. Calculation with fractions. Inequalities. Square roots. Curves and equations of second degree. Plane geometry. Analytic geometry. The circle, ellipse, hyperbola. Arithmetic and geometric sums. The binomial theorem. Modulus of a number. Trigonometry. Powers and logarithms. The concept of a function. The properties of the elementary functions: graphs, formulas. Sequences of numbers. 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. 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. Oral and written assignment. ONLY STUDENTS WHO PASSED THE COMPUTER QUIZZES AND THE ASSIGNMENT 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. The assignment (oral and in writing) must be passed before the examination.
Code: 0221. **Name:** Assignment.
Credits: 0. **Grading scale:** UG.
Code: 0321. **Name:** Computer Quizzes.
Credits: 0. **Grading scale:** UG.

Admission

The number of participants is limited to: No
The course overlaps following course/s: FMAA05, FMA410, FMA415, FMA645, FMAA01, FMAB45, FMAB50

Reading list

- Övningar i Inledande geometri för högskolestudier. Studentlitteratur, 2010, ISBN: 9789144067865.
- Månsson, J. och Nordbeck, P.: Endimensionell analys. Studentlitteratur, 2011, ISBN: 9789144056104.

- Övningar i endimensionell analys. Studentlitteratur, 2018, ISBN: 9789144127187.
- Diehl, S: Inledande geometri för högskolestudier. Studentlitteratur, 2010, ISBN: 9789144105000. Chapters P,T, A.

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/20328
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.