Course syllabus

Endimensionell analys Beta 1
Calculus in One Variable Beta 1

FMAB66, 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: F1, Pi1
Language of instruction: The course will be given in Swedish

Aim

The aim of the course is to give a basic introduction to single variable calculus.

Special importance is given to its role in different engineering subjects, with the intention to give the future engineer a sound foundation for further studies in mathematics or other subjects.

A further aim is 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

- be able to describe how knowledge about the derivative gives information about the local and global properties of a function.
- be able to roughly outline and illustrate how derivatives can be used in mathematical models and in other applications.
- be able to account for definitions, theorems and short proofs within the course.

Competences and skills
For a passing grade the student must

- demonstrate a good ability to perform algebraic calculations and, within the framework of the course content, be able to handle elementary functions of a single variable -- in particular finding limits and derivatives -- with assurance.
- when solving problems, demonstrate the ability to integrate knowledge from different parts of the course.
- demonstrate the ability to account for a mathematical argument in a structured and logically coherent manner.

Judgement and approach
For a passing grade the student must

- for a given problem be able to evaluate and discuss the pros and cons of different possible solution methods for problems within the framework of the course.
- demonstrate the ablity to identify his or her need for further knowledge, also within other subjects.

Contents

Number systems. Elementary algebra, in particular calculation with fractions. Inequalities. Square roots. Polynomials, polynomial division and Factor Theorem, and polynomial equations. Arithmetic and geometric sums. The Binomial Theorem. Absolute value. Trigonometry. Exponentiation and logarithms. The notion of a function. Definitions and properties of the elementary functions. Sequences. Limits with applications such as asymptotes, the existence of the number e, basic terminology for series. Continuous functions. Definition and properties of the derivative with applications. Derivatives of the elementary functions. Properties of differentiable functions, e.g. the Mean Value Theorem, and applications: Curve sketching, local extrema, optimization and simple mathematical models. Solution of problems within the above areas.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Computer quizzes during the course. Written examination comprising theory and problems. Only students who passed on the computer quizzes before the written examination are entitled to participate in the written examination. Before each re-sit examination the student have the chance to take any remaining computer quizzes.

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: 0123. **Name:** Calculus in One Variable Beta 1.
Credits: 5. **Grading scale:** TH. **Assessment:** Written examination comprising theory and problems.
Code: 0223. **Name:** Computer Tests.
Credits: 0. **Grading scale:** UG.

Admission

The number of participants is limited to: No
The course overlaps following course/s: FMAB45, FMAB65, FMAA01, FMAA05

Reading list

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

Contact and other information

Course coordinator: Anders Holst, studierektor@math.lth.se
Course administrator: Studerandeexpeditionen, expedition@math.lth.se
Teacher: Mikael P Sundqvist, mikael.persson_sundqvist@math.lth.se
Course homepage: https://canvas.education.lu.se/courses/22890
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.