SF1623 Mathematics I 15.0 credits

Matematik I

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SF1623 valid from Autumn 2008

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Mathematics, Technology

Specific prerequisites

Knowledge corresponding to mathematics of Swedish upper secondary school, courses A – D.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

To enhance the mathematical skills of first-year students and thus build sound foundations for further studies of mathematical, scientific and technical subjects at University level.

To give a deeper and broader view of the elements of calculus and vectors treated in upper secondary schools(gymnasium)

To encounter different modes of teaching mathematics.

To provide skills in communicating mathematics, orally as well as in writing.

After the course, the students should be able to

Fundamental concepts

use the fundamental concepts of calculus, linear algebra and geometry: function, limit, continuity, derivative, integral, matrix, determinant, vector.

Usage of language

write mathematical text using notation for variables, parameters, sum, limit, derivative and integral.

Reasoning

perform mathematical reasoning using the fundamental concepts mentioned above.

Mathematical modelling

set up mathematical models and problems expressed in the terms of the fundamental concepts.

Problem solving

use classical solution methods of calculus, linear algebra and vector geometry.

Complementary aims

After the course the student should have

- Achieved a study technique that lays as basis for prosperous learning of the mathematical, scientific and technical subjects.
- Insights on how mathematical tools and thinking can be used in the further education and future professional life.

Course contents

After the course, the students should be able to

- Use real and complex numbers, algebraic expressions, inequalities and equations.

- Elementary functions: the natural logarithm, the exponential and power functions, the trigonometric functions, the complex exponential function. The properties of elementary functions. The Euler formulae.
- Logic, proof, induction and recursion, the binomial, sums, products.
- Sequences.
- Define and interpret the fundamental concepts: real numbers, limits, continuity, derivatives, integrals, vectors, dot product, cross product, triple product.
- Investigate curves and analyze inequalities by using derivatives.
- Use vector algebra to evaluate projections, distance, areas and volumes.
- Use Taylor polynomials to approximate functions.
- Evaluate limits using Taylor expansion and l'Hospital's Rule.
- Solve first or second order linear differential equation with constant coefficients.
- Evaluate some definite integrals using antiderivatives.
- Use the methods of integration to evaluate areas and volumes.
- Determine whether or not an improper integral converges.
- Derive some formulas and theorems.
- The course also connects to mathematical education, by treating for example oral and written presentations of mathematics.

Course literature

Persson&Böiers/Analys i en variabel.

LTH/Övningar i analys i en variabel.

Andersson Lennart m.fl. : Linjär algebra med geometri.

Examination

- SEM1 - Assignment, 0.0 credits, grading scale: P, F
- TENA - Examination, 9.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

TEN1 (6 hp, compulsory). Continuous examination and written exam.
TENA (9 hp, compulsory). Continuous examination and written exam.
SEM1 (0 hp, compulsory). Essay and oral presentation.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.