



# SF1622 Calculus in One Variable and Linear Algebra 9.0 credits

Envariabelanalys och linjär algebra

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

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

## Establishment

Course syllabus for SF1622 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

SF1612 Basic course in Mathematics.

## Language of instruction

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

## Intended learning outcomes

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, line, plane.

### **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

- Define and interpret the fundamental concepts: limit, continuity, derivative, integral, infinite series, matrix, determinant, vector, dot product, cross product, triple product, line, plane.
- Investigate curves and analyze inequalities by using derivatives.
- Solve and geometrically interpret systems of linear equations.
- 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.
- Determine whether a series converges or diverges
- Derive some formulas and theorems.

## Course literature

Persson&Böiers/Analys i en variabel.

LTH/Övningar i analys i en variabel.

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

## Examination

- TEN1 - Examination, 9.0 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.

## Other requirements for final grade

The course aims are written with a direction to the grade 3 and will be examined through continuous examination and a written exam (TEN1; 9 university credits). It will be up to the coordinating teacher to decide the forms of the continuous examination.

## 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.