



SF1625 Calculus in One Variable

7.5 credits

Envariabelanalys

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 SF1625 valid from Autumn 2014

Grading scale

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

Education cycle

First cycle

Main field of study

Mathematics, Technology

Specific prerequisites

Basic and specific requirements for engineering program.

Mandatory for first year, can not be read by other students

Language of instruction

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

Intended learning outcomes

After completing this course with a passing grade the student should be able to

- Use, explain and apply the fundamental concepts and problem solving methods of one variable Calculus, especially:
 - Use the derivative to investigate functions, e.g. sketch graphs and solve extremal value problems
 - Use Taylor's formula to approximate functions with polynomials to a desired degree of accuracy
 - Explain the definition of the Riemann integral and account for some of its applications, compute integrals using anti-derivatives, partial integration and change of variables
 - Solve certain linear ordinary differential equations with constant coefficients and explain how they are used in applications
 - Compute some elementary limits and use these to study the behavior of a function locally or asymptotically
- Propose mathematical models for applications that can be described by functions of one variable, discuss relevance and accuracy of such models, and be aware of how mathematical software can be used, for example to plot graphs and solve equations
- Read and understand mathematical text about functions of one variable and their applications, communicate mathematical reasoning and computations within this field orally as well as in writing in such a way that it is easy to follow

For the higher grades the student should also be able to:

- Deduce some particularly important theorems and formulas
- Generalize and adapt the methods to fit in new situations
- Solve problem that require complex computations in several steps
- Explain the mathematical theory behind the concepts limit, continuity, series

Course contents

Function, graph of a function. Transcendental function, the unit circle, trigonometric formulas and equations, exponential function, logarithms, laws of the logarithm, powers. Limits, standard limits, continuity. The derivative, laws of derivation and applications: extremal value problems, curve sketching, inequalities. Taylor's formula with estimations of the error. Linear ordinary differential equations with constant coefficients and their applications. The Riemann integral, anti-derivatives, change of variables, partial integration, geometric and other applications of the integral, generalized integrals. Series.

Course literature

Robert A. Adams, Christopher Essex, **Calculus - A Complete Course**, 8th edition. ISBN 978-0-321-78107-9.

Examination

- TEN1 - Examination, 7.5 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

Written exam, possibly with the possibility of 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.