SF1606 Complementary Course in Calculus 3.0 credits

Kompletteringskurs i differential- och integralkalkyl

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

Establishment

Course syllabus for SF1606 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

SF1625 Calculus in One Variable and SF1626 Calculus in Several Variables, or equivalent.

Language of instruction

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

Intended learning outcomes

The general objective of the course is to be a complement for students that have taken a smaller course in differential and integral calculus in one and several variables, especially the courses SF1625 and SF1626, so that the student will achieve the same knowledge as is expected in the courses Differential and integral calculus II, part 1 SF1602 and part 2 SF1603. More precisely, after a course is expected that the students should be able to

- Describe the difference between limits and continuity in one and several variables.
- Define differentiability and conditions that imply differentiability.
- Formulate the mean value theorem (for derivatives) and the fundamental theorem of calculus, and explain also the consequences of these theorems.
- Specify methods for determining minimum and maxmimum values of continuous functions on closed and bounded sets.
- Define and, in simple cases, determine the convergence of generalised integrals and series.
- Calculate derivatives by implicit differentiation and give condtions for when the derivates exist.
- Describe how the Riemann integral is introduced by Riemann sums, both for single and multiple integrals.
- Describe and prove fundamental theorems in differential och integral calculus in one and several variables.

Course contents

The concept of functions, elementary functions. Real numbers, limits, continuity. Derivatives, extreme value problems. Harmonic motion. Integrals, geometric applications. Taylor's formula. Series, convergence tests for series.

Functions of several variables. Topological concepts in R^n. Differentiability and linear approximations of mappings.

Partial derivatives, differentials, gradient.

The chain rule in general form. The implicit function theorem.

Extreme value problems with and without constraints. Multiple integrals, change of coordinates, geometric applications. Elementary vector analysis: line and surface integrals, Gauss', Green's and Stokes' theorem.

Course literature

Adams: Calculus

Examination

- TEN1 - Examination, 3.0 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

Oral or written exam.

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.