



SF1646 Calculus in Several Variable 6.0 credits

Analys i flera variabler

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 SF1646 valid from Autumn 2008

Grading scale

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

Education cycle

First cycle

Main field of study

Mathematics, Technology

Language of instruction

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

Intended learning outcomes

Basic course in differential and integral calculus in several variables. After the course the students should know and be able to use the basic concepts in the calculus of functions of several variables: partial derivative, differentiability, differentials, gradient, directional derivative, total derivative, Jacobian, multiple integrals, contour integrals. More specifically after finishing the course the students should be able to

- apply the chain rule and decide whether a function satisfies a certain partial differential equation
- compute tangent planes and directional derivatives using the gradient
- compute limits of certain functions of several variables and decide whether it is differentiable
- form differentials and Taylor expansions of functions of several variables
- transform partial derivatives by changing variables
- use total derivatives and Jacobians to solve problems in connections with local existence for inverse functions and implicit functions
- compute and analyze the type of stationary points
- solve optimization problems for different types of regions with or without constraints
- use the method of least squares
- compute certain multiple integrals
- use multiple integrals to compute volumes and area, and compute the length of curves using integrals
- compute contour integrals using parametrizations and Green's formula

Course contents

Functions of several variables: partial derivatives, the chain rule, the gradient and its properties and directional derivatives.

Total derivatives and Jacobians

Differentials and their invariance. Taylor's formula for functions of several variables

Transformation of partial derivatives by change of variables

The inverse and implicit function theorems

Local extremal points. Global extreme value problems with and without constraints.

The Lagrange multiplier method.

The method of least squares

Multipelintegral, kurvintegral och Greens formel. Tillämpningar.

Multiple integrals, contour integrals and Green's formula. Applications.

Specific prerequisites

SF1644 Calculus in one variable and SF1645 Linear Algebra.

Compulsory for first year students, cannot be taken by other students.

Course literature

Persson&Böiers/Analys i flera variabler.

LTH/Övningar i analys i flera variabler.

Examination

- 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.

Other requirements for final grade

One 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.