



Course syllabus

Faculty of Technology
Department of Mathematics

1MA452 Flervariabelanalys, 7,5 högskolepoäng
Analysis of several variables, 7.5 credits

Main field of study

Mathematics

Subject Group

Mathematics

Level of classification

First Level

Progression

G1F

Date of Ratification

Approved by Faculty of Technology 2014-10-03
The course syllabus is valid from autumn semester 2015

Prerequisites

1MA403 Vector Geometry 7.5 credits, and 1MA404 Calculus II 7.5 credits or equivalent.

Objectives

After completion of the course the student shall:

- understand basic properties of open, closed and compact sets in \mathbb{R}^n ;
- understand the definition of limits of functions of several variables and be able to perform computations with limits, also using the definition;
- understand and be able to deduce properties of continuous functions of several variables defined on compact sets;
- be able to investigate functions with partial derivatives for extreme values;
- understand the concept differentiability and be able to investigate functions for differentiability using the definition;
- understand the link between differentiability and linearization and the existence of tangent planes;
- understand the chain rule for partial derivatives of first order as well as of higher order;
- be able to use the chain rule to simplify and solve simple partial differential equations;
- understand the geometric meanings of gradient and directional derivatives and apply them, e.g. to the determination of tangent planes;
- be able to evaluate integrals over multidimensional domains by iteration and by change of variables;
- be able to calculate areas and volumes using double integrals;

- be able to prove the integrability of a continuous function defined on a rectifiable set;
- understand and be able to give an account of definitions and relations between central concepts of the course and apply them to solve problems.

Content

The course comprises:

- open, closed and compact sets in \mathbb{R}^n ;
- functions of several variables;
- limits of functions of several variables;
- continuity;
- continuous functions on compact sets;
- partial derivatives;
- optimization of functions of several variables;
- differentiability;
- the Chain Rule;
- gradient and directional derivatives;
- the inverse and implicit functions theorems;
- double integrals.

Type of Instruction

Lectures and seminars.

Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as failed.

The principal assessment method is a written exam at the end of the course, involving both computation and theory questions. Non-compulsory assignments during the course will be offered.

Course Evaluation

A course evaluation will be carried out and compiled after the course is completed. The compilation will be presented to the current board as well as to the students and filed by the coordinating department.

Credit Overlap

This course cannot be part of a degree in combination with another course in which the content fully or partly correspond to the content of this course: IMA152

Analysis of several variables, 7.5 credits

Required Reading and Additional Study Material

R.A. Adams, C. Essex,
Calculus - A Complete Course, Pearson Education, 2013.

Supplementary literature

Lars-Christer Böiers, Thomas Claesson, Arne Persson, Lars-Christer Böiers, *Analys i flera variabler*, Studentlitteratur, 2005.

Övningar i Analys i flera variabler, Studentlitteratur, 2007.