Multivariable Calculus

Programme course

4 credits

Flervariabelanalys

TATA76

Valid from: 2017 Spring semester

Determined by
Board of Studies for Computer Science
and Media Technology

Date determined
2017-01-25

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G1X

Course offered for
- Computer Science and Engineering, M Sc in Engineering
- Information Technology, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Linear Algebra, Calculus, one variable

Intended learning outcomes
The student should acquire the proficiency in multivariable calculus required for subsequent studies. After completing the course the student should be able to:

- define and explain the central concepts of the course e.g., basic topological notions, function, limit, continuity, functional determinant, volume, area, mass, potential and the different kinds of derivatives and integrals that are used in the course.
- quote, explain, use and in occurring cases prove the central theorems of the course e.g., the theorem of global extrema, differentiability implies existence of partial derivatives, the chain rule, variable substitution in multiple integrals and the connection between gradients and directional derivatives.
- verify that results and partial results are correct or reasonable.
- calculate limits for functions of several variables
- solve partial differential equations by using the chain rule.
- calculate directional derivatives and equations for tangents, normals and tangent planes as well as explain and use the geometric interpretations of these objects and use them to solve problems.
- calculate multiple integrals by means of iterated integration and variable substitutions (e.g., polar, spherical and linear substitutions).

Course content
The space R^n. Fundamental notions from topology. Functions from R^n to R^p. Function graphs, level surfaces and level curves. Definitions of limit and continuity. Partial derivatives. Differentiability and differential. The chain rule. Gradient, normal, tangent and tangent plane. Directional derivative. Multiple integrals. Iterated integration. Variable substitution. Area, volume and mass.

Teaching and working methods
Lectures and lessons.

Examination

TEN1	Written examination	4 credits	U, 3, 4, 5

Grades
Four-grade scale, LiU, U, 3, 4, 5

Department
Matematiska institutionen

Director of Studies or equivalent
Jesper Thorén

Examiner
Fredrik Andersson

Education components
Preliminary scheduled hours: 46 h
Recommended self-study hours: 61 h

Course literature
Persson, A, Böiers, L-C: Analys i flera variabler, Studentlitteratur, Lund.
Problemsamling utgiven av MAI.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.