

# Calculus in One and Several Variables

Programme course

6 credits

En- och flervariabelanalys

TATA91

Valid from: 2018 Spring semester

**Determined by**

Board of Studies for Computer Science  
and Media Technology

**Date determined**

## Main field of study

Mathematics, Applied Mathematics

## Course level

First cycle

## Advancement level

G1F

## Course offered for

- Computer Science and Software Engineering, 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

Calculus in one variable 1, Linear Algebra

## Intended learning outcomes

Gain familiarity with mathematical concepts, reasoning and relationships in calculus in one and several variables, and gain the calculation and problem solving skills needed for further studies. After completing this course you should be able to

- cite, explain and use the definitions and theorems of the course's key concepts
- solve problems and verify that results are correct or reasonable

## Course content

Taylor's and Maclaurin's formulae: Maclaurin expansions of the elementary functions, the Ordo form of the remainder term with applications, e.g. computations of limits. Ordinary differential equations: first order linear and separable equations, higher order linear equations with constant coefficients. Improper integrals: investigation of convergence, absolute convergence. Numerical series: investigation of convergence, absolute convergence, Leibniz criterion. The space  $\mathbb{R}^n$ : basic topological concepts, functions from  $\mathbb{R}^n$  to  $\mathbb{R}^p$ , function surfaces, level surfaces and level curves. Differential calculus: partial derivatives, the chain rule, partial differential equations, gradient, normal, tangent, tangent plane and directional

## Teaching and working methods

The course consists of lectures and classes.

## Examination

TEN1      Written exam      6 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

Göran Forsling

## Course website and other links

<http://courses.mai.liu.se/Lists/html/index-amne-tm.html>

## Education components

Preliminary scheduled hours: 36 h

Recommended self-study hours: 124 h

## Course literature

### Books

Forsling, G. och Neymark, N., (2011) *Matematisk analys, en variabel* Liber

M. Neymark, (2016) *Matematisk analys, flera variabler*.