

# Calculus in One Variable 2

Programme course

6 credits

**Envariabelanalys 2** 

TATA42

Valid from: 2017 Spring semester

**Determined by** 

Board of Studies for Electrical Engineering, Physics and Mathematics

**Date determined** 

2017-01-25

## Main field of study

Mathematics, Applied Mathematics

### Course level

First cycle

### Advancement level

 $G_1F$ 

#### Course offered for

- Industrial Engineering and Management, M Sc in Engineering
- Computer Science and Engineering, M Sc in Engineering
- Design and Product Development, M Sc in Engineering
- Energy-Environment-Management M Sc in Engineering
- Information Technology, M Sc in Engineering
- Chemical Biology, M Sc in Engineering
- Biomedical Engineering, M Sc in Engineering
- Mechanical Engineering, M Sc in Engineering
- Engineering Biology, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Physics, Bachelor's Programme
- Mathematics, Bachelor's Programme
- Industrial Engineering and Management International, M Sc in Engineering
- Applied Physics and Electrical Engineering International, 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



### Intended learning outcomes

To give basic proficiency in mathematical concepts, reasoning and relations contained in single-variable calculus. To provide the skills in calculus and problem solving required for subsequent studies. After a completed course, the student should be able to

- read and interpret mathematical text
- quote and explain Taylor's formula and the concepts involved in numerical series and convergence of series
- derive expressions for, and compute, geometrical quantities such as plane area, arc length, and volume and surface area of solids of revolution
- solve ordinary differential equations (first order linear and separable equations, and higher order linear equations with constant coefficients) and integral equations
- use Taylor expansions to approximate functions by polynomials, compute limits and rational approximations, and to investigate local properties of functions
- carry out investigations of convergence of improper integrals, numerical series and power series
- use power series to calculate sums and to solve differential equations
- perform routine calculations with confidence
- carry out inspections of results and partial results, in order to verify that these are correct or reasonable.

#### Course content

Applications of integrals: plane area, arc length, volume and surface area of solids of revolution and centre of mass. Taylor's and Maclaurin's formulae: Maclaurin expansions of the elementary functions, the Lagrange and Ordo forms of the remainder term, applications, e.g. error estimates for approximations and computations of limits. Ordinary differential equations: first order linear and separable equations, integral equations, higher order linear equations with constant coefficients. Improper integrals: investigation of convergence, absolute convergence, Leibniz criterion.

Power series: radius of convergence, calculation of sums, solving differential equations

# Teaching and working methods

Lectures and problem classes.

The IT programme has a different organisation, due to the study programme syllabus.

#### Examination

TEN1 Written examination 6 credits U, 3, 4, 5



### Grades

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

#### Other information

Supplementary courses: Calculus in several variables, Vector analysis, Complex analysis, and Fourier analysis.

### Department

Matematiska institutionen

# Director of Studies or equivalent

Jesper Thorén

#### **Examiner**

Mats Aigner (I,Ii), Johan Thim (D,IT,U,KB,TB), Ulf Janfalk (M,DPU,EMM), Tomas Sjödin (Y,Yi, MED,Mat,FyN,FRIST)

### Course website and other links

http://www.mai.liu.se/und/kurser/index-amne-tm.html

## **Education components**

Preliminary scheduled hours: 70 h Recommended self-study hours: 90 h

#### Course literature

#### **Additional literature**

#### **Books**

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

#### Compendia

Complementary material and a collection of problems edited by the Department of Mathematics.



#### **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.

