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
G1X

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. Numerical series: 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.