Multivariable Calculus and Differential Equations

Programme course

4 credits

Flervariabelanalys och differentialekvationer

TATA90

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 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 multivariable calculus and linear differential equations in one variable, and gain the calculation and problem solving skills needed for further studies. After completing this course you should be able to

- cite and explain the definitions of the course's key concepts, such as topological fundamental concepts, functions, limits, continuity, partial derivatives, multiple integrals, functional determinants etc..
- handle differential equations (first order linear, separable and higher order linear equations with constant coefficients).
- quote, explain and use the course central theorems, such as the chain rule, change of variables in multiple integrals, the relationship between gradients and directional derivatives, theorems concerning multiple integral properties etc..
- solving some partial differential equations using the chain rule.
- verify that results are correct or reasonable.
- calculate the directional derivatives and tangent-, normal- and tangent plane equations and explain and use the concepts geometrical significance in problem solving.
- compute multiple integrals using repeated integration, change of variables (e.g. polar, spherical and linear).

Course content

The space R ^ n. Basic topological concepts. Functions from R ^ n to R ^ p. Function surfaces, level surfaces and level curves. Limits. Partial derivatives. The chain rule. Gradient, normal, tangent and tangent plane. Directional derivative. Multiple integrals. Repeated integration. Variable Substitution. Functional determinants. Ordinary Differential Equations. First order linear and separable equations. Linear equations of higher order with constant coefficients.

Teaching and working methods

The course consists of lectures and classes.

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

Jesper Thorén

Education components

Preliminary scheduled hours: 36 h
Recommended self-study hours: 71 h

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.