Calculus III

Programme course

6 credits

Analys III

TNA006

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
- Electronics Design Engineering, M Sc in Engineering
- Communications, Transport and Infrastructure, M Sc in Engineering
- Media Technology and Engineering, M Sc in Engineering
- Civil Engineering, B 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 I-II and Linear algebra, or similar courses.

Intended learning outcomes
This course is a continuation of the first year course in single variable calculus. Consequently, the aims are similar: to give students an understanding of mathematical concepts and familiarity with mathematical methods of analysis. Here, these aims relate to the treatment of functions of several variables which arise in all branches of physics and engineering. Students will be expected to be able to do the following after completing this course:

- handle multivariable functions, e.g. to be able to determine limits,
- decide if a function is continuous and differentiable, determine partial derivatives and use the chain rule for transforming and solving partial differential equations
- solve global and local maximum and minimum problems, with and without constaints.
- quote and explain definitions of concepts like limit, contiuity, partial derivative, differentiability, gradient, tangent plane, multiple integrals.
- explain and use central theorems like the implicit function theorem, calculate double and triple integrals, derive expressions for area and volumes using multiple integrals.

Course content

Functions of several variables. Limits and continuity. Partial derivative, the gradient, directional derivative and differential. Tangent plane and linearization. The chain rule. Taylor's formula. Vector-valued functions, the Jacobian matrix and the Jacobian. Implicit differentiation and implicit functions. Local and global maxima and minima. Finding of maxima and minima with and without constraints. Double and triple integrals. Iterated integrals. Change of variables. Space curves.

Teaching and working methods

The course is given in the form of lectures, tutorials, tests and a final examination.

Examination

KTR1	Written test	0 credits	U, G
TEN1	Written examination	6 credits	U, 3, 4, 5

Grades

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

Other information

Supplementary courses: Vector analysis, Applied transform theory, Optimization, Statistics and Probability Theory.

Department

Institutionen för teknik och naturvetenskap

Director of Studies or equivalent

George Baravdish

Examiner

Olof Svensson

Course website and other links

http://www2.itn.liu.se/utbildning/kurs/

Education components

Preliminary scheduled hours: 50 h
Recommended self-study hours: 110 h

Course literature

Additional literature

Books

Persson, A, Böiers, L-C, *Analys i flera variabler*
Studentlitteratur.

Compendia

Problemsamling för kursen TNA006

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.