Calculus I

Programme course

6 credits

Analys I

TNA003

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

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
Foundation course in mathematics

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 definitions of concepts like local extremum, limit, continuity, derivative, antiderivative and integral
- quote, explain and use central theorems such as the first and second fundamental theorem of calculus, the mean value theorems, the intermediate value theorem, the extreme value theorem
- use rules for limits, derivatives, antiderivatives and integrals
- carry out examinations of functions, e.g., using derivatives, limits and the properties of the elementary functions, and by that means draw conclusions concerning the properties of functions
- use standard techniques in order to determine antiderivatives and definite integrals
- investigate improper integrals with antiderivatives
- compare sums and integrals
- 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

Functions of a real variable. Limits and continuity. Derivatives. Rules of differentiation. Properties of differentiable functions. Derivative and monotonicity. Graph sketching, tangents and normals, asymptotes. Local and global extrema. Derivatives of higher order. Convex and concave functions. How to find primitive functions. The Riemann integral. Definition and properties. Connection between the definite integral and primitive function. Methods of integration. Improper integrals. Sums and integrals.

Teaching and working methods

Lectures and problem classes or classes alone.

Examination

KTR1	Optional examinations	0 credits	D
TEN1	Written exam	6 credits	U, 3, 4, 5

Grades

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

Department
Institutionen för teknik och naturvetenskap

Director of Studies or equivalent
George Baravdish

Examiner
Sixten Nilsson

Course website and other links
http://www2.itn.liu.se/utbildning/kurs/

Education components
Preliminary scheduled hours: 84 h
Recommended self-study hours: 76 h

Course literature
Forsling, G. och Neymark, N.: Matematisk analys, en variabel. Liber.
Problemsamling utgiven av matematiska institutionen.

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.