SYLLABUS

Differential Calculus and Learning 7.5 credits M0057M

Differentialkalkyl och lärande

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2021-02-17

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LULEÅ TEKNISKA UNIVERSITET

Differential Calculus and Learning 7.5 credits M0057M

Differentialkalkyl och lärande

First cycle, M0057M

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Matematik	Mathematics

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language +
Swedish upper secondary school courses Physics 2, Chemistry 1, Mathematics 4 or Mathematics E.

Selection

The selection is based on final school grades or Swedish Scholastic Aptitude Test.

Course Aim

After completed course, the students should be able to:

- explain and use mathematical reasoning and notation.
- use sets and logic in mathematical proofs.
- use key concepts and methods in the calculus of one variable on extreme value calculations, graphing, limit calculations, analysis of functions and expressions, inverse functions, approximations of functions and other applied problems.
- prove central theorems in the field of differential calculus in one variable.
- manage and prove key properties of elementary functions and their inverses.
- derive methods for numerical solution of equations in one variable.
- reflect on students' learning in the field of differential calculation in a variable.
- use digital tools and programming to investigate key concepts and theorems in the field of differential calculus in one variable and reflect on students' opportunities for learning through the use of digital tools and programming.

Contents

The course treats basic principles in differential calculus. In addition, a didactic analysis of these is made.

1. Basics: Logic, sets, equation solving, proofs, functions, graphs, trigonometry.
2. Differential calculus: limits, continuity, tangent, derivative, differentiation rules, mean value theorem.
3. Differentiation: higher-order derivatives, implicit differentiation, elementary functions, inverse functions.
4. Applications: Graphing, asymptotes, extreme values, related rates, Newton’s method, linear approximation, Taylor polynomials.
5. Didactical analysis of mathematical concepts and processes.

The computer software MATLAB will be used to solve and analyze mathematical problems which are relevant for the course.

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
Lectures, problem solving, laboratory work

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Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Written examination and a report which also should be presented orally.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Remarks

Cannot be included in the degree together with M0047M or M0029M.

Transition terms

The course replaces M0047M.

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Report	U G#	1.5	Mandatory	A21	
0003	Written exam	G U 3 4 5	6	Mandatory	A21	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Head Faculty Programme Director Niklas Lehto 2021-02-17

Syllabus established

by Head Faculty Programme Director Niklas Lehto 2021-02-17

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