

SYLLABUS

Mathematical Analysis and Geometry 7.5 credits M7028M

Matematisk analys och geometri

Course syllabus admitted: Autumn 2019 Sp 1 - Present

**DECISION DATE
2019-02-15**

Mathematical Analysis and Geometry 7.5 credits M7028M

Matematisk analys och geometri

Second cycle, M7028M

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

Entry requirements

Some familiarity with basic concepts in mathematical analysis, such as induction, limits, derivatives, and linear algebra corresponding to the courses Calculus(M0047M) and Linear Algebra and Calculus (M0048M) or similar.

Selection

The selection is based on 30-285 credits

Examiner

Niklas Grip

Course Aim

Mathematical analysis:

The course gives an introduction to the topic of analysis and real functions of one variable. Contrary to other analysis courses that focus on handling the tools, this course focuses on developing theorems that are used in analysis, starting from the real number axiom.

After reading the course, the student shall be able to

- formulate and understand mathematical proofs,
- explain used notions and their context
- give illustrative examples of the introduced notions and theorems
- apply the notions and theorems in problem solving
- discuss and critically review elementary presentation of the theory in corresponding courses in upper secondary school and universities,
- Apply mathematical notion and methods in the following topics:
 - countable and uncountable sets,
 - limits introduced via sequences,
 - topology of real numbers for providing access to known properties of functions (for example the mean value problem),
 - differentiable functions.
- Show a ability to integrate ideas from different topics,
- Do mathematical reasoning in a structured and logically consistent way.

Geometry:

After reading the course, the student shall be able to:

Use the ideas, symbols, representation forms, rules and algorithms in geometry that are covered by this course, as well as:

- Applying geometric ideas and methods in the following topics:
- Identify properties of different geometric objects,
- To explain and use some definitions, postulates and use some definitions, postulates and theorems in Euclidean geometry,
- Construct and explain some geometric mappings,
- Perform simple computations in coordinate geometry,
- Explain some definitions and theorems in non-euclidean geometry,

Contents

Real numbers and functions, sequences and series of real numbers, functions and limits, continuous functions and differentiable functions.

Fundamental ideas and relations in geometric figures (congruence, similarities, the Pythagorean theorem, trigonometry in triangles). Postulates, definitions and theorems in Euclidean geometry. Geometric problem solving including proofs. Analytic and non-euclidean geometry.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The course is taught through lectures

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. A written exam is given at the end of the course. The grade obtained in this exam is the final grade of the course.

Transition terms

Cannot be included in the degree together with M7026M.

Literature. Valid from Autumn 2019 Sp 1

Steven G. Krantz, Real Analysis and Foundations, Chapman and Hall/CRC, 4 edition, December 2016.
Anders Tengstrand, Åtta kapitel om geometri, Studentlitteratur 2004.

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0001	Written exam	G U 3 4 5	7.5	Mandatory	A19	

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.

Syllabus established

by Niklas Lehto 2019-02-15