



# LT2047 Selected Topics in Mathematics 7.5 credits

Teman inom matematiken

This is a translation of the Swedish, legally binding, course syllabus.

## Establishment

The official course syllabus is valid from the fall semester 2023 in accordance with the decision by the Head of School: M-2023-0887. Date of decision: 17/04/2023

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

Second cycle

## Main field of study

Technology and Learning

## Specific prerequisites

- Upper secondary courses Sw B/3 and/or ENG B/6
- Course ML1000 (completed)

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

After passing the course, the student should be able to:

1. Discuss how the numeral system has evolved historically from integers to abstract algebraic structures, and what problems have motivated the introduction of new numeral systems
2. Critically analyse the basic design of the numeral system, both intuitively and axiomatically, in particular the Peano axioms for natural and rational numbers
3. Discuss how the arithmetic operations defined on natural numbers can be generalised to larger number fields.
4. Analyse how the power laws for positive integer exponents can be generalised to non-positive integer and rational exponents, and explain the relation between power laws and exponential laws
5. Examine how geometry has evolved from ancient Greek to Euclidian geometry, and further to non-Euclidian geometry.
6. Discuss the basic concepts in geometry and explain and prove their most central properties, in particular for triangles, trigonometric functions, Pythagoras' theorem, circles and ellipses.
7. Use congruence and similarity to carry out simple designs with compasses and ruler

## Course contents

This course is designed to give the students a deeper understanding of the history of mathematics, the abstraction of mathematics and its relevance for other scientific disciplines. The main content of the course is basic arithmetic and the axiomatic structure of geometry. The course covers the gender perspective on the history of mathematics and the numeral system by reviewing the Egyptian, the Babylonian, the Roman and the Hindu-Arabic system. Students will also become acquainted with the numeral system with an emphasis on natural numbers and their properties, theorems of prime numbers and their applications, and the Pythagoreans and geometry. The course specifically emphasises mathematical reasoning, mathematical communication and modern mathematics regarded as a logical system and how this development has influenced teaching, learning and assessment in mathematics teaching.

## Examination

- LEXA - Continuous assessment, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- PRO1 - Project, 1.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

## **Ethical approach**

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.