LT1048 Selected Topics in Mathematics 7.5 credits

Teman inom matematiken

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

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

Establishment

On 15/10/2021, the Dean of the ITM School has decided to establish this official course syllabus to apply from autumn term 2022 (registration number M-2021-1852).

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

General entry requirements.

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. Describe how the number system historically has been developed from integers to abstract algebraic structures and which problems that have justified the introduction of new number systems,

2. Explain the basic design of the number system both intuitively and axiomatically, particularly the Peano axioms for natural and rational numbers. Something about real numbers.

3. Explain how the arithmetic operations that are defined on natural numbers can be generalised to larger number fields.

4. Explain how the power laws for positive integer exponents can be generalised to non-positive integer exponents and rational exponents and explain the relationship between power laws and exponential laws.

5. Examine how geometry has been developed from antique Greek to Euclidean geometry and furthermore to non-Euclidean geometry.

6. Define basic concepts in geometry and explain and prove their most important properties particularly: triangles, trigonometric functions, Pythagoras theorem, circles and ellipses.

7. Use congruence and similarity and carry out simple designs with compass and ruler.

Course contents

This course is designed to give the students a deeper understanding of the history of the 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 the geometry. The course will cover the gender perspective on matematics history and the numeral system by reviewing the Egyptian, the Babylonian, the Roman and the Hindu-Arabic system. Students will also touch upon the number system with an emphasis on natural numbers and their properties; theorems about prime numbers and their applications; the Pythagoreans and geometry. Special emphasis is placed on mathematical reasoning, mathematical communication and modern mathematics regarded as a logical system and how this development has influenced teaching, learning and assessment in mathematical tuition.

Examination

- LEXA - Continous 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.

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.