



LUND
UNIVERSITY

Faculty of Science

MATA23, Mathematics: Foundations of Algebra, 7.5 credits

Matematik: Algebras grunder, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2015-09-10 to be valid from 2015-09-11, autumn semester 2015.

General Information

The course is a compulsory course for first-cycle studies for a Bachelor of Science degree in mathematics.

Language of instruction: English and Swedish

Main field of studies

Mathematics

Depth of study relative to the degree requirements

G1N, First cycle, has only upper-secondary level entry requirements

Learning outcomes

The aim of the course is to enable students to acquire the following knowledge and skills on completion of the course.

Knowledge and understanding

On completion of the course, the student should be able to:

- explain basic algebraic concepts and definitions;
- state the more important results and theorems within the field of the course and describe the fundamental features of their proofs.

Competence and skills

On completion of the course, the student should be able to:

- apply algebraic theory, methods and techniques to modelling and problem solving;
- summarise a course section in writing and/or orally so that the main principles appear;
- describe a course section using everyday language that can be understood also by an individual with another educational background.

Judgement and approach

On completion of the course, the student should be able to:

- argue for the importance and applicability of mathematics within other fields of study.

Course content

- Elementary logic and set theory.
- The structure of the number systems from an axiomatic perspective.
- Basic properties of the integers: Induction, divisibility, prime numbers, Euclid's algorithm, modular arithmetic, representation of numbers in different bases, Diophantine equations.
- Rational and irrational numbers.
- Enumerability.
- Complex numbers.
- Functions and relations. Equivalence relations.
- Elementary combinatorics.
- Polynomials and algebraic equations: Factorisation, Euclid's algorithm, relationship between zeros and coefficients.

Course design

The teaching consists of lectures, seminars and exercise classes. An essential element of the seminars and exercise classes is training in problem solving and oral mathematical communication.

A project, or a series of smaller written assignments, is included in the course requirements. The project and the assignment series concern theoretical aspects and applications of the course content but can also have a didactic specialisation. The project and the written assignments also aim at providing the students with training in mathematical communication in speech and writing.

Assessment

The examination consists of the following parts:

- a presentation of the project or the written assignments (1.5 credits)
- a written examination, possibly together with an oral examination (6 credits)

The oral examination is required to achieve the grade Pass with distinction and is offered only to students who passed the corresponding written examination.

Students who fail the ordinary examination are offered a resit examination shortly thereafter.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

To achieve a Pass grade, a student is required to pass the project/assignments and the written examination.

To achieve Pass with distinction it is also required to pass the oral examination. Whether the grade Pass with distinction should be given is decided by combining the results of the included examination parts.

Entry requirements

General and courses corresponding to the following Swedish Upper Secondary School Programs: Mathematics 4.

Further information

The course may not be included in a degree together with MATA11 Mathematics 1 alfa, 15 credits or MATA15 Algebra 1, 15 credits.

Subcourses in MATA23, Mathematics: Foundations of Algebra

Applies from H15

- 1501 Written exam, 6,0 hp
Grading scale: Fail, Pass
- 1502 Project, 1,5 hp
Grading scale: Fail, Pass