



**LUND**  
UNIVERSITY

Faculty of Science

## MATA22, Mathematics: Linear Algebra 1, 7.5 credits

*Matematik: Lineär algebra 1, 7,5 högskolepoäng*

First Cycle / Grundnivå

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### Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2015-06-08 to be valid from 2015-07-01, autumn semester 2015.

### General Information

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

*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:

- give an account of the basic concepts and definitions that are listed under the contents of the course;
- illustrate and interpret important concepts in the course in concrete situations;
- express different geometric concepts in three-dimensional space by means of algebra;
- derive relevant algebraic relationships and formulae.

## Competence and skills

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

- use the theories, methods and techniques covered in the course to solve mathematical problems;
- present mathematical arguments;
- summarise in writing or orally a course section 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

Analytic geometry in two and three dimensions: vectors, bases and coordinates, linear dependence, equations of lines and planes, inner product, quadratic curves, calculation of distances and angles, vector and volume product, calculation of area and volume.

Systems of linear equations: Gauss elimination, solvability. Matrices and determinants. Introduction to linear spaces and linear transformations.

## Course design

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

A project is included in the course requirements. The project concerns theoretical aspects and applications of the course content but can also have a didactic specialisation. The project, that may consist of a number of smaller written assignments, aims also at providing the students with training in mathematical communication in speech and writing.

## Assessment

The examination consists of the following parts:

- written and oral presentation of the project (1.5 credits)
- written examination (6 credits)

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 and the written 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 Mathematics 1 alpha (MAT131 or MATA11), Mathematics 1 beta (MAT132 or MATA12), or with Algebra 1 (MATA15).

## Subcourses in MATA22, Mathematics: Linear Algebra 1

Applies from H15

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