UNIVERSITY OF SKÖVDE

TRANSLATION FROM SWEDISH

COURSE SYLLABUS

Linear Algebra

7.5 credits

Course code: MA04XG
Version number: 1
Valid from: 1 July 2027
Ratified by: Curriculum Committee for Engineering Science
Date of ratification: 12 November 2026

1. General information about the course

The course is provided by the University of Skövde and is named Linear Algebra (Linjär algebra). It comprises 7.5 credits and is a first-cycle course. The level of progression is GXX.

The course is a part of the subject of Mathematics. The disciplinary domain of the course is Natural Sciences.

2. Entry requirements

General entry requirements.
Additional requirements: Physics 2, Mathematics 3c or Mathematics D
Or:
Physics level 2, Mathematics Further level 1c (or the equivalent).

3. Course content

This course provides basic skills to be able to apply linear algebra in the formulation and analysis of linear models in different areas. Initially, the course deals with geometric vectors and component vectors including the properties of vectors and vectors as abstract concepts. Thereafter, matrices and their properties, matrix algebra, determinant of a matrix, matrix multiplication as linear mapping, and matrices for linear maps in different bases are treated. Furthermore, linear combinations, linear dependence/independence, vector spaces, bases, coordinates and base swaps are treated. In connection with this, Gram–Schmidt's algorithm for orthogonalization is introduced. The course also covers eigenvalues, eigenvectors and diagonalization. In addition, the formulation of systems of equations such as matrix equations, different solution methods and solution structures for linear systems of equations, as well as the least squares method is included.

4. Objectives

After completion of the course, the student shall be able to:

- describe vectors geometrically, in coordinates with respect to a base and as abstract concepts,
- formulate and solve linear systems of equations, and geometrically interpret solutions to such systems,
- use matrix arithmetic, link matrix arithmetic to linear maps, perform elementary matrix operations and solve matrix equations,
- describe and use the concepts of base and coordinate systems and formulate matrices for linear maps with respect to different bases,
- calculate determinants, eigenvalues and eigenvectors, perform diagonalization and apply this in selected contexts,
- formulate linear models mathematically and analyze the models using methods from linear algebra in the field of the course,
- describe and perform calculations within the area of the course,
- understand and correctly use logical reasoning and mathematical terminology in the area of the course.

5. Examination

The course is graded 5 (Excellent), 4 (Good), 3 (Satisfactory) or U (Fail).

The examinations of the course consist of the following modes of assessment:

- **On-campus supervised written examination**
  5 credits, grades: 5/4/3/U (determines the final grade)
- **Written assignments**
  2.5 credits, grades: G/U

Students with a permanent disability who have been approved for directed educational support may be offered adapted modes of assessment.

6. Types of instruction and language of instruction

The teaching is comprised of lectures and exercises.

The teaching is conducted in English.

7. Course literature and other educational materials

Poole, D. (2025). *Linear Algebra: A Modern Introduction, Cengage International Edition* (5th ed.). Cengare Learning. ISBN 9798214405896.

8. Student influence

Student influence in the course is ensured by means of course evaluation. The students are informed about the results of the evaluation and potential measures that have been taken or are planned, based on the course evaluation.

9. Additional information

Further information about the course, as well as national and local governing documents for higher education, is available on the website of the University of Skövde.