



Faculty of Health, Science and Technology
Mathematics

Syllabus

Linear Algebra

Course Code:	MAGA04
Course Title:	Linear Algebra <i>Linjär algebra</i>
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
MAA (Mathematics)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2018-08-27, and is valid from the Spring semester 2019 at Karlstad University.

Prerequisites

Attended courses Foundation course in Mathematics, 7.5 ECTS credits, Fundamental concepts and proofs in Mathematics, 6 ECTS credits and Calculus and Geometry, 7.5 ECTS credits, or equivalent.

Learning Outcomes

Upon completion of the course, students should be able to:

- give an account of and apply basic concepts in linear algebra such as vector spaces, subspaces, linear independence, bases, dimension, linear transformations, isomorphism, inner product,
- determine bases for vector spaces and matrices of linear transformations, and determine how these are related with change of bases,
- determine eigenvalues and eigenvectors, and diagonalize matrices,
- determine orthogonal projections and apply the least-squares method, as well as use the Gram-Schmidt's method,
- perform orthonormal transformations on quadratic forms to analyze and classify curves in the plane and surfaces in space,
- formulate basic definitions and theorems covered in the course,
- prove a pre-specified selection of the most important theorems in the course,
- demonstrate understanding of the subject by combining new concepts, theorems and problem solving skills, and by identifying analogies and making generalizations.

Content

- Vector spaces, subspaces, bases, coordinate systems, dimension, change of bases,
- Linear transformations between vector spaces and matrix representation of linear transformations,
- Inner product, orthogonality, Gram-Schmidt's orthogonalization, least square method, inner product spaces,

- Eigenvalues and eigenvectors, diagonalization,
- Spectral theorem for symmetric matrices, quadratic forms.

Reading List

See separate document.

Examination

Assessment is in the form of a written exam. The number of examination opportunities for earning a Pass grade is limited to three per academic year.

Grades

One of the grades U (Fail), G (Pass), or VG (Distinction) is awarded in the examination of the course. Engineering students are awarded a grade on the scale U (Fail), 3 (Pass), 4 (Pass with Some Distinction), or 5 (Pass with Distinction).

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.