

Linear Algebra

Programme course

8 credits

Linjär algebra

TATA31

Valid from: 2017 Spring semester

Determined by
Board of Studies for Industrial
Engineering and Logistics

Date determined
2017-01-25

Main field of study

Mathematics, Applied Mathematics

Course level

First cycle

Advancement level

G1X

Course offered for

- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Foundation course in Mathematics or equivalent

Intended learning outcomes

To give the basic mathematical knowledge about vectors and matrices which is required for future studies in analysis, numerical analysis, mathematical statistics, economics, cryptography, control theory, optimization, etc. After this course students will be able to handle the linear algebra which is used in other courses in the programme. To pass this course students will need to

- solve systems of linear equations and understand the structure of the solutions
- work with scalar and vector products of geometric vectors
- carry out calculations with matrices and determinants
- understand the concept of vector space, and calculate with vectors and coordinates
- understand the concept of linear transformations, find its matrix and calculate kernel and range
- determine and work with orthonormal bases in Euclidean spaces, apply the 'least-squares' method and use these to calculate the orthogonal projection on a subspace
- determine eigenvectors and eigenvalues, and interpret them geometrically
- understand and apply the principle axes theorem
- understand and use quadratic forms in geometric applications
- work through simple applications to linear differential equations and difference equations

Course content

Systems of linear equations. Geometric vectors, straight lines and planes in three dimensions. Scalar and vector products. Matrices and determinants. General vector spaces and Euclidean spaces. Linear transformations. Eigenvalues and eigenvectors, diagonalisation of matrices, linear transformations, quadratic forms. Conic curves and quadratic surfaces. Elementary applications to linear differential equations and difference equations

Teaching and working methods

Teaching is done through lectures and problem classes.

Examination

TEN1	Written examination	8 credits	U, 3, 4, 5
KTR1	Written test	0 credits	U, G

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Matematiska institutionen

Director of Studies or equivalent

Jesper Thorén

Examiner

Ulf Janfalk

Education components

Preliminary scheduled hours: 110 h

Recommended self-study hours: 103 h

Course literature

Janfalk, U: Linjär algebra

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.