Linear Algebra with Geometry

Programme course

6 credits

Linjär algebra med geometri

TATA67

Valid from: 2017 Spring semester

Determined by
Board of Studies for Mechanical Engineering and Design

Date determined
2017-01-25

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G1X

Course offered for
- Design and Product Development, M Sc in Engineering
- Energy - Environment - Management, M Sc in Engineering
- Mechanical Engineering, 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
Lycée mathematics and physics (natural sciences or technical programmes).

Intended learning outcomes
To give the basic knowledge of linear algebra that is needed in other courses. After the course the student should be able to:

- use coordinates, bases, scalar products, and vector products.
- work with lines, planes and calculate distances.
- solve systems of linear equations.
- use vectors in R^n and matrices.
- use the least squares method.
- compute determinants and use determinants to investigate existence and uniqueness of solutions to quadratic systems of linear equations and existence of inverse of a matrix.
- determine the matrix of a linear transformation.
- use change of basis in order to solve problems.
- compute eigenvalues and eigenvectors, and describe eigenvalues and eigenvectors of a geometrical linear transformation.
- cite the spectral theorem.
- use diagonalisation to solve problems including systems of differential equations, recursive sequences, quadratic forms or powers of matrices.
- perform calculations and verify that the results are correct.

Course content
Linear systems of equations. Geometrical vectors, straight lines and planes. Matrices. Linear spaces. Euclidean spaces. Determinants. Linear mappings. Eigenvalues and eigenvectors. Symmetric mappings. Quadratic forms. Systems of differential equations.

Teaching and working methods
Teaching is done through lectures and problem classes.
The course runs over the entire autumn semester.

Examination

KTR1	Optional written test	0 credits	U, G
TEN1	Written examination	6 credits	U, 3, 4, 5

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

Department
Matematiska institutionen

Director of Studies or equivalent
Jesper Thorén

Examiner
Jan Åslund

Course website and other links
http://www.mai.liu.se/und/kurser/index-amne-tm.html

Education components
Preliminary scheduled hours: 90 h
Recommended self-study hours: 70 h

Course literature
Linjär algebra med geometri, andra upplagan av L Andersson m fl

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://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.