Linear Algebra

Programme course

8 credits

Linjär algebra

TATA24

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G1N

Course offered for
- Biomedical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Physics and Nanoscience, Bachelor's Programme
- Mathematics, Bachelor's Programme
- Computer Science and Software Engineering, M Sc in Engineering
- Computer Science and Engineering, M Sc in Engineering
- Information Technology, 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
Admisson to the course requires , as well as general university requirements, secondary school mathematics (or equivalent).

Intended learning outcomes

To give a unified framework for geometrical and algebraic techniques, with applications in analysis, mechanics, numerical analysis, mathematical statistics, control theory, linear optimisation and other subjects. After completing the course the students will be able to read and understand the linear algebra which is used in other courses within the programme and the linear algebra which can be found in technical articles. In order to handle this it is necessary to be able to

- solve systems of linear equations and know of the structure of the set of solutions
- work with inner product and vector product for geometrical vectors
- perform calculations with matrices and determinants
- describe the concept of a vector space and perform calculations with vectors and coordinates
- describe the concept of a linear mapping, determine the matrix of a linear mapping and calculate the null space and the range
- project orthogonally on subspaces and use the method of least squares
- use a change of basis in order to solve problems
- formulate the spectral theorem and use it in order to solve systems of differential equations and systems of difference equations

Course content

Linear systems of equations. Geometrical vectors, straight lines and planes. Matrices. Vector 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	Written test	0 credits	U, G
TEN1	Written examination	8 credits	U, 3, 4, 5

Grades

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

Other information

Supplementary courses: Linear Algebra, honours course, Functional Analysis, Numerical Linear Algebra

Department
Matematiska institutionen

Director of Studies or equivalent
Jesper Thorén

Examiner
Göran Bergqvist (FyN,Mat,Y,Yi, MED) och Tomas Sjödin (D,U,IT)

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

Education components
Preliminary scheduled hours: 108 h
Recommended self-study hours: 105 h

Course literature

Additional literature

Books
Janfalk, U, *Linjär algebra*

Compendia

Other
Exempelsamling i 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://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.