

Matrix Analysis

Matrisanalys
6 credits

Programme course

TATB10

Valid from:

Determined by	Main field of study	
	Mathematics, Applied Mathematics	
Date determined	Course level	Progressive specialisation
	Second cycle	A1F
Revised by	Disciplinary domain	
Revision date	Subject group	
Offered first time	Offered for the last time	
VT2026		
Department	Replaced by	
Matematiska institutionen		

Course offered for

- Master of Science in Engineering Mathematics
- Master of Science in Applied Physics and Electrical Engineering - International
- Master of Science in Applied Physics and Electrical Engineering
- Master's Programme in Mathematics

Prerequisites

Linear Algebra, Honours Course or similar

Intended learning outcomes

After completing the course the student should be able to communicate, apply, model, analyze and solve problems by using the concepts and methods described in the course content.

Course content

Properties of matrix rank. Block matrices and Schur complement. Special matrices: Toeplitz, circulant, Vandermonde, Hankel, and Hessenberg matrices. Companion matrices. Real and complex canonical forms. Vector and matrix norms.

Eigenvalues: location, inequalities, perturbations, variational characterization.

Singular values: inequalities, variational characterization, low rank approximation for unitarily invariant norms.

Functions of matrices, power series. Matrix products: Kronecker, Hadamard and Khatri-Rao products. Linear and nonlinear matrix equations. Matrices of functions, matrix calculus and differentiation.

Multilinear algebra: rank, decomposition and approximation of tensors.

Teaching and working methods

Lectures and seminars with student presentations

Examination

UPG1 Assignments and projects 6 credits U, 3, 4, 5

UPG1 also includes oral and written presentations

Grades

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