Matrix Analysis, 8.0 credits

Matrisanalys, 8.0 hp

Third-cycle education course

6FMAI14

Dept of Mathematics

Valid from: First half-year 2023

Approved by
Head of Department

Approved

Registration number

Entry requirements

Linear Algebra, honours course (TATA53) or equivalent (the following topics should be familiar: complex vector spaces, the spectral theorem for Hermitian and normal operators, the singular value decomposition, the Jordan normal form).

Contents

- Special matrices: Toeplitz, circulant, Vandermonde, Hankel, and Hessenberg matrices.
- Block matrices: inversion formulas, Schur complement.
- Real and complex canonical forms.
- Vector and matrix norms.
- Eigenvalues: location, inequalities, perturbations, Rayleigh quotients, variational characterization. Hadamard´s inequality.
- Singular values: inequalities, variational characterization, Schatten and Ky Fan norms.
- Total least squares. Quadratic minimization with linear constraints.
- Matrix products: Kronecker, Hadamard and Khatri-Rao products.
- Matrix equations. Stable matrices.
- Functions of matrices.
- Matrices of functions, matrix calculus and differentiation.
- Multilinear algebra, tensor product, decomposition and approximation of tensors.

Educational methods

Lectures.

Examination

Hand-in assigments and oral presentations.

Grading

Two-grade scale

Course literature

Horn and Johnson: *Matrix Analysis* (recommended), lecture notes.