EQ2820 Matrix Algebra, Accelerated Program 7.5 credits

Matrisalgebra, forskarförberedande

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

The official course syllabus is valid from the autumn semester 2022 in accordance with Head of School decision: J-2021-1812.Decision date: 14/10/2021

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Knowledge in linear algebra, 7.5 higher education credits, equivalent to completed course SF1624.

Knowledge in mathematical analysis, 15 higher education credits, equivalent to completed courses SF1625 and SF1626.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student should be able to

- use and explain some basic tools (be specified by the course content) in matrix algebra
- identify scientific problems where tools from matrix algebra can be powerful
- apply the matrix algebra knowledge to solve and analyse the identified problems

For higher grades, the student should also be able to

- combine several partial problems and solutions to solve and analyse more complex problems.

Course contents

Main contents:

1. Repetition of vector spaces, inner product, determinant, rank
2. Eigenvalues, eigenvectors and characteristic polynomials
3. Unitary equivalence, QR-factorisation
4. Canonical forms, Jordan form, polynomials and matrices
5. Hermitian and symmetric matrices, variational characterisation of eigenvalues, simultaneous diagonalisation
6. Norms for vectors and matrices
7. Localisation and disturbance of eigenvalues
8. Positive definite matrices. Singular value decomposition
9. Nonnegative matrices, positive matrices, stochastic matrices
10. Stable matrices; Liapunov's theorem
11. Matrix equations, Kronecker product and Hadamard product
12. Matrices and functions, square roots, differentiation

Examination

- TEN1 - Examination, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH’s coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Examination is carried out as weekly submissions of assignments. If assignments have not been solved in a satisfactory way, a written examination is carried out.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.