Study programme(s): Mathematics (M3)

Level: bachelor

Course title: Numerical Methods of Linear Algebra 1 (M3-24)

Lecturer: Ljiljana D. Cvetković

Status: obligatory

ECTS: 8

Requirements: none

Learning objectives

Mastering the basic matrix factorizations and some special classes of matrices as a basis for understanding and creating algorithms in numerical linear algebra.

Learning outcomes

Students will be able to independently solve problems based on various matrix factorizations, and to independently create simple eigenvalue localization areas for a given matrix.

Syllabus

Theoretical instruction

Vector norms. Matrix norms. Matrices with a special structure. Factorization using eigenvalues. Localization of eigenvalues. Geršgorin-type theorems. Cholesky factorization. Factorization using singular values. Projectors. QR factorization. Conditional number. Stability.

Practical instruction

Vector norms. Matrix norms. Matrices with a special structure. Factorization using eigenvalues. Localization of eigenvalues. Geršgorin-type theorems. Cholesky factorization. Factorization using singular values. Projectors. QR factorization. Conditional number. Stability.

Literature

1. Lloyd N. Trefethen and David Bau, III: Numerical Linear Algebra, SIAM, 1997.
2. Roger A. Horn and Charles R. Johnson: Matrix Analysis, Cambridge University Press, 1999.
3. Richard S. Varga: Geršgorin and his Circles, Springer, 2004.
4. Ljiljana Cvetković: NuMeLa, SC:ALA, 2012.

Weekly teaching load				Other: 0
Lectures: 3	Exercises: 4	Other forms of teaching: 0	Student research: 0	

Teaching methodology

Lectures, revision of the material, active student participation in problem solving, knowledge tests - colloquia.

Grading (maximum number of points 100)

Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	50	written exam	50