Study program: Artificial intelligence

Name of the subject: Numerical Linear Algebra 1

Teacher(s): Nataša Krklec Jerinkić

Status of the subject: elective

Number of ECTS credits: 6

Conditions: none

Subject goal

Mastering basic algorithms of numerical linear algebra for large linear systems and thier implementation in MATLAB.

Outcome of the subject

Students will be able to use successfully algorithms of numerical linear algebra built-in in MATLAB, to independently solve problems in the field of applied linear algebra and to construct advanced numerical tehcniques for large linear systems and matrix equations.

Subject content

Theory

Basis of iterative methods for solving systems of linear equations. Sparse matrix methods for large linear systems. Classical iterative methods and their paralelization. Projective methods and their paralelization. Solving the problem of least squares. Numerical algorithms for matrix equations (Lyapunov, Riccati). Implementation of algorithms in MATLAB.

Practical learning

Use of built-in functions in MATLAB for solution of large sparse linear systems and matrix equations arising in applications (dynamical systems, control theory, signal processing, network theory). Implementation of advanced numerical algorithms in MATLAB.

Literature

1. Lloyd N. Trefethen and David Bau, III: Numerical Linear Algebra, SIAM, 1997.
2. James W. Demmel: Applied Numerical Linear Algebra, SIAM, 1997.
3. Yousef Saad: Iterative Methods for Sparse Linear Systems, Second Edition SIAM, 2003.

Number of active teaching classes	**Theoretical teaching: 2**	**Practical teaching: 3**

Method of carrying out the teaching

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

Evaluation of knowledge (maximum number of points 100)

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