**Study program:Artificial Intelligence**

**Name of the subject: Numerical Linear Algebra 2**

**Teacher(s): Nataša Krejić, 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 eigenvalue problems and their implementation in MATLAB.

**Outcome of the subject**

Students will be able to use successfully algorithms of numerical linear algebra for eigenvalue computations built-in in MATLAB, to independently solve problems in the field of applied linear algebra and to construct advanced numerical techniques for large eigenvalue and singular value problems

**Subject content**

*Theory*

Basis of iterative methods for solving eigenvalue and singular value problems. Krylov subspace methods for sparse matrices and their parallelization. Preconditioning. Non-standard eigenvalue techniques. Non-normal matrices and pseudospectral computations. Implementation of algorithms in MATLAB.

*Practical learning*

Use of built-in functions in MATLAB for solution of large eigenvalue and singular value problems 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: Numerical Methods for Large Eigenvalue Problems, Revised Edition (Classics in Applied Mathematics), SIAM, 2011.

| **Number of active teaching classes** | **Theoretical teaching: 2** | **Practical teaching: 3** |
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**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 |
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| Colloquia | 50 | Written exam | 50 |