Course Unit Descriptor

Study Programme: Applied Mathematics – Data Science			
Course Unit Title: Numerical Linear Algebra 1			
Course Unit Code: MDS03			
Name of Lecturer(s): Vladimir R. Kostić			
Type and Level of Studies: Master studies			
Course Status (compulsory/elective): Compulsory			
Semester (winter/summer): Winter			
Language of instruction: English			
Mode of course unit delivery (face-to-face/distance learning): Face-to-face			
Number of ECTS Allocated: 6			
Prerequisites: none			
Course Aims: Mastering basic algorithms of numerical linear algebra for large linear systems and thier implementation in MATLAB.			
Learning Outcomes: 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.			
Syllabus: *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. *Practice* 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.			
Required Reading: 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.			
Weekly Contact Hours:	**Lectures: 2**	**Practical work: 3**	
Teaching Methods: Lectures, revisions of the material, active student participation in problem solving, knowledge tests - colloquia.			
Knowledge Assessment (maximum of 100 points): 100			
Pre-exam obligations	points	**Final exam**	points

Active class participation		written exam	50
Practical work		oral exam	
Preliminary exam(s)	50	Course project	
Seminar(s)			
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			