<table>
<tr><td>COURSE NAME</td><td colspan="5">Numerical linear algebra</td></tr>
<tr><td>Code</td><td>PMM210</td><td>Year of study</td><td colspan="3">2nd year of graduate study</td></tr>
<tr><td>Course teacher</td><td>Jurica Perić</td><td>Credits (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td></tr>
<tr><td>30</td><td></td><td>30</td></tr>
<tr><td>Status of the course</td><td>ELECTIVE COURSE</td><td>Percentage of application of e-learning</td><td colspan="3">40%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Introducing methods of numerical linear algebra that are commonly used in scientific and technical applications, the ability to assess the accuracy of the method, the ability to make own algorithms and the use of existing programming libraries.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Successfully completed courses „Linearna algebra“, „Foundation of mathematical analysis“.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">The student is able to:
- operate with basic theorems in the theory of optimal approximation (approximation from a given set, the existence, uniqueness)
- reproduce basic matrix norms and their properties
- analyze differences in solving system of linear equations, solve system of linear equations using Gaussian algorithm (LU factorization, LU factorization with pivoting) and Cholesky algorithm
- examine the numerical properties if operations in the algorithm are performed on the computer in the final precision arithmetic
- explain and use SVD decomposition
- Analyze orthogonal diagonalization of a matrix
- explain Householders factorization and its advantages</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">The fundamental ideas of linear algebra: basic algorithms on matrices, vector and matrix norms. – 2 hours
Computer arithmetic. – 2 hours
Systems of linear equations: Gauss algorithm, Cholesky algorithm, accuracy and improvement of accuracy. – 4 hours
Iterative methods. – 2 hours
Least squares problem (LS) and QR decomposition. – 4 hours
Eigenvalue problem for symmetric matrices: QR method, Jacobi method. – 4 hours
Gram-Schmidt orthogonalization, Householder factorization. – 4 hours
Singular Value Decomposition (SVD), fast updating of SVD decomposition (updating and downdating). – 4 hours
Latent Semantic Indexing (LSI) and the application of SVD decomposition for constructing Web browser. – 4 hours</td></tr>
<tr><td>Format of instruction</td><td colspan="5">Lectures, exercises.</td></tr>
<tr><td>Student responsibilities</td><td colspan="5">Attendance at 70% of lectures and 70% of exercises.</td></tr>
<tr><td>Screening student</td><td colspan="5">Attendance – 1 ECTS</td></tr>
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work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Colloquium – 1.5 ECTS Written exam – 1 ECTS Oral exam – 1.5 ECTS
Grading and evaluating student work in class and at the final exam	The exam is taken in written and oral form. Written exam is preliminary part of the exam and requirement for the oral exam is to pass a written exam. The written form of the exam can be taken partially, during class, where curriculum provided. Activity in class, solving homework, colloquium, written and oral examination are the elements from which form the final grade is formed.
Required literature (available in the library and via other media)	G. H. Golub i C. F. Van Loan: Matrix Computations, 3rd Edition, John Hopkins Univers Maryland, 1996. E. Anderson i drugi: LAPACK Users' Guide, 2nd Edition, SIAM, Philadelphia 1995. M. W. Berry, Z. Drmač, E. R. Jessup: Matrices, Vector Spaces and Information Retriev (1999) 335-362. J. W. Demmel, Applied numerical linear algebra, SIAM, 1997.
Optional literature (at the time of submission of study programme proposal)	G. W. Stewart, Afternotes on Numerical Analysis, SIAM, Philadelphia, 1996. G. W. Stewart, Afternotes on Numerical Analysis: Afternotes Goes to Graduate School, SIAM, Philadelphia, 1998.
Quality assurance methods that ensure the acquisition of exit competences	Statistics of test results and student evaluation via anonymous questionnaires at the end of the course. The survey is conducted according to the rules of the University of Split.
Other (as the proposer wishes to add)	