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| **1. Course title:** Applied Linear Algebra | | | | |
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| **2. Code:** | | **3. Type (lecture, practice etc.):** lecture + seminar | | |
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| **4. Contact hours:** 2+2 hoursper week | | **5. Number of credits (ECTS):** 4 | | |
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| 6. Preliminary conditions (max. 3): | | | | |
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| **7. Announced:** fall semester, spring semester, both | | | | |
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| **8. Limit for participants:** 150 | | | | |
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| **10. Responsible teacher (faculty, institute and department):**  Dr. Mátyás Koniorczyk (Faculty of Science, Institute of Mathematics and Informatics, Department of Applied Mathematics) | | | | |
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| 11. Teacher(s) and percentage: | | Dr. Mátyás KONIORCZYK | | 60 % |
| András BODOR | | 20 % |
| Péter BERKICS | | 20 % |
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| **12. Language:** English | | | | |
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| 13. Course objectives and/or learning outcomes:  Objectives: The aim of the course is to obtain the necessary knowledge and the ability to use certain mathematical techniques for those students who use linear algebra because of the nature of their curriculum or their interests.  Learning outcomes: students completing the course will  *have a knowledge* on the prevalently used methods of linear algebra, on its terminology. They obtain sufficient *knowledge* to study subjects requiring an elementary understanding of linear algebra and the ability to use it.  They will be *able* to use methods of linear algebra in solving certain problems.  They will be *open* to follow a mathematical approach to problems and *intend* to deepen their mathematical knowledge and extend their problem solvig abilities.  They will be *able* *in a stand-alone way* to recognize the applicability of methods of linear algebra in solving certain problems and solve them using the learned techniques. | | | | |
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| 14. Course outline   1. Complex vector spaces 2. Bases and coordinates in general vector spaces 3. Norms, Euclidean spaces. Orthogonal complements. Cauchy-Schwartz inequality 4. Parity of permutations, the Levi-Cività symbol and its properties 5. The determinant and its properties 6. Cross product of vectors. Calculations with indices. 7. Matrices of linear operators, similar matrices 8. Eigenvalues and eigenvectors of Hermitian matrices 9. Spectral resolution and analytical functions of Hermitian operators 10. Conic sections 11. Singular value decomposition and its applications 12. Selected applications 13. Selected applications | | | | |
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| **15. Mid-semester works**  Problem solving tests on the 6th and 13th week. | | | | |
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| **16. Course requirements and grading**  Written tests involve problems considered in the practical course. They are graded on a five-point scale. Mark 1 (failed) tests have to be repeated.  There is an oral colloquium at the end of the course. Its prerequisite is a non-failed grade of both written tests. The final mark is calculated as a weighted average of the grades of the two tests and the colloquium, with 25%-25%-50% weights, respectively, which can be still improved on the colloquium.  The mark is 1 (insufficient), if either of the tests finally conclude in grade 1 or the colloquium itself concludes with a mark of 1 (insufficient). | | | | |
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| 17. List of readings   1. Bernard Kolman and David Hill: Elementary Linear Algebra with Applications, 9th ed., Pearson 2007. | | | | |
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| 18. Recommended texts, further readings   1. Philip N. Klein: Coding the Matrix: Linear Algebra through Applications to Computer Science, Newtonian Press 2013. 2. K. F. Riley, M. P. Hobson, S. J. Bence: Mathematical Methods for Physics and Engineering: A Comprehensive Guide, Cambridge University Press; 3rd. ed. (2006) | | | | |
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| **Date** | 13 April, 2017 | **Prepared by** |  | |
| Dr. Mátyás KONIORCZYK  responsible teacher | |
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| **Endorsed by** | | |  | |
| XXX program supervisor | |