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| **1. Course title:** Elementary 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 familiarize students whose curriculum involves higher mathematics with the basic concepts and methods of linear algebra.  Learning outcomes: students completing the course will  *have a knowledge* on the basics of linear algebra and its terminology.  They will be *able* to use elementary methods of linear algebra in solving certain simple problems.  They will be *open* to follow simpler mathematical approaches to problems and *intend* to improve their problem solvig abilities.  They will be *able* *in a stand-alone way* to recognize the applicability of basic methods of linear algebra in solving simple problems and solve them using the learned techniques. | | | | |
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| 14. Course outline   1. Systems of linear equations, their types and applications. The concept of a matrix. 2. Operations of matrices, their properties and applications. 3. Using indices. The Kronecker-delta symbol. Special matrices. 4. Elementary row and column operations. Echelon forms, reduced echelon forms, matrix equivalence. Gaussian elimination, Gauss-Jordan reduction. 5. Elementary matrices. Inverse of a matrix. Equivalence of matrces. 6. Determinants: their evaluation and applications. 7. Real vector spaces. Inner product spaces. 8. Linear independence. Basis, dimension, orthonormal bases. 9. Gram-Schmidt orthogonalization. Linear subspaces. Rank and nullity of a matrix. 10. Linear operators and their matrices on orthonormal bases. 11. The spectrum and eigensubspaces of orthogonal matrices 12. Applications 13. 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 | |