|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. Course title: Elementary Linear Algebra | | | | |
|  | | | | |
| 2. Code: | | 3. Type (lecture, practice etc.): lecture + seminar | | |
|  | | | | |
| 4. Contact hours: 2+2 hoursper week | | 5. Number of credits (ECTS): 4 | | |
|  | | | | |
| 6. Preliminary conditions (max. 3): | | | | |
|  | | | | |
| 7. Announced:fall semester, spring semester, both | | | | |
|  | | | | |
| 8. Limit for participants: 150 | | | | |
|  | | | | |
| 10. Responsible teacher (faculty, institute and department):  Dr. Mátyás Koniorczyk (Faculty of Science, Institute of Mathematics and Informatics, Department of Applied Mathematics) | | | | |
|  | | | | |
| 11. Teacher(s) and percentage: | | Dr. Mátyás KONIORCZYK | | 60 % |
| András BODOR | | 20 % |
| Péter BERKICS | | 20 % |
|  | |  |
|  | |  |
|  | | | | |
| 12. Language:English | | | | |
|  | | | | |
| 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. | | | | |
|  | | | | |
| 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 | | | | |
|  | | | | |
| 15. Mid-semester works  Problem solving tests on the 6th and 13th week. | | | | |
|  | | | | |
| 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). | | | | |
|  | | | | |
| 17. List of readings   1. Bernard Kolman and David Hill: Elementary Linear Algebra with Applications, 9th ed., Pearson 2007. | | | | |
|  | | | | |
| 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) | | | | |
|  | | | | |
| **Date** | 13 April, 2017 | **Prepared by** |  | |
| Dr. Mátyás KONIORCZYK  responsible teacher | |
|  | | | | |
| **Endorsed by** | | |  | |
| XXX program supervisor | |