Syllabus

Term: 2024/25/2 **Subject name:** Applied Linear Algebra **Subject code:** KEMNA0302

Unit (Unit code)	(KEMIA)
Lecturer responsible for the course:	Dr. LUCSKAI Gábor
Requirement:	Exam
Classes per week :	2/2/0
Classes per term:	0/0/0

Purpose of education:

Contents:

Week 1: Vectors in two and dimensional spaces. Norm, length, distance, opreations. Statistical expressions with vectors.

Week 2: Matrices: addition, multiplication (4 different methods) and their properties. Application: pictures, physics etc.

Week 3: Determinant: definion and properties. Adjoint. Sarrus-rules. Laplace expansion theorem with one and more rows or columns. Applications: geometry, Cramer-rule.

Week 4: Inverse. Shermann-Morrison-Woodburry theorem.

Week 5: Block matrices. Operations. Applications: graphs, multiplication with big matrices.

Week 6: Eigenvalues, eigenvectors. LE Verrier Sooriau algorithm.

Week 7-10: Power of matrices. Applications: linear recursions, power of incidence matrices.

Week 11-12: Gram-Schmidt ortogonalization. LU and QR decomposition. Fourier-series.

Week 13: Further applications.

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System of examing and valuation:

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).

Bibliography:

Henry Ricardo: A modern introduction to the linear algebra, Chapman \& Hill, 2019.

1. Bernard Kolman and David Hill: Elementary Linear Algebra with Applications, 9th ed., Pearson 2007.

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)

Bibliography: