Syllabus

Term:	2023/24/1	**Subject name:**	Elementary linear algebra	**Subject code:**	PTIA0301

Unit (Unit code)	(MATINFO)
Lecturer responsible for the course:	Dr. FRIGYIK Béla András
Requirement:	Exam
Classes per week :	2/2/0
Classes per term:	0/0/0

Purpose of education:

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 *ablein 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.

Contents:

Week	Topics
1.	The concept of a matrix. Operations of matrices, their properties and applications. Using indices. Example for special matrices.

Term: 2023/24/1 **Subject name:** Elementary linear algebra **Subject code:** PTIA0301

Contents:

2. Elementary row and column operations. Linear equation systems. Echelon forms, reduced echelon forms, matrix equivalence. Gaussian elimination, Gauss-Jordan reduction.

3. Determinants: their evaluation and applications.

4. Elementary matrices. Inverse of a matrix. Equivalence of matrices.

5. Real vector spaces. Examples. Subspaces. Linear independence, Span.

6. Rank of a matrix. Kronecker-Capelli theorems. Applications 1.

7. Basis, dimension. Orthonormal basis. Change of a basis. Isomorphism of vector spaces.

8. Linear operators. Rank and nullity of a matrix. Properties of linear operators.

9. Linear operators and their matrices on orthonormal bases.

10 Inner product spaces. Gram-Schmidt orthogonalization. Orthogonal complement.

11. Eigenvalues and eigenvectors. Characteristic polynomials.

12. Diagonalization of symmetric matrices

Term: 2023/24/1 **Subject name:** Elementary linear algebra **Subject code:** PTIA0301

Contents:

System of examing and valuation:

Seminar: **You have to write two tests.** *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. The two tests contains only numerical exercises. The minimum requirement is 40% from both tests.*

Grades: 0-40% (1), 41%- 55% (2), 56%- 70% (3), 71%-85% (4), 86%-100% (5)

There is an written colloquium at the end of the course. Its prerequisite is a non-failed grade of both written tests.

Colloquium

You have to register to the exam on Neptun! There is an written colloquium at the end of the course. Its prerequisite is a non-fialed grade of both written tests.

The final mark is calculated as a weighted average of the grades of two tests

Term: 2023/24/1 **Subject name:** Elementary linear algebra **Subject code:** PTIA0301

System of examing and valuation:

and the colloquium with 25%-25%-50% weights respectively.
After retake tests you have a grade 1 also then the signature is refused and you cannot write the colloquium!

The mark is 1 if the final test is 1 (insufficient).

Grades: 0-40% (1), 41%- 55% (2), 56%- 70% (3), 71%-85% (4), 86%-100% (5)

Bibliography:

1. Bernard Kolman and David Hill: Elementary Linear Algebra with Applications, 9th ed., Pearson 2007.
2. Henry Ricardo: A Modern Introduction to Linear Algebra, Taylor & Francis Group, LLC, 2010

Bibliography:

1.