

M018	Obligatory - Semester 2	Linear Algebra I	L+P+S 2+3+0	ECTS 7
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Course objectives. Adoption of basic concepts and methods of linear algebra, mastering manipulation with basic examples of vector spaces and operations with matrices.

Course prerequisites. *Geometry of Plane and Space.*

Syllabus.

1. Vector spaces: Concept of vector spaces. Linear dependence and linear independence. Spanning sets. Basis and dimension. Subspace. Sum of subspaces. Direct sum and complement. Quotient spaces.
2. Matrices: Operations with matrices. Invertible matrices. Determinant. Elementary transformation. Adjugate matrix. Rank.
3. Systems of linear equation: *Solvability and structure of the set of solutions.* Kronecker-Capelli theorem. Homogeneous systems. Particular solution. Gaussian elimination. Cramer's rule.

Expected learning outcomes.

After completing the course, students are expected to:

- describe the structure and give examples of vector space;
- explain the concepts of linear dependence and independence;
- solve the task of determining the base and / or the dimension of vector space;
- use matrix calculus;
- check the regularity of square matrix;
- describe the necessary and sufficient conditions for solvability of the system of linear equations;
- identify and apply different ways of solving linear systems;
- implement mathematical proof of soundness of procedures and formulas which are used in this course.

Teaching methods and student assessment. Lectures and exercises are obligatory. The exam consists of a written and an oral part and it is taken after the completion of lectures. During the semester, students can take three mid-term exams (quizzes) that replace the written exam.

Can the course be taught in English: Yes.

Basic literature:

1. D. Bakić, Linearna algebra, Školska knjiga, Zagreb, 2008.

Recommended literature :

1. S. Kurepa, Uvod u linearnu algebru, Školska knjiga, Zagreb, 1987.
2. S. Kurepa, Konačno dimenzionalni vektorski prostori i primjene, Liber, Zagreb, 1992.
3. N. Bakić, A. Milas, Zbirka zadataka iz linearne algebre, PMF-Matematički odjel Sveučilišta u Zagrebu, 1995.
4. L. Čaklović, Zbirka zadataka iz linearne algebre, Školska knjiga, 1992.
5. K. Horvatić, Linearna algebra, Golden marketing, Tehnička knjiga, Zagreb, 2004.
6. G. Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press, 2009.
7. J. Hefferon, Linear Algebra, <http://joshua.smcvt.edu/linearalgebra/>
8. S. Axler, Linear Algebra Done Right, Springer, 2009.
9. C. Meyer, Matrix Analysis and Applied Linear Algebra, SIAM, 2001.
10. N. Elezović, A. Aglič, Linearna algebra: zbirka zadataka, Element, Zagreb, 1999.
11. V. Proskurjakov, Problems in linear algebra, Mir, Moskva, 1978.