Study programme: Mathematics(M3)

Level: bachelor

Course title: Linear Algebra

Lecturer: Ivica V. Bosnjak

Status: obligatory

ECTS: 8

Requirements: none

Learning objectives

Introducing the basic ideas and techniques of linear algebra for use in other lecture courses.

Learning outcomes

Students will be able to understand the basic principles and ideas of linear algebra and the role and importance of linear algebra in the system of mathematical disciplines. Students will be able to apply the basic techniques of linear algebra in a selection of applications.

Syllabus

Theoretical instruction

Vector spaces. Basis and dimension. Inner product. Orthogonality and Gramm-Schmidt process. Linear transformations. Matrices. Matrix of a linear transformation. Rank of a matrix. Regular matrices. Cayley-Hamilton theorem. Smith canonical matrix. Similar matrices. Minimal polynomial of a matrix. Eigenvalues and eigenvectors. Diagonalization of a matrix. Canonical forms of similarity. Jordan canonical form. Quadratic forms. Matrix congruence.

Practical instruction

Linear dependence and independence. Basis of a subspace. Sum and intersection of subspaces. Orthogonality. Gramm-Schmidt process. Matrix algebra. Matrix of a linear transformation. Rank of a matrix. Inverse of a matrix. Applications of Cayley –Hamilton theorem. Smith canonical matrix. Minimal polynomial. Eigenvalues and eigenvectors. Diagonalization of a matrix. Companion matrix. Elementary divisors. Canonical forms of similarity. Quadratic forms. Positive definite and semi-definite matrices.

Literature

1. Z Stojakovic, I. Bošnjak, *Elementi linearne algebre,* Symbol, Novi Sad, 2010.

5. Z. Stojakovic, I. Bošnjak, *Zadaci iz linearne algebre,* PMF Novi Sad, Symbol, Novi Sad, 2005.

Weekly teaching load

Lectures: 4	Exercises: 3	Other forms of teaching: 0	Student research: 0	Other: 0

Teaching methodology

Lectures are conducted using classical teaching methods and supported by beamer presentations. Exercises are used to practise and analyse typical problems and their solutions. The ability of application of theoretical knowledge is checked through independent solving of exercises on one or two colloquia. The final exam is oral and students are expected to demonstrate general understanding of the presented theoretical material.

Grading (maximum number of points 100)

Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	50	Oral exam	50