Study Program: Mathematics

Type and level of studies: Bachelor studies, IV semester

Course name: Numerical analysis

Lecturer: Petković S. Dojčin

Status: Elective

ECTS: 8

Attendance Prerequisites: none

Course aims

Learning the basic methods of numerical analysis for solving the problems in linear algebra.

Course outcome

The student has acquired the basic knowledge of the numerical methods of linear algebra and is able to solve real problems independently with the use of appropriate software.

Course content

Theoretical part

Approximate numbers and errors. Recursive calculations. Differential equations. Two-term and three-term recurrent relations. Continued fractions. Asymptotic development. General theory of iterative processes. Banach's position on the fixed point. Iterative processes for solving equations. General methods for accelerating the convergence of iterative processes. Nonlinear equations and systems: Newton's method. Interval halving method. Construction of higher order methods. Newton-Kantorovic method for systems of nonlinear equations. Gradient methods. Solving algebraic equations. Bernoulli's method. Numerical methods in linear algebra. Vector and matrix norms. Convergence of matrix arrays and rows. Direct methods for solving systems of linear equations. Gaussian method. Iterative processes in linear algebra. Formation of iterative processes. Simple iteration method and Gauss-Saidel method. Characteristic-value problems. Methods for determining a characteristic polynomial. Jacobi's method. Interpolation of functions. Chebyshev systems. Lagrange interpolation. Error estimate. Calculation of finite differences. Newton's interpolation formulas. Central difference interpolation formulas. Hermit's interpolation. Numerical differentiation and introduction to numerical integration. Interpolation type quadrature formulas. Newton-Cotes formulas. Generalized quadrature formulas.

Practical part: Practice

The problems solved are in accordance with the theoretical in terms of content.

Literature

1. Градимир Миловановић," *Нумеричка анализа 1,2,3",* Научна књига, Београд 1986.
1. Љ. Петковић, С. Тричковић, П. Рајковић, *збирка задатака из нумричке математике*, Универзитет у Нишу, Машински факултет, 1997

Number of active classes				Other classes
Lectures: 3	Practical classes: 3	Other forms of teaching:	Students' research work	

Teaching methods

Lectures, solving problems with and without computers. Laboratory practice and term tests.

Assessment (maximum 100 points)

Course assignments	**points**	Final exam	**points**
activity during lectures	**10**	written exam	**30**
practical classes	-	oral exam	**30**
term test(s)	**30 (15+15)**	.....	
seminar(s)			
Total	**40**		**60**