Study programmes: Bachelor studies – Mathematics

Course name: M4.09 – Numerical Analysis 1B

Lecturers: Zorica Dražić

Status: Compulsory

ECTS: 5

Attendance prerequisites: -

Course aims: Acquisition of general and specific knowledge of numerical analysis

Course outcome: At the end of the course, a student will have a basic knowledge of numerical analysis. Further, student will be able to solve real problems by implementing adequate numerical methods in computer program and using the existing software packages.

Course content:

Function interpolation.
Introduction to function interpolation. The best arrangement of nodes for interpolation. Chebyshev polynomials. Convergence analysis of an interpolation process. Interpolation of multivariate functions.

Numerical differentiation and integration.
Introduction to numerical differentiation and integration Numerical methods for improper integrals. Romberg method**.** Richardson extrapolation method. The convergence of a quadrature process. Optimization of the quadrature formulas. Euler–Maclaurin quadrature formula. Monte-Carlo method.

Function approximation.
The general problem of the approximation of functions. Best uniform approximation in normed linear spaces. Approximation by generalized polynomials in the space of continuous functions. Haar theorem. Chebyshev theorem. Algebraic polynomials of best uniform approximation. Trigonometric polynomials of best uniform approximation. Weierstrass theorem. Function approximation in Hilbert spaces. Orthonormal systems. Fourier series. Least square approximation.

N**umerical methods for solving algebraic and transcendental equations and systems of equations.**
Introduction to algebraic and transcendental equations. Numerical methods for solving algebraic equations. Newton method for solving algebraic and transcendental equations. Modifications of Newton method. The method of iteration for solving systems of algebraic and transcendental equations Modifications of the method of iteration. Gradient methods.

Literature:
A. Zolić, *Numerička matematika I,* Beograd 2008.
D. Radunović, *Numeričke metode,* Beograd 2003.

Number of hours: 4	**Lectures: 2**	**Exercises: 2**	**Laboratory: -**	**Research: -**

Teaching and learning methods: Frontal

Assessment (maximal 100 points)

Course assignments	**points**	**Final exam**	**points**
Lectures	-	Written exam	30
Exercises / Tutorials	-	Oral exam	40
Colloquia	-	Written-oral exam	
Essay / Project	30		