Study programmes: Bachelor studies – Mathematics

Course name: 4.13 – Numerical Analysis 2A

Lecturers: Sandra Živanović, Zorica Stanimirović, Milan Dražić

Status: Compulsory

ECTS: 5

Attendance prerequisites: none

Course aims: Acquiring general and specific knowledge of numerical methods for solving differential and integral equations.

Course outcome: Upon completion of the course, the student has basic knowledge in numerical methods for solving differential and integral equations. He is trained to solve problems from practice using numerical software packages.

Course content:

CAUCHY PROBLEM FOR ORDINARY DIFFERENTIAL EQUATIONS

Analytical methods: series expansion, Cauchy-Picard method, Newton-Kantorivich method, Chaplygin method. Euler method. Modifications of Euler's method. Runge-Kutta methods. Multistep methods: Adams and Milne methods. Runge's error estimate. Automatic step selection.

BOUNDARY PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS

Transforming to Cauchy problem. Variational and projection methods. Finite difference method. The concept of difference scheme. Approximation and convergence. Solving the difference scheme. Higher accuracy schemes. Richardson extrapolation. Sturm-Liouville problem. Finite element method.

INTEGRAL EQUATIONS

Fredholm integral equations of first and second kind. Volterra integral equations of first and second kind. Analytical methods: Successive approximatiions method, Degenerate kernel method. Projection methods: Ritz-Galerkin method, Least squares method, Collocation method. Disctretization methods. Regularization methods.

Literature:

B. Jovanović, D. Radunović, *Numerička analiza,* Matematički fakultet, Beograd, 2003.

Number of hours: 4	**Lectures**: 2	**Tutorials**: 2

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	30	Written-oral exam	-
Essay / Project	-		