Study Program: Mathematics
Type and level of studies: Bachelor studies, VII semester
Course name: **Numerical methods**
Lecturer: Dojčin S. Petković
Status: Elective
ECTS: 7
Attendance Prerequisites: none

Course aims

Mastering the concepts and methods for approximating functions as well as the basic methods of numerical analyses to solve differential equations, partial differential equations and integral equations.

Course outcome

The students have gained basic knowledge of numerical methods for solving differential equations, partial differential equations and integral equations and are able to independently solve real problems using appropriate software.

Course content

Theoretical part

The concept of a best approximation. Best Approximations with algebraic and trigonometric polynomials in various metrics. Approximate solution of ordinary differential equations, linear multi-step methods: Euler's method. General linear multi-step method. Convergence. Selection of starting values. Error analysis. Numerical stability. Predictor-corrector methods. Applications.

Runge-Kutta methods: Classical Runge-Kutta methods. Numerical stability. Applications for solving systems of differential equations and higher order differential equations.

Approximate solution of integral equations: Linear integral equations. Methods of successive approximations. Iterated kernel methods. Resolvent. Application of quadrature formulas.

Practical part: Exercises, Examples are processed in accordance with theoretical classes.

Web 2.0 e-learning tools. Course Management Systems. Moodle.

Literature

1. Градимир Миловановић," *Нумеричка анализа 3".* Научна књига, Београд 1986G.Mastroianni,

2. G.V. Milovanović: *Interpolation Processes – Basic Theory and Applications,* Springer Verlag, Berlin – Heidelberg – New York, 2008.

3. Љ. Петковић, С. Тричковић, П. Рајковић, *збирка задатака из нумричке математике*, Универзитет у Нишу, Машински факултет, 1997

Number of active classes	Lectures: **2**		Practical classes: **2**	

Teaching methods

Frontal, group, interactive.

Assessment (maximum 100 points)				
Course assignments	**points**		Final exam	**points**
activity during lectures	10		written exam	**20**
practical classes	-			30
term test(s)	40 (20+20)			
seminar(s)				
Total	**50**			50