Study programmes: Bachelor studies – Informatics

Course name: M106 – Introduction to Numerical Mathematics

Lecturers: Aleksandra Delić, Milan Dražić, Zorica Dražić, Aleksandar Savić, Zoran Stanić, Zorica Stanimirović, Sandra Živanović

Status: Compulsory

ECTS: 5

Attendance prerequisites: No

Course aims: Acquiring of general and specific knowledge of the theory of interpolation, numerical methods for solving linear algebra problems, and solving nonlinear equations or systems.

Course outcome: Upon completion of the course the student knows how to determine the approximate value of the interpolation function. Using the polynomial interpolation he is able to determine the approximate derivative of any order of a function in a given point and to approximately compute the integral of a given function. In all cases, the student can assess the reliability of the results obtained by estimating the error. Next, the student is able to solve the four main problems of linear algebra in a real-time computation stable methods. Finally, he can determine the solution of nonlinear equations or systems with the desired accuracy. The application of the theory exposed students realize through practical exercises on the computer using the software package MatLAB.

Course content:

- About numerical mathematics and its role in mathematical modelling.
- Notion of error (of a model, method or an aproximated number).
- Errors of approximated numbers or functions.
- Direct methods for solving systems of linear equations.
- Iterative methods for solving systems of linear equations.
- Methods for solving nonlinear equations.
- Polynomial interpolation (Lagrange, Newton and Hermite polynomial).
- Spline interpolation.
- Numerical derivation.
- Numerical intgration.
- Mean square approximation and the method of minimal squares.
- Fourier analysis.
- Discrete Fourier transformation.
- Fast Fourier transformation.
- Solving of simple models by applicatin of given methods and use of MatLAB.

Literature:

1. D. Radunović, Numeričke metode, Akademska misao, Beograd, 2004.
2. D. Radunović, A. Samardžić, F. Marić, Numeričke metode – zbirka zadataka kroz C, Matlab i Fortran, Akademska misao, Beograd, 2005.
3. F. B. Hildebrand, Introduction to Numerical Analysis (second edition), Dover Publications, New York, 2013.
4. A. Delić, Z. Dražić, S. Živanović, M. Ivanović, Zbirka rešenih zadataka iz uvoda u numeričku matematiku, Matematički fakultet, Beograd, 2017.

Number of hours: 5	**Lecures: 2**	**Tutorials: 2**	**Laboratory: 1**	**Research: -**

Teaching and learning methods: Lectures and Exercises

Assessment (maximal 100 points)

Course assignments	**points**	**Final exam**	**points**
Lectures	5	Written exam	-
Exercises / Tutorials	5	Oral exam	-
Colloquia	30	Written-oral exam	60
Essay / Project	-		