Study programme(s): Applied Mathematics (MAP)

Course title: NUMERICAL ANALYSIS 1 (P402)

Lecturer(s): Nataša Krklec Jerinkić

Course status: compulsory

ECTS points: 6

Requirements: Introduction to Analysis

Learning Objectives

The goal of this course is to introduce students to fundamental concepts of numerical analysis, such as approximation methods and error analysis. The focus will be on one-dimensional cases (functions of one single variable, onefold integrals, etc.)

Learning Outcomes

Students will gain the ability to form, analyze and implement basic numerical analysis concepts such as function interpolation, numerical differentiation and integration, as well as numerical equation solving.

Syllabus

Theoretical instructions

The introductory part of the course starts with the introduction of basic notions in error analysis. It is followed by topics on function approximation including polynomial interpolation and spline interpolation with a short review of data fitting as an alternative to interpolation. Further topics involve the elementary and general differential quotients for the approximation of the derivatives, methods for the approximation of the integral with an emphasis on "primitive" and Newton-Cotes quadrature rules. The numerical solution of (nonlinear) equations will be accessed through basic iterative procedures: through the fixed-point procedure and through Newton's procedure and its modifications. At the end of the course, topics related to initial value problems and their numerical solutions will be presented. The focus will be on one-step methods for ODEs.

Practical instructions

Practical teaching involves working with students to facilitate their understanding of the material and its applications. Special emphasis will be on applications of the theoretical results and on the implementation of the numerical procedures in adequate programming languages such as Matlab and Python.

Literature

1. D. Herceg, N. Krejić, **Numerička analiza**, Univerzitet u Novom Sadu, Stilos, 1997.

Number of active classes	**Lectures: 2**	**Exercises: 3**

Teaching methods

Classical teaching methods (demonstration of lecture materials on the blackboard), discussions on the topic of exposition, interactive practical teaching with emphasis on implementation.

Grading (maximum number of points 100)

Pre-exam obligations	Points	**Final exam**	Points
colloquia	**50**	oral exam	**50**