Study programme(s): Applied Mathematics (MAP)

Course title: NUMERICAL METHODS AND OPTIMIZATION (P504)

Lecturer(s): Sanja Rapajić, Nataša Krklec Jerinkić

Course status: compulsory on modules: Mathematics of Finance, Data Analytics and Statistics

ECTS points: 5

Requirements: Linear Algebra, Multidimensional Analysis

Learning Objectives

The goal of this course is to introduce students to fundamental concepts of numerical optimization so that they may gain insight into basic methods for solving optimization problems.

Learning Outcomes

After this course, students will acquire skills in basic methods of numerical optimization. Additionally, they will gain insight into the classification of optimization problems and to making an adequate choice and implementation method for their solution.

Syllabus

Theoretical instructions

Theoretical instructions will cover optimization problems with and without constrains, optimality conditions and basic methods for solving both linear and nonlinear optimization problems. A special emphasis will be placed on linear programming problems, convex problems, least square problems, and classification problems. The gradient method and Newton-type methods will be studied. Discrete optimization.

Practical instructions

Practical teaching will include the application of the theoretical results and the implementation of the numerical procedures in adequate programming languages such as Matlab and Python.

Literature

1. Friedlander, N. Krejić, N. Krklec Jerinkić, **Lectures on Fundamentals of Numerical Optimization**, 2019.
2. Nenad Teofanov, Milica Žigić, **Osnovi optimizacije**, PMF, NS, 2018.
3. Stephen Boyd, Lieven Vandenberghe, **Convex Optimization,** Cambridge University Press, 2004.
4. Jorge Nocedal, Stephen J. Wright, **Numerical Optimization**, Springer, 1999.

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

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**