Course Unit Descriptor

Study Programme: Applied Mathematics

Course Unit Title: Optimization

Course Unit Code: MB38

Name of Lecturer(s): Milica Žigić

Type and Level of Studies: Master Academic Degree

Course Status (compulsory/elective): elective

Semester (winter/summer): winter

Language of instruction: Serbian

Mode of course unit delivery (face-to-face/distance learning): face-to-face

Number of ECTS Allocated: 5

Prerequisites: none

Course Aims:

Introduction to the theoretical foundations and applications of the convex programming and the calculus of variations.

Learning Outcomes:

It is expected that a student learns the theoretical foundations of the convex analysis and the calculus of variations and examples of applications of the theory.
It is desirable that the student adopts the knowledge and becomes able to discover the possible application of the basic tools in optimization.

Syllabus:

Theory

Basic notions, convex sets and cones, topological characteristics of convex sets and cones, separation theorems and the Minkowski-Farkas theorem, the extreme point and the Krein-Milman theorem. Semi-continuous functions and the Weierstrass theorem. Convex functions, saddle points, Lagrange multipliers and basic convex programming theory. Introduction to the calculus of variations, necessary conditions for extremes, the Euler-Lagrange equation with applications and its modification in relation to different types of boundary conditions, problems of the calculus of variations with different types of constraints and applications.

Practice

Classical problems of determining extremes with comments, projections, necessary and sufficient conditions for the convexity, problems with conditional extremes. Various exercises and examples of the calculus of variations.

Required Reading:

1. N. Teofanov, M. Žigić: Osnovi optimizacije, PMF, Novi Sad, 2018

Weekly Contact Hours: 4	**Lectures:** 2	**Practical work:** 2

Teaching Methods:

Lectures: exposition of theoretical basics with comments
and students group work: introduction to applications of accepted theory through exercises

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Preliminary exam(s)	50	oral exam	50