Study programme(s): Mathematics (M3)

Level: bachelor

Course title: Optimization

Lecturer: Nenad M. Teofanov

Status: elective

ECTS: 6

Requirements: Analysis 1

Learning objectives

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

Learning outcomes

It is expected that a student learns theoretical foundations of convex analysis and variational calculus and examples of applications of the theory. Students should obtain knowledge and become capable of doing research in possible applications of the basic tools in optimization.

Syllabus

Theoretical instruction

Basic notions, Hilbert space structure, convex sets and cones. Separation theorems, extreme points and the Krein-Milman theorem. Convex functions, saddle points, Lagrange multipliers. Introduction to variational calculus, necessary conditions for extremes, the Euler-Lagrange equation, problems with constraints.

Practical instruction

Classical problems of finding extremes with comments, projections, necessary and sufficient conditions for convexity, problems with conditional extremes. Different exercises and examples in variational calculus.

Literature

1. Nenad Teofanov, Ljiljana Gajić, Predavanja iz optimizacije, Departman za matematiku i informatiku, PMF, Novi Sad, 2006.

Weekly teaching load				Other:
Lectures: 2	Exercises: 3	Other forms of teaching:	Student research:	

Teaching methodology

Presentation of the theoretical basics with comments.

Introduction to applications of the accepted theory through exercises.

Grading (maximum number of points 100)			
Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	60	Oral exam	40