ERASMUS+

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Incoming student mobility

UNIOS University Unit: SCHOOL OF APPLIED MATHEMATICS AND INFORMATICS

COURSES OFFERED IN FOREIGN LANGUAGE
FOR ERASMUS+ INDIVIDUAL INCOMING STUDENTS

Department or Chair within the UNIOS Unit	School of Applied Mathematics and Informatics

Study program	Graduate university study programme in mathematics (Master level) Branches: • Financial Mathematics and Statistics • Mathematics and Computer Science

Study level	Graduate (master)

Course title	Linear optimization
Course code (if any)	M128
Language of instruction	English
Brief course description	Syllabus. 1. Introductory part: Definition of linear programming problem. Examples of linear programming problems. By parts linear convex function. Graphic solution of two-dimensional linear programming problem. 2. Linear programming geometry: Polyhedron and convex sets. Extreme points, vertices and basic feasible solution. Polyhedron in standard form. Degeneration. Extreme point existence and optimality 3. Simplex method: Optimality condition. Derivation and implementation of the simplex method. Bland's rule. Determining the initial basic solution. Complexity analysis of the simplex method. 4. Dual problem: Dual problem. Theorems of weak and strong duality. Farkas' lemma and linear inequalities. Theorems and separation. Dual simplex method. 5. Sensitivity analysis: Local sensitivity analysis. Global sensitivity analysis. Interpretation. 6. Ellipsoidal method: Geometric meaning and complexity. 7. Network Flow Problems: Definitions, Formulation of Network

	Flow Problems and Properties. The law of conservation of flow. Equivalent problems: transport problem, join problem, various variants of network flow problems. Simplex algorithm for network flow problem: trees and basic permissible solutions, base change, simplex method for capacity problems. 8. Maximum flow problem: Definitions, formulation of maximum flow problem, properties, Ford-Fulkerson algorithm, magnifying path search, graph cut, Max-flow min-cut theorem. 9. Problems of integer programming (backpack problem, packing, partitioning, coverage, merchant passenger problem, scheduling problems, etc.) Modeling techniques. Strong formulation of the problem. Modeling with exponentially many conditions.
Form of teaching	
Form of assessment	Lectures and exercises are obligatory. The exam consists of a written and an oral part. Upon completion of the course, students can take the exam. Successful midterm exam scores replace the written exam.
Number of ECTS	8
Class hours per week	3+2+1
Minimum number of students	
Period of realization	Winter semester
Lecturer	Ivana Kuzmanović Ivičić