

Incoming student mobility

UNIOS University Unit: DEPARTMENT OF MATHEMATICS

COURSES OFFERED IN FOREIGN LANGUAGE
FOR ERASMUS+ INDIVIDUAL INCOMING STUDENTS

Department or Chair within the UNIOS Unit	Department of Mathematics
Study program	Graduate university study programme in mathematics (Master level) Branches: <ul style="list-style-type: none"> • Financial Mathematics and Statistics-elective • Mathematics and Computer Science-obligatory
Study level	Graduate (master)
Course title	Linear optimization
Course code (if any)	M128
Language of instruction	English
Brief course description	<p>Syllabus.</p> <ol style="list-style-type: none"> 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.

	<p>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.</p> <p>8. Maximum flow problem: Definitions, formulation of maximum flow problem, properties, Ford-Fulkerson algorithm, magnifying path search, graph cut, Max-flow min-cut theorem.</p> <p>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.</p>
Form of teaching	Consultative 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