

Faculty of Mechanical Engineering / ROAD TRAFFIC / OPERATIONAL RESEARCHES

Course:	OPERATIONAL RESEARCHES			
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
4084	Mandatory	5	6	3+2+0
Programs	ROAD TRAFFIC			
Prerequisites	No prerequisites			
Aims	Application of methods and techniques of operational research in the decision-making process with the aim of finding optimal results for preparing and making management decisions.			
Learning outcomes	After passing this exam, the student will be able to: Recognize the possibilities of applying methods i Operational Research technique Apply the methods and techniques of Operational Research to a specific problem and in order to find optimal solutions to the problem Analyzes and interprets possible solutions of a particular problem			
Lecturer / Teaching assistant	Prof. dr Jelena Šaković Jovanović Prof. dr Aleksandar Vujović Mr Marko Lučić			
Methodology	Lectures, exercises			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	History of Linear Programming. The general form of the LP task. Basic characteristics of the LP model. The standard maximization problem. Possible applications of the LP model. General solution of the LP model. Determination optimal solution of the LP task - graphic method			
I week exercises	History of Linear Programming. The general form of the LP task. Basic characteristics of the LP model. The standard maximization problem. Possible applications of the LP model. General solution of the LP model. Determination optimal solution of the LP task - graphic method			
II week lectures	Determining the optimal solution of the LP task - simplex method. Criteria for changing the vector base			
II week exercises	Determining the optimal solution of the LP task - simplex method. Criteria for changing the vector base			
III week lectures	Mixed maxima problem. Standard and mixed minima problem			
III week exercises	Mixed maxima problem. Standard and mixed minima problem			
IV week lectures	Dual problem - formulation and solution of a dual problem. Duality theorems			
IV week exercises	Dual problem - formulation and solution of a dual problem. Duality theorems			
V week lectures	Simplex table-general form. The procedure for calculating the optimal solution of the task LP Simplex table - example .			
V week exercises	Simplex table-general form. The procedure for calculating the optimal solution of the task LP Simplex table - example .			
VI week lectures	Special cases of the LP task			
VI week exercises	Special cases of the LP task			
VII week lectures	Postoptimal analysis. Change in vector C. Change in vector B.			
VII week exercises	Postoptimal analysis. Change in vector C. Change in vector B.			
VIII week lectures	Preparation for the I test			
VIII week exercises	I test			
IX week lectures	Transport problem, general form and basic theorems. Determination of the initial basic solution. Methods optimization of the transport problem.			
IX week exercises	Transport problem, general form and basic theorems. Determination of the initial basic solution. Methods optimization of the transport problem.			
X week lectures	Open transport problem. Assignment problem			
X week exercises	Open transport problem. Assignment problem			
XI week lectures	Simulation. Monte Carlo method.			
XI week exercises	Simulation. Monte Carlo method.			

XII week lectures	Mass serving systems.					
XII week exercises	Mass serving systems.					
XIII week lectures	Combinatorial optimization. Transport problems on the network. Graphs and networks. Determination of the shortest times					
XIII week exercises	Combinatorial optimization. Transport problems on the network. Graphs and networks. Determination of the shortest times					
XIV week lectures	Minimal spanning tree. The problem of the Chinese postman.					
XIV week exercises	Minimal spanning tree. The problem of the Chinese postman.					
XV week lectures	The traveling salesmans problem. Vehicle routing problem. Preparation for the final exam.					
XV week exercises	The traveling salesmans problem. Vehicle routing problem. Preparation for the final exam.					
Student workload						
Per week			Per semester			
6 credits x 40/30=8 hours and 0 minuts 3 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises 3 hour(s) i 0 minuts of independent work, including consultations			Classes and final exam: 8 hour(s) i 0 minuts x 16 =128 hour(s) i 0 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 8 hour(s) i 0 minuts x 2 =16 hour(s) i 0 minuts Total workload for the subject: 6 x 30=180 hour(s) Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) 36 hour(s) i 0 minuts Workload structure: 128 hour(s) i 0 minuts (cources), 16 hour(s) i 0 minuts (preparation), 36 hour(s) i 0 minuts (additional work)			
Student obligations			Regular attendance of classes (lectures and exercises)			
Consultations			Tuesday and Thursday 10-12h			
Literature			Rakočević S., Backović M. « Operaciona istraživanja», Ekonomski fakultet, Podgorica, 2003 Rakočević S.»Operaciona istraživanja-zbirka zadataka», Ekonomski fakultet, Podgorica, 1996 Levin R., Rubin D., «Quantitative Approaches to Management», Mc Graw Hill, 1989 Cvetičanin D.,»Operaciona istraživanja» Ekonomski fakultet, Beograd, 1992 Vukadinović S.,»Transportni zadatak LP», Naučna knjiga, Beograd, 1992			
Examination methods			Test and exam with 50 points each (tasks and theory)			
Special remarks						
Comment						
Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points