COURSE DESCRIPTION CARD

<table>
<tr><td colspan="5" align="center">Bialystok University of Technology
Faculty of Engineering Management</td></tr>
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Field of study	Management		Degree level and programme type	first degree/ second degree
Specialisation/ diploma path	-		**Study profile**	-
Course name	Optimization for transport planning		**Course code**	IS-FM-00098W
			Course type	elective

Forms and number of hours of educational activities	L	C	LC	P	SW	FW	S	Semester	winter
		30						**No. of ECTS credits**	4

Entry requirements	MS Excel
Course objectives	Knowledge: The student has knowledge of planning, design and organization of transport systems and optimization transport processes. Skills: Has practical skills in planning, evaluating and improving various transport systems, including optimizing travel routes. Uses methods to optimize routes. Social competences: Demonstrates the ability to identify and resolve problems that arise in the work of a transport planner.
Course content	Mathematical models of transport problems. A transportation problem (North West Corner method, Least cost method), the issue of allocation (allocation of means of transport), minimization of empty runs and methods of solving them using computer applications. Multicriteria decision problems and methods of solving them (SAW, TOPSIS, AHP), with practical examples of application in planning and organizing transport. Application of graph theory in transport planning problems - methods of optimization the network flows by searching for: the shortest paths in the graph (dynamic programming methods, Dijkstra's algorithm, Danzing's algorithm, minimum spannig tree),the maximum flow in the network, the solution of problem of flow in a network with minimal cost, the solution of the traveling salesman problem.
Teaching methods	information lecture, problem lecture, subject exercises
Assessment method	Test, points for the tasks

Symbol of learning outcome	Learning outcomes	Reference to the learning outcomes for the field of study
	Knowledge: the graduate knows and understands	
LO1	the theory of transport systems, modeling and optimization of transport processes	
	Skills: the graduate is able to	

LO2	independently identify and solve the problem of optimal planning of the transport	
LO3	identify the problems of determine routes of the vehicle and indicates ways to solve them	
LO4	determine optimal routes	
Social competence: the graduate is ready to		
LO5	independently identify and solve the problem in the group of students	

Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	Test, points for the tasks	**C**
LO2	Test, points for the tasks	**C**
LO3	Test, points for the tasks	**C**
LO4	Test, points for the tasks	**C**
LO5	Test, points for the tasks	**C**

Student workload (in hours)		**No. of hours**
Calculation	participation in the classes	**30**
	participation in the student-teacher sessions	**10**
	preparation to the exam and presence on it	**20**
	preparation to pass classes	**40**
	TOTAL:	**100**

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	**40**	**1,6**
Student workload – practical activities	**70**	**2,8**

Basic references	1. Ennio Cascetta, Transportation Systems Analysis, Models and Applications, Springer US, 2009. 2. Lóránt Tavasszy, Gerard De Jong, Modelling Freight Transport, Elsevier, 2014. 3. David A. Hensher, Kenneth J. Button (Eds.), Handbook of transport modelling, Emerald, Inc., 2008. 4. Cynthia Barnhart, Gilbert Laporte (Eds.), Handbooks in Operations Research and Management Science. Transportation, Elsevier B.V., 2007.
Supplementary references	1. Peter R. White, Public Transport: Its Planning, Management and Operation, Routledge, 2016. 2. Rodney Tolley, Brian John Turton, Transport Systems, Policy and Planning: A Geographical Approach, Routledge, 2014.

Organisational unit conducting the course	International Department of Logistics and Service Engineering	Date of issuing the programme
Author of the programme	Assoc. Prof. Marta Jarocka, PhD	**15.10.2021**

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar