GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	OPERATIONAL RESEARCH, PG_00061050		
Field of study	BADANIA OPERACYJNE		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Part-time studies (on-line)	Mode of delivery	blended-learning
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Management Engineering and Quality -> Faculty of Management and Economics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jolanta Łopatowska	
	Teachers	dr inż. Jolanta Łopatowska	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	16.0	8.0	0.0	0.0	0.0	24

E-learning hours included: 18.0

eNauczanie source addresses:

Moodle ID: 46241 Badania operacyjne MSU nst. online 2025/26
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=46241

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	24	7.0	69.0	100

Subject objectives

To prepare students to solve complex decision-making problems in organizations through the use of optimization methods and operational research tools, based on knowledge of mathematical modeling, network programming, optimization theory, and principles of result interpretation, as well as shaping attitudes related to responsibility for the quality of analysis and communication of results, in the context of managerial decision-making in an organizational environment.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W06] identifies reliable sources of information relevant to the analyzed issues	knows and understands the principles of constructing and interpreting optimization models and the sources of data supporting managerial decisions, in the context of applying operational research tools in management	[SW1] Ocena wiedzy faktograficznej
[K7_U04] prepares and presents convincing, professional presentations of the results of its activities, with their in-depth interpretation	can apply linear and dynamic optimization methods, network programming, to analyze decision-making problems in an organization.	[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu

<table>
<tr><td>Subject contents</td><td>Lecture
Introduction, definitions, decision situation.
General form of a linear optimization model, interpretation and analysis of the solution.
Linear optimization models application areas.
Integer optimization model
Elements of graph theory.
Planned networks CPM, CPM-Cost, PERT, CCPM methods.
Ford-Fulkerson algorithm.
Elements of dynamic programming.
Elements of nonlinear programming.
Multi-objective models.
Sequential problem.

Exercises
Types of optimization models.
Construction of linear optimization models: assortment selection model, cutting model, technological process optimization model, transportation model, and the allocation of mutually substitutable resources.
Graphical method, simplex algorithm, dual model.
Planned network - CPM, CPM-Cost, PERT methods.
Application of the Ford-Fulkerson algorithm.
Application of dynamic programming to solve selected optimization problems.
Solving sequential problems.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Test</td><td>60.0%</td><td>50.0%</td></tr><tr><td>Exam</td><td>60.0%</td><td>50.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>Zawadzka L.(1996). Metody ilościowe w organizacji i zarządzaniu, cz. I. Gdańsk, Wyd. PG.
Zawadzka L. (1997). Metody ilościowe w organizacji i zarządzaniu cz. II. Gdańsk, Wyd. PG.
Kukuła K (red.). (2020). Badania operacyjne w przykładach i zadaniach. Warszawa, PWN.
Goldratt, E.M. (2023). Łańcuch krytyczny. MINT Books.</td></tr><tr><td>Supplementary literature</td><td>Anholcer M. (2023). Badania operacyjne. Poznań, Wyd. UE w Poznaniu.
Bernardelli M., Decewicz, A.Tomczyk, E. (2022). Ekonometria i badania operacyjne. Warszawa: Wydawnictwo Naukowe PWN.
Gajda, J.B.,Jadczak, R. (2015). Badania operacyjne. Przykłady zastosowań. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.
Gruszczyński M., Kuszewski T. , Podgórska M. (red.) (2017). Ekonometria i badania operacyjne. Warszawa: Wydawnictwo Naukowe PWN</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Critical path analysis using the PERT method
Solving and interpreting linear programming models.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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