GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	OPERATIONAL RESEARCH, PG_00066541		
Field of study	Economic Analytics		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-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	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jolanta Łopatowska	
	Teachers	dr inż. Jolanta Łopatowska Alicja Kukułka	

Lesson types

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

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 6772 Badania operacyjne AG nst. 2026/27
https://enauczanie.pg.edu.pl/2025/course/view.php?id=6772

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	5.0	71.0	100

Subject objectives

preparing students to solve decision-making problems in organizations by applying optimization methods and operations research tools, based on knowledge of mathematical modeling, network programming, optimization theory, and the principles of interpreting results, while fostering responsibility for the quality of analysis and effective communication of findings in the context of managerial decision-making within an organizational environment.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W05] Possesses advanced knowledge of data integration from multiple sources and advanced analytical methods, enabling the analysis of complex economic problems.	knows and understands advanced analytical methods and the need to integrate data from multiple sources in the context of modeling and solving the optimization problems covered in the course.	[SW1] Assessment of factual knowledge
[K6_U05] Designs innovative solutions to challenging problems by applying knowledge from the field of economic analytics, achieving economically and socially valuable outcomes.	can develop solutions to decision-making problems by applying operations research methods to analyze and optimize business processes	[SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Typy modeli optymalizacyjnych
Budowa liniowych modeli optymalizacyjnych - model doboru asortymentu, model rozkroju, model optymalizacji procesu technologicznego, model transportowy, model przydziału wzajemnie zastępowalnych zasobów.
Rozwiązywanie modeli programowania liniowego z wykorzystaniem algorytmów postępowania, metody graficznej, metody simpleks i modelu dualnego. Analiza rozwiązania.
Modele ciągłe i dyskretne.
Zastosowanie metod planowania sieciowego CPM, CPM-COST, PERT, CCPM
Zastosowanie algorytmu Forda-Fulkersona
Zagadnienie kolejnościowe.

Course content – exercises

Types of optimization models
Construction of linear optimization models: product mix model, cutting stock model, technological process optimization model, transportation model, and resource allocation model (for substitutable resources).
Solving linear programming models using algorithmic approaches, the graphical method, the simplex method, and the dual model. Solution analysis.
Continuous and discrete models.
Application of network planning methods: CPM, CPM-COST, PERT, CCPM.
Application of the Ford-Fulkerson algorithm.
Sequencing problems.
Dynamic programming</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>mathematics</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>Problem-solving tasks</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Test comprising open-ended theoretical questions, true/false questions, and problem-solving tasks.</td><td>60.0%</td><td>50.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Bernardelli M., Decewicz, A.Tomczyk, E. (2022). Ekonometria i badania operacyjne. Warszawa: Wydawnictwo Naukowe PWN.
Goldratt, E.M. (2023). Łańcuch krytyczny. MINT Books.
Kukuła, K. (red.). (2016). Badania operacyjne w przykładach i zadaniach, Warszawa: Wydawnictwo Naukowe PWN.
.</td></tr>
<tr><td>Supplementary literature</td><td>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
Sikora, W (red.). (2008). Badania operacyjne. Warszawa: PWE.
Zawadzka, L. (1996). Metody ilościowe w organizacji i zarządzaniu, cz. 1. Gdańsk: Wydawnictwo Politechniki Gdańskiej.
Zawadzka, L. (1997). Metody ilościowe w organizacji i zarządzaniu, cz. 2. Gdańsk: Wydawnictwo Politechniki Gdańskiej.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Application of linear programming to build and solve models of decision situations.
Compare CPA and PERT methods.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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