GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Decision analysis, PG_00045316		
Field of study	Data Engineering, Data Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	English
Semester of study	5	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Informatics In Management -> Faculty of Management and Economics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Nina Rizun	
	Teachers	dr Nina Rizun mgr Jaromir Durkiewicz	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	0.0	60

E-learning hours included: 0.0

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	60	8.0	82.0	150

Subject objectives

The aim of the lecture is to discuss the issues concerning decision analysis and rationale procedures based on the heuristics, descriptive and simulative methods in the context of the applications in management area.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U01] analyzes and evaluates complex processes in the context of their improvement possibilities, using various methods, including analytical and simulation	The student analyzes complex decision problems in organizations using analytical methods and decision models (e.g., decision trees, scenario analysis, simulations) and evaluates alternative courses of action to improve decision-making processes.	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K6_K02] makes competent and ethical decisions to create and maintain economic, social and environmental values	The student makes informed and responsible decisions, considering economic, social, and environmental consequences and applying ethical principles when evaluating and selecting optimal decision alternatives.	[SK2] Assessment of progress of work [SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
[K6_W04] demonstrates creative and entrepreneurial activity in formulating and implementing innovative ideas	The student understands and explains decision-making principles under uncertainty and applies decision analysis methods to generate and evaluate innovative solutions to business and organizational problems	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture
• Decision-making process. Decision making vs problem solving. Models in decision-making process
• Deterministic models LP
• Descrete variables. Sensitivity Analysis
• Compex problems and heuristics solutions
• Complex problems. Evolutionary algorithms
• Non-linear programming
• Risk and Uncertainty
• Decision trees
• Utility theory
• Risk premium and risk aversion
• Multi-criteria decision making

Course content – laboratory
• Decision-making theory: Data preprocessing case
• LP - standard - geometric
• LP problems with SOLVER
• LP - Integer variables
• Binary and mixed variables
• Non-linear problems
• Network problems ctnd. - location determining
• Risk and uncertainty measures
• Decision trees and Exected utility and Risk premium</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>colloquium</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>exam</td><td>50.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Bakke D.: The Decision Maker: Unlock the Potential of Everyone in Your Organization, One Decision at a Time Hardcover. Pear Press, 2013.
2. Fisher, T., & Adams, R. (2018). Problem Solving in Organizations: A Methodological Handbook for Business and Management Students</td></tr>
<tr><td>Supplementary literature</td><td>1. Bakke D.: The Decision Maker: Unlock the Potential of Everyone in Your Organization, One Decision at a Time Hardcover. Pear Press, 2013.
2. Fisher, T., & Adams, R. (2018). Problem Solving in Organizations: A Methodological Handbook for Business and Management Students</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>• - Choose the correct statement regarding the Allowable range values interpretation in the Sensitivity analysis
• P-class problems can be defined as...
• Linear Programming problems can be put in a general form that consists of...
• Choose the statements that are incorrect for binding constraints...
• Mark all properly defined constraints in the Linear Programming problem
• Choose the statements that are correct to describe NP-hard problems
• Choose conditions under which any local optimal is guaranteed to be a global optimal
• Please give 2 examples of situations when a rational decision is made
• Please provide and explain the main steps of geometric solving of LP
• Please explain the meaning of the problem named P versus NP
• Please give an example of chromosomes encoding in a genetic (evolutionary) algorithm</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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