GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Decision Support - Structures and Algorithms, PG_00038315
Field of study	Automation, Robotics and Control Systems

Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish None
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Department of Intelligent and Decision Support Systems -> Faculty of Electrical and Control Engineering -> Wydziały Politechniki Gdańskiej

Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Robert Piotrowski
	Teachers	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	15.0	0.0	45
	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	45	5.0	25.0	75

Subject objectives	1. To familiarise students with selected forms of decision-making issues. 2. To develop students' skills in formulating and solving single and multi-criteria decision-making issues. 3. For students to master the skills of modelling uncertainty in decision-making issues and considering risks in the decision-making process. 4. To familiarise students with methods of hierarchical solution of decision-making issues.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U10] is able to apply the known mathematical tools and methods and computer techniques to analyse and evaluate automation and robotics components, devices, systems and systems	Solves multi-objective problems with selected methods, e.g. task programming methods.	[SU4] Assessment of ability to use methods and tools
	[K7_K02] can interact and work in a group assuming various roles and identify priorities for the achievement of a specific task	Performs sub-tasks in a group of several people.	[SK3] Assessment of ability to organize work [SK1] Assessment of group work skills
	[K7_W02] has a structured knowledge of the application of information systems to improve the reliability, efficiency, speed and mobility of control and management systems	Defines single and multi-criteria decision-making issues.	[SW3] Assessment of knowledge contained in written work and projects
	[K7_W06] has an extended knowledge of the design of automation components and devices, control and decision support systems control and decision support systems and complex mechatronic systems	Solves single and multi-criteria decision-making problems using selected methods.	[SW3] Assessment of knowledge contained in written work and projects
	[K7_U07] is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems in the field of automation and robotics	Solves multi-attribute problems with selected methods, e.g. AHP method.	[SU4] Assessment of ability to use methods and tools
	[K7_W09] has knowledge of typical security systems in industrial settings, knows methods of identification and design of protection systems in accordance with the methodology of functional security, has knowledge of information security	Models uncertainty in decision-making issues.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	
	1 Introduction. Map of concepts and issues. Computer decision support systems.
	2. Multi-criteria issues - division: multi-attribute and multi-objective issues.
	3. Models and methods for finding solutions to multi-attribute decision problems.
	4. Models and methods for finding solutions to multi-objective decision problems.
	5. Models and methods for finding solutions to decision problems under uncertainty.
	6. Methods for finding solutions to decision problems in hierarchical structures.

Prerequisites and co-requisites	
	None

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	50.0%	30.0%
	Colloquium 2	50.0%	35.0%
	Colloquium 1	50.0%	35.0%

Recommended reading	Basic literature	1.Vincke Ph. (1992). Multicriteria Decision-aid. Wiley.
		2.Sakawa, M. (1993). Fuzzy Sets and Interactive Multiobjective Optimization. Plenum Press.
		3.Bojar W., Rostek K., Knopik L. (2014). Systemy wspomagania decyzji. Polskie Wydawnictwo Ekonomiczne, Warszawa.
		4. Krupa K. (2021). Systemy wspomagania decyzji. Metody badań operacyjnych z zastosowaniem arkusza kalkulacyjnego. Wydawnictwo Naukowe PWN, Warszawa.
	Supplementary literature	1.Ignizio J.P., Cavalier T.A. (1994). Linear Programming. Prentice Hall International.
	eResources addresses	

Example issues/ example questions/ tasks being completed	Demonstrate the steps involved in solving a multi-attribute decision problem using the AHP method.
Work placement	Not applicable

Document generated electronically. Does not require a seal or signature.

Example issues/ example questions/ tasks being completed	Demonstrate the steps involved in solving a multi-attribute decision problem using the AHP method.
Work placement	Not applicable