

## 表 GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

Subject name and code	Optimization Methods, PG_00038273								
Field of study	Automation, Robotics and Control Systems								
Date of commencement of studies	October 2023		Academic year of realisation of subject			2023/2024			
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		Mode of delivery			at the university			
Year of study	1		Language of instruction			Polish			
Semester of study	1		ECTS credits			5.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering								
Name and surname	Subject supervisor		dr hab. Anna Witkowska						
of lecturer (lecturers)	Teachers								
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	30.0	0.0	10.0	10.0		0.0	50	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity Participation ir classes includ plan		I didactic     Participation in consultation hours		Self-study SUM				
	Number of study hours	50		5.0		70.0		125	
Subject objectives	The aim of the course is to familiarise with the methods of optimization and preparation for self problem solving in the field of optimization by using various computer tools.								
Learning outcomes	Course out	tcome	Subject outcome			Method of verification			
	K7_W14		The student knows the analytical and numerical algorithms for solving optimization; able to define the objective function, decision variables, constraints and boundary conditions.			[SW1] Assessment of factual knowledge			
	K7_U07		The student knows and is able to select an appropriate method and algorithm optimization for advanced problems in engineering practice			[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			
	K7_W04		Students gain skills in the formulation of optimization problems, build mathematical models optimized task. Students can evaluate and make correct interpretation of the obtained solutions			[SW1] Assessment of factual knowledge			
	K7_K06		The student knows and is able to select an appropriate method and algorithm to solve the optimization problem for advanced problems in engineering practice			[SK5] Assessment of ability to solve problems that arise in practice			

Subject contents	Optimization basics, repetytory range of degree studies. Dekomposition problems in linear and nonlinear aspects. Problems of discrete programming: integer, binary and mixed. Dekompsition methods for solving linear programming problems. Algorithms for a large array of issues rare. Gradient directions of the improvement in linear programming. Penalty function method. Dynamic Optimization: Continuous Bellman optimality principle, the principle of maximum Pontriagin. NP-problems: Cycles and Hamiltonian path. Seeking solutions to issues multipurpose optimization. Issues multilevel optimization problem. Problems of scheduling processes. Special modern optimization methods.						
Prerequisites and co-requisites	Optimization and support of decision making						
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade				
	practical exercises	60.0%	30.0%				
	project	60.0%	30.0%				
	exam	60.0%	40.0%				
Recommended reading	Basic literature	<ol> <li>A. Stachurski, A. Wierzbicki, Podstawy o Wydawnicza PW, Warszawa 1999.</li> <li>K. Amborski, Podstawy metod optymaliz Politechniki Warszawskiej.</li> <li>M. Brdyś, A. Ruszczyński, Metody optym Wydawnictwa Naukowo-Techniczne, Wz</li> <li>Seidler J., Badach A., Molisz W.: Metody optymalizacji, WNT, Warszawa 1980.</li> <li>Korbut A.: Programowanie dyskretne, PV</li> <li>Arabas G.: Wyklad z algorytmow ewoluc 2003.</li> </ol>					
	Supplementary literature	<ol> <li>W. Findeisen, J. Szymanowski, A. Wierzbicki, Teoria i metody obliczeniowe optymalizacji, Państwowe Wydawnictwo Naukowe, Warszawa 1977.</li> </ol>					
	eResources addresses	Adresy na platformie eNauczanie:					
Example issues/ example questions/ tasks being completed	<ul> <li>Determination of the optimal path of graph</li> <li>Determination of the maximum of unimodal.</li> <li>Decomposition of optimization tasks on the timeline</li> <li>Optimization tasks of objects that may operate in different regimes</li> </ul>						
Work placement	Not applicable						