GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Multi-Objective Optimization Algorithms, PG_00063921		
Field of study	Informatics		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional subject group Specialty 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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Computer Architecture -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Joanna Szłapczyńska	
	Teachers	dr hab. inż. Joanna Szłapczyńska	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	6.0	39.0	75

Subject objectives	Learning modern multi-objective optimization methods and the possibilities of using them to solve real-world problems

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W04] knows and understands, to an increased extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or other elements or programmable devices specific to the field of study, and organization of work of systems using computers or such devices	Knows and is able to use programming platforms that offer access to multi-objective optimization algorithms	[SW1] Assessment of factual knowledge
[K7_W01] knows and understands, to an increased extent, mathematics to the extent necessary to formulate and solve complex issues related to the field of study	Is able to model a given optimization problem, knows the basics of how optimization algorithms work and is able to interpret the results of their operation	[SW1] Assessment of factual knowledge
[K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it	Is able to implement a program in a high-level language that solves a given multi-objective optimization problem	[SU4] Assessment of ability to use methods and tools

Subject contents

1. Introduction to optimization
2. Multi-Criteria Decision Making (MCDM) and Multi-Objective Optimization (MOO)
3. Multi-Objective Optimization model
4. Simplifying the Multi-Objective Optimization
5. AI meta-heuristics used in Multi-Objective Optimization
6. Selected meta-heuristic Multi-Objective Optimization algorithms
7. Programming frameworks and libraries for Multi-Objective Optimization
8. Methods of taking into account the decision-maker's preferences
9. Performance and efficiency testing of Multi-Objective Optimization algorithms

Prerequisites and co-requisites

Knowledge of issues related to operational research, ability to program in C++ and Python

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
laboratory exercises	50.0%	50.0%
passing	50.0%	50.0%

Recommended reading

Basic literature	1. Multiobjective Optimization - Principles and Case Studies, Y. Collette, P. Siarry, Springer, 2003 2. Multi-Objective Optimization Problems Concepts and Self-Adaptive Parameters with Mathematical and Engineering Applications, F. S. Lobato, V. Steffen Jr., Springer, 2017 3. Lecture materials.
Supplementary literature	1. Qi Liu, Xiaofeng Li, Haitao Liu, Zhaoxia Guo, Multi-objective metaheuristics for discrete optimization problems: A review of the state-of-the-art, Applied Soft Computing, Volume 93, 2020, 106382, ISSN 1568-4946, https://doi.org/10.1016/j.asoc.2020.106382.
eResources addresses	Adresy na platformie eNauczanie: 2024/25 Algorytmy optymalizacji wielokryterialnej - Moodle ID: 42110 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42110

Example issues/ example questions/ tasks being completed

Work placement

Not applicable

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