GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Algorithms and Data Structures, PG_00042217						
Field of study	Mathematics						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2022/2023		
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	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Zakład Analizy Nieliniowej -> Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jakub Maksymiuk					
	Teachers	dr inż. Jakub Maksymiuk mgr inż. Tomasz Gzella					

Lesson types and methods of instruction	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	0.0	0.0	60

Subject objectives	Getting familiar with most important algorithms and data structures, and also with basics of analysis of algorithms, including computational complexity.		

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_U10	The student is able to write a program that meets the project requirements and test it.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	K6_W08	The student is able to describe the advantages, disadvantages and limitations of selected algorithms.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	1. Mathematical foundations of analysis of algorithms, including the big-O notation. 2. Design and analysis of algorithms. 3. The "divide and conquer" method and its sample applications. 4. Heapsort, quicksort, sorting in linear time, medians and position statistics. 5. Elementary data structures: lists, queues, heaps, binary search trees. 6. Dynamic programming, greedy algorithms, amortized cost analysis. 7. Selected graph algorithms: DFS and BFS, finding shortest paths.

Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	software programs (lab work)	50.0%	100.0%

Recommended reading	Basic literature	T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein. Introduction to Algorithms, Third Edition. The MIT Press, Cambridge, 2009. ISBN 978-0262033848.
	Supplementary literature	A.V. Aho, J.E. Hopcroft, J.D. Ullman. Data Structures and Algorithms, 1st Edition. Pearson, 1985. ISBN 978-0201000238.
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Determine the order of a given function using the big-O notation, e.g., n^3+3n+2^n.
	Describe a selected sorting algorithm and state its computational complexity.
	Implement the DFS algorithm in a programming language of your choice.
	Determine the computational complexity of an algorithm written in pseudocode.

Work placement	Not applicable