GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Algorithms and data structures, PG_00060216		
Field of study	Technical Physics		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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	3	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Katedra Fizyki Teoretycznej i Informatyki Kwant. -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. arch. Jan Kozicki	
	Teachers	dr hab. inż. arch. Jan Kozicki	

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						
	eNauczanie source addresses: Moodle ID: 46581 Algorytmy i Struktury Danych 2025/2026 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=46581						

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	5.0	60.0	125

Subject objectives	Learning the theoretical knowledge with some practical aspects of algorithms and data structure.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U01] learns independently, obtains information from literature, databases and other properly selected sources	Can study independently, gaining knowledge from literature and using appropriate sources	[SU2] Assessment of ability to analyse information
	[K6_W05] has knowledge of programming methodology and techniques, and the use of selected IT tools in physics and technology	Has basic knowledge of programming methodology and techniques.	[SW1] Assessment of factual knowledge
	[K6_U03] knows programming languages and can use basic software packages	Has the ability to program in the selected language.	[SU1] Assessment of task fulfilment
	[K6_K01] understands the need to learn and improve professional and personal competencies, inspires and organizes other people's learning process	Understands the need for lifelong learning and the need to improve competences.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	1. Growth of functions- asymptotic notation and standard notations and common functions 2. Recurrences- the subsittution method and the iteration method 3. The master method 4. Tables 5. Hash tables- hash functions and open addressing 6. Hash functions and open addressing 7. Heapsort- heaps, maintaining the heap property, building a heap, the heapsort algorith and priority queues 8. Quicsort- description, performance, randomized versions and analysis of quicksort 9. Elementary date structures- stacks and queues and linked lists 10. Trees 11. Binary search trees- what is a binary search tree, quering a binary searcg tree, insertion and deletion 12. Balanced trees 13. String Matching- the naive string-matching algorithm and the rabin-Karp algorithm 14. String matching with finite automata and the Knuth-Morris-Pratt algorithm 15. The Boyer-Moore algorithm
Prerequisites and co-requisites	Taking courses in mathematical analisys, algebra and discrete mathematic.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	56.0%	50.0%
	Written examination	56.0%	50.0%

Recommended reading	Basic literature	T. H. Cormen, Ch. E. Leiserson, R. L. Rivest, Introduction to algorithms, The MIT Press, Cambridge, 1990 K. Goczyła, Struktury danych, Wydawnictwo PG, Gdańsk 2002
	Supplementary literature	D. Harel, rzecz o istocie informatyki, Algorytmika, Wydawnictwo naukowo-Techniczne, Warszawa 2001D. Harel, Y. feldman, Algorithmics. The Spirit of Computing, Addison-Wesley, 2004
	eResources addresses	

Example issues/ example questions/ tasks being completed	What is an asymptotic notation? Standard notation and growth of functions Solving of recurrence equations. Pseudocodes, the rules. Executing chosen sorting algorithms. Building string matching algorithms with finite automata.
Work placement	Not applicable

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