GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Algorithms and data structures, PG_00020768		
Field of study	Technical Physics		
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	English Lecture: English Laboratory: Polish
Semester of study	3	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Theoretical Physics and Quantum Information -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. Andrew Felt	
	Teachers	prof. Andrew Felt 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						

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	15.0	75.0	150

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_K01	Understands the need for lifelong learning and the need to improve competences.	[SK5] Assessment of ability to solve problems that arise in practice
	K6_W05	Has basic knowledge of programming methodology and techniques.	[SW1] Assessment of factual knowledge
	K6_U03	Has the ability to program in the selected language.	[SU1] Assessment of task fulfilment

Subject contents	1. Growth of functions- asymptotic notation and standard notations and common functions 2. Recurrences 3. The master method 4. Stacks, queues, and linked lists 5. Priority queues/heaps 6. Hash tables- hash functions and open addressing 7. Heapsort 8. Quicksort- description, performance, randomized versions and analysis of quicksort 9. Trees 10. Binary search trees- what is a binary search tree, querying a binary search tree, insertion and deletion 11. Balanced trees 12. String Matching- the naive string-matching algorithm and the Rabin-Karp algorithm 13. String matching with finite automata and the Knuth-Morris-Pratt algorithm 14. The Boyer-Moore algorithm
Prerequisites and co-requisites	Taking courses in mathematical analisys, algebra and discrete mathematics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written examinations and participation	56.0%	50.0%
Practical exercise	56.0%	50.0%

Recommended reading	Basic literature	T. H. Cormen, Ch. E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd Ed., The MIT Press, Cambridge, 2009 Pat Morin, Open Data Structures: an Introduction, AU Press, Edmonton, AB, 2013. (open-source text)
	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	Adresy na platformie eNauczanie:

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