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 2020	Academic year of realisation of subject	2021/2022
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	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. dr hab. Józef Sienkiewicz	
	Teachers	dr hab. inż. arch. Jan Kozicki prof. dr hab. Józef Sienkiewicz	

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

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=17703
Adresy na platformie eNauczanie:

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 competencies.	[SK5] Assessment of ability to solve problems that arise in practice
K6_W05	Has a basic understanding of methodology and techniques of writing computer programs.	[SW1] Assessment of factual knowledge
K6_U03	Has the ability programming in a selected language	[SU1] Assessment of task fulfilment

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.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Practical exercise</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Written examination</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>T. H. Cormen, Ch. E. Leiserson, R. L. Rivest, Introduction to algorithms, The MIT Press, Cambridge, 1990
D. Harel, rzecz o istocie informatyki, Algorytmika, Wydawnictwo naukowo-Techniczne, Warszawa 2001
K. Goczyła, Struktury danych, Wydawnictwo PG, Gdańsk 2002
D. Harel, Y. feldman, Algorithmics. The Spirit of Computing, Addison-Wesley, 2004</td></tr>
<tr><td>Supplementary literature</td><td>_</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">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.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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