

Code

Course item:

1. INFORMATION ABOUT THE COURSE**A. Basic information**

Name of course	<i>Algorithms and Data Structures</i>
Study level	<i>First degree</i>
Unit running the study programme	<i>Faculty of Telecommunication, Computer Science and Electrical Engineering</i>
Study programme	<i>Computer science</i>
Speciality	
Name of teacher (s) and his academic degree	<i>Młcisław Śrutek, PhD</i>
Introductory courses	<i>none</i>
Prerequisites	<i>Basic knowledge of computers</i>

B. Semester/week schedule of classes

Semester	Lectures	Classes	Laboratories	Project	Seminars	Field exercises	ECTS
winter or summer			30				2

2. EFFECTS OF EDUCATION (acc. to National Qualifications Framework)

Knowledge	<i>on successful completion of the course student is supposed to describe basic sorting and searching algorithms. Be able to identify an algorithm design paradigm based on recursive subproblems: divide and conquer.</i>
Skills	<i>on successful completion of the course student is supposed to: construct algorithms using basic algorithmic techniques and make analysis of their complexity, to assess the suitability of methods and tools for solving simple engineering problems and select and apply appropriate technologies</i>
Competences	<i>on successful completion of the course student is supposed to be able to act and think creatively</i>

3. TEACHING METHODS

<i>multimedia lecture</i>

4. METHODS OF EXAMINATION

<i>written exam at the end of lecture</i>

5. SCOPE

Lectures	<ul style="list-style-type: none"> - Basic data structures, methods of storing and searching them. - Basic principles of writing and analyzing algorithms - correctness, computational and memory complexity of an algorithm, - Methods of designing efficient algorithms - divide and conquer method, greedy algorithms, dynamic programming, search with recursion and the method of division and limitation. - Sorting - sorting by insertion, selection, exchange, quick sort, complexity of the sorting problem. - Selection - Hoare's algorithm , magic fives algorithm - Search and dictionaries - linear and binary search, binary search trees, balanced search trees, hashing , B-trees - Travelling salesman problem, Euler and Hamiltonian paths, Dijkstra's algorithm.
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	<p>- <i>Graph algorithms - computer representations of graphs, graph search methods and their applications - shortest paths, consistency, biconsistency, strong consistency, topological sorting, path problems, minimal spanning tree, most numerous associations in bipartite graphs.</i></p> <p>- <i>Textual data structures - suffix arrays, suffix trees</i></p>
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6. LITERATURE

Basic literature	<ol style="list-style-type: none"> 1. <i>Aditya Bhargava, Grokking Algorithms: An Illustrated Guide for Programmers and Other Curious People, Manning Publications; Edycja Annotated, 2016</i> 2. <i>Narasimha Karumanchi, Data Structures and Algorithms Made Easy, Careermonk Publications; 2016,</i> 3. <i>Robert Sedgewick, Algorithms, Addison-Wesley Professional, 2011</i>
Supplementary literature	<ol style="list-style-type: none"> 1. <i>Steven S Skiena, The Algorithm Design Manual, Springer, 2020</i> 2. <i>Robert Lafore, Data Structures and Algorithms in Java, Sams Publishing, 2002</i>