



### COURSE DESCRIPTION

Course code	full-time studies	
	part-time-studies	
Course name	<b>Algorytmy i struktury danych</b>	
Course name in English	<b>Algorithms and data structures</b>	
Valid from academic year	<b>2022/23</b>	

### PLACEMENT IN THE TEACHING PROGRAM

Field of study	<b>Computer Science</b>
Level of education	<b>1<sup>st</sup> degree</b>
Studies profile	<b>General</b>
Form and method of teaching classes	<b>Full-time and part-time studies</b>
Specialization	<b>All specializations</b>
Organizational unit responsible for the course	<b>Department of Computer Systems</b>
Course coordinator	<b>dr inż. Barbara Łukawska</b>
Approved by	<b>Dean of the Faculty of Electrical Engineering, Automatic Control and Computer Science Roman Deniziak, KUT prof., DSc, PhD</b>

### GENERAL CHARACTERISTIC OF THE COURSE

Course affiliation	<b>Introductory course</b>	
Course status	<b>Mandatory</b>	
Language	<b>English</b>	
Semester	full-time studies	<b>2<sup>nd</sup></b>
	part-time-studies	<b>2<sup>nd</sup></b>
Requirements	<b>Fundamentals of programming 1</b>	
Exam (YES/NO)	<b>YES</b>	
ECTS	<b>5</b>	

Course form		lecture	classes	laboratory	project	other
Hours per semester	full-time studies	<b>30</b>	<b>30</b>	-	-	-
	part-time-studies	<b>18</b>	<b>18</b>	-	-	-

## LEARNING RESULTS

Category	Result Symbol	Learning Results	References to the field of study results
Knowledge	W01	Student knows and understands classic algorithms used in computer science, how they are implemented and work, as well as advantages and disadvantages.	INF1_W06
	W02	Student knows and understands methods of verification and evaluation of a specific algorithm.	INF1_W06
	W03	Student knows and understands algorithms for working with dynamic data structures.	INF1_W06
Skills	U01	Student is able to solve classic IT problems with the help of appropriately selected algorithms.	INF1_U06
	U02	Student is able to analyse various algorithms in order to solve a specific problem.	INF1_U06
	U03	Student is able to correctly select data structures and evaluate the advantages and disadvantages of their use.	INF1_U06
Social competence	K01	Student is ready to expand his knowledge.	INF1_K01
	K02	Student is ready to be properly prepared to solve a problem.	INF1_K02

## COURSE CONTENT

Course Form	Content
lecture	<ol style="list-style-type: none"> <li><b>Algorithms operating on abstract data structures</b> (lists, trees, graphs).</li> <li><b>Algorithm strategies</b> (greedy, brute force, divide and conquer, based on dynamic programming, backtracking).</li> <li><b>Correctness and computational complexity of an algorithm.</b></li> <li><b>Selected families of algorithms</b> (sorting, hashing, coding, compression).</li> </ol>
classes	<ol style="list-style-type: none"> <li><b>The definition of an algorithm.</b></li> <li><b>Recursion.</b></li> <li><b>The use of abstract data structures</b> (lists, trees, graphs).</li> <li><b>Algorithm strategies</b> (use of algorithms: greedy, brute force, divide and conquer, based on dynamic programming, backtracking to solve typical problems).</li> <li><b>Algorithm families</b> (comparison of selected sorting, hashing, coding and compression algorithms).</li> </ol>

## LEARNING RESULTS VERIFICATION METHODS

Result Symbol	Learning results verification methods					
	Oral Exam	Written Exam	Midterm	Project	Report	Other
W01		X	X			
W02		X	X			
W03		X	X			
U01			X			
U02			X			
U03			X			
K01			X			
K02			X			

## ASSESSMENT FORMS AND CRITERIA

Course Form	Assessment Form	Assessment Criteria
lecture	Exam	The student should obtain at least 50% of points at the written exam.
classes	Passing grade	The student should obtain at least 50% of points in two mid-terms, taking into account activity in classes.

## STUDENT'S VOLUME OF WORK

ECTS Balance												
No.	Activity Type	Student Involvement										Unit
		full-time studies					part-time-studies					
		Lec	C	Lab	P	S	Lec	C	Lab	P	S	
1.	Participation in classes according to the schedule	30	30				18	18				h
2.	Other (consultations, exams)	4	2				4	2				h
3.	<b>Total with the direct assist of an academic teacher</b>	<b>66</b>					<b>42</b>					h
4.	<b>Number of ECTS, that students obtains with the direct assist of an academic teacher</b>	<b>2,64</b>					<b>1,68</b>					ECTS
5.	<b>Hours of unassisted student work</b>	<b>59</b>					<b>83</b>					h
6.	<b>Number of ECTS that student obtains working unassisted</b>	<b>2,36</b>					<b>3,32</b>					ECTS
7.	<b>Practical classes volume of work</b>	<b>30</b>					<b>18</b>					h
8.	<b>Number of ECTS obtained by student at practical classes</b>	<b>1,2</b>					<b>0,72</b>					ECTS
9.	<b>Total student's volume of work expressed in hours</b>	<b>125</b>					<b>125</b>					h
10.	<b>ECTS</b>	<b>5</b>										ECTS

## BIBLIOGRAPHY

1. Niklaus Wirth: *Algorithms + Data Structures = Programs*, Prentice-Hall Series in Automatic Computation
2. Wróblewski P.: *Algorytmy, struktury danych i techniki programowania*, Helion, 2019 (Polish only)
3. Adam Drozdek: *Data Structures and Algorithms in C++*, Cengage Learning 2012