



Subject card

Subject name and code	Basics of programming - algorithms and data structures, PG_00062716						
Field of study	Technologies for Industry 5.0						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		6.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Grzegorz Jasiński				
	Teachers		dr inż. Grzegorz Jasiński				
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		5.0		85.0	150
Subject objectives	The aim of the course is for students to acquire knowledge and skills in programming. The student should master the ability to create and analyse algorithms and the principles of programming in the C/C++ language: instructions, data types, operators and functions. Students should acquire knowledge of structures, pointers and other basic concepts related to programming in C/C++.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U01] applies knowledge of mathematics, physics, chemistry, IT tools and other engineering disciplines to solve theoretical, engineering and technological problems		The student programs in a procedural programming language, runs and tests programs. The student is able to analyze problems and select appropriate data models and structures data.		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K6_W01] demonstrates knowledge and understanding of mathematics, physics, chemistry and IT tools at the level necessary to formulate and solve typical engineering and technological problems		The student knows basic data structures and corresponding algorithms. The student is able to write programs in C/C++ using appropriate libraries.		[SW1] Assessment of factual knowledge		
	[K6_K01] is aware of the need to constantly update and enrich knowledge and practical skills, and improve professional, personal and social competences		The student understands the need to explore and learn well-known technologies. The student is able to analyze problems and select appropriate data models and data structures. The student understands the life cycle and development of code.		[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work		

Subject contents	1. Programming languages, alphabet, syntax and semantics. Translation. 2. Classification of types. Integer and floating point types. 3. Arithmetic operators and expressions. 4. Selected standard functions. 5. Character type. Type casting. 6. Logical type. Logical operators and expressions. 7. Basics of input/output. 8. Conditional statements (if, switch) and conditional expression. 9. Iterative instructions (for, while, do-while). Nested iterations. 10. Defining types. Constant. Enum type. 11. One-dimensional and multidimensional arrays. Strings. 12. Validity scope and lifetime of variables 13. Functions. 14. Function parameters. 15. Pointer type. Pointer arithmetic. 16. Pointers in communication between functions. 17. Dynamic memory allocation. 18. Structures 19. The concept of an algorithm, differences between algorithms, the influence of the model on the solution, representation of algorithms, correctness analysis. 20. Examples of recursive and iterative solutions, exhaustive and heuristic methods, dynamic programming. 21. Examples of recursive divide and conquer solutions. 22. Basic data structures: list, queue, stack and methods of their implementation. 23. Basic sorting algorithms, binary search, quick sort, heap sort.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lab	50.0%	50.0%
	Lecture	50.0%	50.0%
Recommended reading	Basic literature	KERNIGHAN, Brian W.; RITCHIE, Dennis M. The C programming language, Prentice Hall, 2006 Grębosz Jerzy, Symfonia C++ Standard (tom 1 i 2), Wydanie 2000, Krakow 2008	
	Supplementary literature	Stephen Prata, "Język C++. Szkoła programowania". Wydanie VI. Helion 2012 Mirosław J. Kubiak, "C++. Zadania z programowania z przykładowymi rozwiązaniami", Helion 2011	
	eResources addresses	Adresy na platformie eNauczanie: Podstawy programowania - algorytmy i struktury danych [2024/25] - Moodle ID: 42045 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=42045	
Example issues/ example questions/ tasks being completed	Writing a programme that implements the given functionality. Analyse how the given programme works.		
Work placement	Not applicable		

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