



## Subject card

Subject name and code	Programming Microcomputers, PG_00047696						
Field of study	Automatic Control, Cybernetics and Robotics						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
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	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Automatic Control -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Paweł Raczyński				
	Teachers		dr inż. Krzysztof Cisowski				
			dr inż. Paweł Raczyński				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30		2.0		18.0	50
Subject objectives	The main aim of the subject is to know basic techniques for assembly programming						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study		The student knows how to create software or its time-dependent fragments using low-level languages. The student knows how to use assembler language compilers and linkers in practice. The student knows how to put into practice the techniques of using program memory and disk memory and is able to implement software support for various devices using register programming techniques. The student knows how to use the techniques of combining assembler with programs written in C and PASCAL languages. The student knows how to use PC computers and the BIOS program module in practice.		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K6_W04] Knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices		The student knows the programming principles in various programming languages, including low-level programming. Knows the construction and organization of typical computer interfaces and peripherals. He knows the rules of their program support. Knows the principles of cooperation between user programs and system software.		[SW1] Assessment of factual knowledge		

Subject contents	1. Simple assembler, syntax, key words, name dictionary, operations on the name dictionary 2. Simple assembler directives 3. Assembly process, example 4. Macro assembler, condition assembly, macroinstructions and subroutines 5. Name attributes, multi file projects, team working 6. Linking process, examples 7. Programming techniques in assembler –TASM and MASM compilers 8. Memory addressing modes and its assembler implementation 9. Memory models and their effect on program construction techniques 10. Static memory and dynamic memory allocation techniques 11. Input and output service in assembler 12. Interrupt service routines in assembler 13. Effective data transfer commands 14. Stack, buffers, cyclic buffers – organization and application 15. Arithmetic commands, number formats, long number calculations 16. Logical commands, flags and its applications 17. Jump commands and its applications in different memory models 18. Functions and procedures, parameter exchange techniques 19. Interface into high level languages (C, C++, PASCAL) 20. File system and file handling techniques 21. Screen monitor, and screen service techniques 22. Basic of graphics programming techniques in assembler, graphic files, basic of data compression techniques 23. Keyboard, mouse - service techniques 24. BIOS, structure and application 25. Operating system, functions and services 26. Debugger idea and applications 27. Selected algorithms and its assembler implementations		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	51.0%	40.0%
	Practical exercise	51.0%	60.0%
Recommended reading	Basic literature	A. Pyrchla, B. Danowski, BIOS. Przewodnik, Helion 2007 E. Wróbel, Asembler Praktyczny kurs asemblera, Helion 2004 J. Hollingworth, D. Buttrfield, B. Swart, J. Allsop, C++ Builder 5 vademecum profesjonalisty tom 1 i 2, Helion 2001 K. R. Irvine, Asembler dla procesorów Intel vademecum profesjonalisty, Helion 2003 S. Kruk, Turbo assembler idee, polecenia, rozkazy procesora Pentium, Mikom 2000 V. Pirogow, Asembler Podręcznik programisty, Helion 2005 Zasoby Internetu	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie: Oprogramowanie mikrokomputerów - 2023-2024 - Moodle ID: 24985 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24985">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24985</a>	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		