Subject card

Subject name and code	Programming of Electronic Systems, PG_00047492					
Field of study	Electronics and Telecommunications					
Date of commencement of studies	February 2022		Academic year of realisation of subject		2021/2022	
Education level	second-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	1		Language of instruction		English	
Semester of study	1		ECTS credits		2.0	
Learning profile	general academic profile		Assessment form		assessment	
Conducting unit	Department of Metrology and Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics					
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Michał Kowalewski			
	Teachers		dr inż. Michał Kowalewski			

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	4.0	16.0	50

Subject objectives	Programming of measurement equipment, control of PC interfaces, learning methods of increasing software efficiency (Win32 API, DLL, ODBC), multithread applications design.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_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, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it	Uses object-oriented programming techniques and MFC library in MS Visual C++ applications. Optimizes applications using preprocessor directives, namespaces, multibit variables, and handling exceptions. Proves skills of low-level programming for Windows with Win32 API. Constructs and uses Dynamic Link Libraries in Windows applications. Programs RS232, USB and GPIB interfaces and controls measurement equipment with use of SCPI language. Integrates applications with database infrastructure with use of ODBC. Realizes multithread applications, by managing threads execution and organizing access to shared resources with use of synchronization objects.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K7_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	Uses object-oriented programming techniques and MFC library in MS Visual C++ applications. Optimizes applications using preprocessor directives, namespaces, multibit variables, and handling exceptions. Proves skills of low-level programming for Windows with Win32 API. Constructs and uses Dynamic Link Libraries in Windows applications. Programs RS232, USB and GPIB interfaces and controls measurement equipment with use of SCPI language. Integrates applications with database infrastructure with use of ODBC. Realizes multithread applications, by managing threads execution and organizing access to shared resources with use of synchronization objects.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents	1. Introduction: course outline, course grading. 2. Programming for Windows with Win32 API. 3. Advanced object-oriented programming in C++. 4. Structure and usage of C++ libraries. 5. Methods of increasing software efficiency. 6. Specification, design and usage of Dynamic Link Libraries. 7. Serial interface programming in high-level languages. 8. Integration of PC-based electronic system with ODBC. 9. Methodology of multithread applications design. 10. Usage of Windows system registry resources. 11. Programming of measurement instrumentation in Linux. 12. Graphical programming with OpenGL.
Prerequisites and co-requisites	Basic programming in C.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory exercises	50.0%	30.0%
	Test	50.0%	70.0%

Recommended reading	Basic literature	Lippman Stanley B., Podstawy języka C++. Wydawnictwo Naukowo-Techniczne, Warszawa, 1994.
		Chapman Davis, Visual C++ dla każdego. Wydawnictwo Helion, Gliwice, 1999.
		Wiliams Al,MFC Czarna księga. Wydawnictwo Helion, Gliwice, 1999.
		Daniluk Andrzej, RS 232C Praktyczne programowanie. Wydawnictwo Helion, Gliwice, 2001.
		Mielczarek Wojciech, USB. Uniwersalny interfejs szeregowy. Wydawnictwo Helion, Gliwice, 2005.
	Supplementary literature	Winiecki Wiesław, Stanik Sławomir, Nowak Jacek, Graficzne zintegrowane środowiska programowe do projektowania komputerowych systemów pomiarowo-kontrolnych. Wydawnictwo MIKOM, Warszawa, 2001.
		Mielczarek Wojciech, Komputerowe systemy pomiarowe. Standardy IEEE-488.2 i SCPI. Wydawnictwo Politechniki Śląskiej, Gliwice, 2004.
		Wilams Mickey, Bennett David, Visual C++6 Programowanie dla Internetu i ActiveX., Wydawnictwo Helion, Gliwice, 2001.
		Świsulski Dariusz, Komputerowa technika pomiarowa. Oprogramowanie wirtualnych przyrządów pomiarowych w LabView. Agenda Wydawnicza PAK-u, Warszawa, 2005.
		Winiecki Wiesław, Organizacja Komputerowych Systemów Pomiarowych. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 1997.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Describe methods of sending and retrieving messages to/from message queue in a Win32 API application? 2. What is the task of a preprocessor and when it is executed? What are the differences between conditional instructions and conditional directives? 3. What is a namespace, how to define it and get access to its members? Give an example. 4. Describe 3 methods of controlling multibit variables. 5. Describe two types of libraries (*.LIB): static, import. What are the differences between implicit and explicit linking when using DLLs? 6. Describe methods of controlling shared resources with use of: critical sections, mutual exclusions and semaphores.	
Work placement	Not applicable	