



## Subject card

Subject name and code	Interfaces of Electronic Systems, PG_00048080						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2022/2023		
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 Metrology and Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Grzegorz Lentka				
	Teachers		mgr inż. Dariusz Palmowski  dr hab. inż. Grzegorz Lentka				
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	Getting familiar with categories and topologies of interfaces, interface model based on interface and device functions. Description of the examples of popular interfaces. Pratices with configuring, programming and diagnostics of the common interfaces.						
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		Organises system on the basis of the selected interfaces. Connects hardware layer and selects drivers and protocol. Uses methods and devices for conversion of interfaces and protocols.		[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		Student explains paradigms of electronic systems construction. Classifies interfaces as buss, star or loop configuration and presents their properties. Interprets interface model based on interface function, interface messages, device functions and device messages on the example of GPIB. Explains generalized protocol of asynchronous transfer negotiation (handshake).		[SW1] Assessment of factual knowledge		

Subject contents	1. Introduction: course outline, course grading, references. 2. Characteristic of electronic systems. The need of the interface in system. 3. Paradigms of electronic systems construction: modularity, hierarchy, structuralism, connectivity 4. Topologies of the systems: star, loop, bus. 5. System classification based on scale: microsystem (SoC), classical systems (laC, laboratory, industrial), distributed systems 6. Interface model based on interface functions, interface messages, device functions and device messages on the example of GPIB 7. Asynchronous interface system: bus, single-line interface messages 8. Set of interface functions as a functional description of the interface. GPIB functions set. 9. Generalized protocol of asynchronous transfer negotiation. Transmission of interface and device messages (3-wire handshake). 10. Multi-line interface messages on GPIB, basic control procedures. 11. Connecting hardware interface to software layers on the example of IEEE-488.2 and SCPI. 12. Autonomous interfaces in embedded controllers. 13. Microinterfaces similar to SMI (SPI, Microwire, etc.) Communication protocol used. 14. I2C interface and implementations. 15. RS-family of interfaces – application in development and diagnostics of systems. 16. CAN interface – node model. 17. CAN interface – basic protocol, distributed network construction. LIN subsystem. 18. Review of industry standards: EIB, Profibus, DeviceNet, J1850. 19. Review of computer interfaces: USB, FireWire. 20. Integration of interface systems. Hardware and software converters of interfaces. Expanders.		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tests during semester	50.0%	72.0%
	Lab exercises	0.0%	28.0%
Recommended reading	Basic literature	1. J. Bogusz: Lokalne interfejsy szeregowo w systemach cyfrowych, BTC 2004 2. W. Mielczarek: Szeregowo interfejsy cyfrowe, Helion 1994 3. W. Mielczarek: USB uniwersalny interfejs szeregowy, Helion 2005 4. W. Nawrocki: Komputerowe systemy pomiarowe, WKiŁ 2006	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie: Interfejsy Systemów Elektronicznych 2022/2023 - Moodle ID: 25408 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25408">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25408</a>	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		