GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Data Acquisition Systems, PG_00068105					
Field of study	Biomedical Engineering					
Date of commencement of studies	October 2025		Academic year of realisation of subject		2028/2029	
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	4		Language of instruction		Polish	
Semester of study	7		ECTS credits		4.0	
Learning profile	general academic profile		Assessment form		assessment	
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology					
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Grzegorz Jasiński				
	Teachers					

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	15.0	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	35.0	100

Subject objectives	The aim of the course is to familiarize students with typical digital interfaces used in data acquisition. Both hardware aspects and issues related to their practical use will be presented. Available solutions, both wired and wireless, will be discussed. Typical solutions of data acquisition systems used in medicine, industry, measurement laboratory and computers will be shown.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_K02] is ready to critically assess possessed knowledge and acknowledge the importance of knowledge in solving cognitive and practical problems	Student wyjaśnia znaczenie podstawowych pojęć związanych z topologią i funkcjonowaniem interfejsów. Student wyjaśnia podstawowe różnice pomiędzy poszczególnymi interfejsami. Student wskazuje i wyjaśnia podstawowe uwarunkowania projektowania i używania systemów akwizycji danych.	[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice
	[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 the importance of basic concepts related to data acquisition. Selected student has test data acquisition systems. Student builds and configures the selected acquisition systems and data exchange. Student creates software data acquisition systems.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	[K6_U12] can analyze the operation of components, circuits and systems related to the field of study, as well as measure their parameters and examine technical specifications, and plan and conduct experiments related to the field of study, including computer simulations and measurements, and interpret obtained results and draw conclusions	The student selects data acquisition systems depending on the application. The student tests the operation of selected data exchange interfaces. The student builds and configures selected data acquisition and data exchange systems. The student develops software that supports popular interfaces.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	Course content – lecture Lecture Content: Importance of data acquisition in the modern world. Structure of the measurement system. Concept of interface and communication protocol. Types of interfaces. Configurations. Types of data transmission. RS232 serial interface and derived interfaces. Basic tools and diagnostics of serial communication. Interfaces in microprocessor systems, construction and operation: I2C, 1-Wire and SPI. Wireless interfaces. Interfaces of measurement systems: GPIB Control of measuring devices (SCPI). Data acquisition using TCP/IP interfaces. Modbus protocol. Data transmission security methods (CRC, error control). Data acquisition cards. Programmable logic controllers (PLCs). LabView programming environment. Lab content: PLC. Modbus protocol. LabView environment. I2C interface. 1-Wire interface. Project content: Development of an automatic data acquisition system using selected measuring instruments (multimeter, temperature calibrator, etc.).

Prerequisites and co-requisites	No requirements

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	50.0%	30.0%
	Written exam 1	50.0%	25.0%
	Labs	50.0%	20.0%
	Written exam 2	50.0%	25.0%

Recommended reading	Basic literature	1. Brent A. Miller, Chatschik Bisdikian, Bluetooth, Wydawnictwo Helion, 2003 2. Jacek Bogusz, Lokalne interfejsy szeregowe, Wydawnictwo BTC, 2004 3. Michael Gook Interfejsy sprzętowe komputerów PC Helion 2005 4. Nawrocki W. Komputerowe systemy pomiarowe WKiŁ 2002 5. Sayood K Kompresja danych wprowadzenie Wydawnictwo RM 2002 6. Waldemar Nawrocki, Komputerowe systemy pomiarowe, Wydawnictwa Komunikacji i Łączności, Warszawa 2002r. 7. Waldemar Nawrocki, Rozproszone Systemy Pomiarowe, Wydawnictwa Komunikacji i Łączności, Warszawa, 2006 8. Winiecki W. Organizacja mikrokomputerowych systemów pomiarowych, Oficyna Wydawnicza Politechniki Warszawskiej 1997 9. Wojciech Mielczarek, Szeregowe interfejsy cyfrowe, Wydawnictwo Helion, 1994 10. Wojciech Mielczarek USB uniwersalny interfejs szeregowy Helion 2005
	Supplementary literature	Materiały do przedmiotu opracowane w formie edukacji na odległość, dostęp: http://uno.biomed.gda.pl

	eResources addresses	
Example issues/ example questions/ tasks being completed	Choose the best communication interface to realize data transmission over a distance of 1 km.	
Practical activites within the subject	Not applicable	

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