GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Data Acquisition Systems Interfaces, PG_00053510		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	3.0
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	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	41.0	75

Subject objectives

The aim of the course is to familiarize students with digital interfaces typically used in data acquisition. Hardware aspects - construction and operation of each interface, as well as issues related to their practical application will be presented. Both wired and wireless solutions will be discussed. Typical data acquisition system solutions used in medicine, industry, lab bench and computers will be presented. Issues concerning the practical use of the interfaces will include issues related to the development of software that communicates with the hardware using selected interfaces.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	Student explains the meaning of basic concepts related to the topology and functioning of interfaces. Student explains the basic differences between individual interfaces. The student indicates and explains the basic conditions for the design and use of data acquisition systems. The student selects the data acquisition systems depending on the application. The student tests the operation of selected communication interfaces. Student builds and configures selected data acquisition systems. Student creates software that uses different interfaces.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[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.	[SU4] Assessment of ability to use methods and tools [SK5] Assessment of ability to solve problems that arise in practice [SU2] Assessment of ability to analyse information

<table>
<tr><td>Subject contents</td><td>The concept of interface. The types of interfaces. Configurations The types of data transmission. Layered model for data exchange. Fundamentals of I/O programming on different operating systems. RS232 serial interface. Similar serial interfaces. RS232 serial interface. Examples and programming in Win32. Centronics Parallel Interface - Overview. Parallel interface - programming. Universal Serial bus. Serial interfaces: FireWire. Microprocessor system interfaces: I2C, construction and operation. Interfaces in microprocessor systems: 1-Wire Microprocessor system interfaces: SPI Wireless Interfaces: IrDA Wireless Interfaces: Bluetooth Wireless Networks: WiMAX and WiFi Sensor networks: Zigbee RFID Systems Industry interfaces systems: Profibus, RS485 Measurement systems interfaces: GPIB Control of measuring devices: SCPI Data acquisition using barcodes Data Acquisition with Ethernet interfaces Acquisition of data from flash memory cards Computer buses: ISA, PCI Medical interface standard: Medical Information Bus Standards for data transmission in the analytical laboratory Standards for transmission of ECG signals. Standard ENV1064. Other medical interfaces. Compression and data encryption. Methods of data protection (CRC,error control)</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>No requirements</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Practical exercise</td><td>50.0%</td><td>20.0%</td></tr>
<tr><td>Written exam 2</td><td>50.0%</td><td>35.0%</td></tr>
<tr><td>DL Course</td><td>50.0%</td><td>10.0%</td></tr>
<tr><td>Written exam 1</td><td>50.0%</td><td>35.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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</td></tr>
<tr><td>Supplementary literature</td><td>Materiały do przedmiotu opracowane w formie edukacji na odległość, dostęp: http://uno.biomed.gda.pl</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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