GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Intelligent Measurement Systems, PG_00047448		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional subject group Specialty 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	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Decision Systems and Robotics -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jakub Wszołek	
	Teachers	dr inż. Jakub Wszołek	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	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

The aim of the course is to acquaint students with methods of building a smart computer measuring systems. The student becomes familiar with the interfaces used widely in automation of measurement. The course design students use the acquired knowledge in practice. The projects relate to actual implementation of the measurement system.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Understanding and appropriate use of distributed processing to analyze measurement data.	[SW1] Assessment of factual knowledge
[K7_U03] can design, according to required specifications, and make a complex device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Practical learning of measuring interfaces by designing and building a measuring track based on the Arduino / Raspberry Pi platform.	[SU1] Assessment of task fulfilment
[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	Getting a practical knowledge of algorithms for the verification of measurement data by designing and implementing an analytical system.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

1. Introduction2. The configuration and structure of the measuring system3. Accuracy of measurement and dynamic measurement systems4. Noise generated within the measuring devices5. Interference generated in the measuring line6. The computer measurement systemsa. The architecture of the machineb. Bus and rail PCc. The bus Universal Serial Bus USB and IEEE-13947. Components measuring systemsa. Structure of computerized measuring systemb. Digital-to-analog and analog-to-digitalc. Measurement systems interfaced. Computer measurement cards and virtual instruments8. Scattered wired measurement systemsa. The CAN interfacei. General, bus, messagesii. The structure of the CAN moduleand. Characteristics of the system and protocol PROFIBUS-DPb. System Interface PROFBUSc. The interface MicoLAN9. Measuring systems in the networka. Network Ethernethb. The IEEE 802.11 wireless network10. Measurement systems on the LANa. Measuring systems on an Ethernet network interface convertersb. Measuring systems on the LAN as an interface busc. Measuring systems on the Internet11. The system architecture aggregating measurement dataa. Database as a reservoir for storing dataand. TCP / IP stacki. The data link and physical layer networkand. the relational modelii. Model nierelacyjnyiii. hierarchical model12. Methods of measurement data mining

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture	50.0%	50.0%
project	50.0%	50.0%

Recommended reading

Basic literature

- Eckel, B., Thinking in Java, 2010
- http://www.jboss.org/get-started/
- http://playground.arduino.cc/Code/WebClient
- http://www.dropwizard.io/
- https://www.arduino.cc/en/Guide/HomePage

Supplementary literature

- Automotive Industry Action Group (AIAG), Measurement Systems Analysis (MSA), 2010
- Pratap Misra, Per Enge, Global Positioning System: Signals, Measurements, and Performance
- A.F.P van Putten, Electronic Measurement Systems: Theory and Practice

	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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