University of Gdańsk

Subject card

Subject name and code	Elements of Automation of Measurements, PG_00182264						
Field of study	Physics						
Date of commencement of studies	October 2025		Academic year of realisation of subject	2027/2028			
Education level	Bachelor's studies		Subject group	Obligatory subject group in the field of study 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 polish			
Semester of study	5		ECTS credits	2.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Dorywalski					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		0.0	20.0	50	
Subject objectives	The aim of the course is to introduce students to the fundamentals of computer-based measurement automation systems, to develop skills in digital acquisition and processing of measurement signals, and to provide practical knowledge of microcontroller-based control of actuating devices, enabling students to independently design and implement simple measurement systems.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[FIZL3_W12] knows the methods of numerical analysis, knows at least one package for symbolic calculations at an advanced level, knows application software packages for presentation of results and data analysis; knows one programming language fluently	The student: - nows modern microcontroller tools and computational packages for the acquisition, processing, analysis, and presentation of measurement signal results, - has knowledge in the field of digital methods for the acquisition of analog signals.	[SW2] presentation/project/paper/ report [SW3] text preparation/written work [SW5] implementation of a problem task
[FIZL3_U02] has the ability to perform measurements of basic physical quantities; is able to develop, describe and present the results of physics experiments and computer simulations; is able to perform quantitative analyses and formulate qualitative conclusions on this basis; can estimate measurement uncertainties	The student is able to perform measurements of basic physical quantities using microcontroller-based data acquisition systems; can process, describe, and present the results of physical experiments, and carry out quantitative analyses.	[SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU5] implementation of a problem task [SU6] demonstration of practical skills [SU8] observation of student's independent or team work
[FIZL3_U11] can use various application software packages to present results and analyze data	The student possesses knowledge in modern microcontroller and programming tools, enabling the acquisition of measurement data and its analysis and presentation using appropriate software packages.	[SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU5] implementation of a problem task [SU6] demonstration of practical skills [SU8] observation of student's independent or team work
[FIZL3_W13] knows measuring instruments, their construction and principle of operation as well as the use of simple electronic systems	The student possesses knowledge and skills in electronics and automation that enable the design and construction of simple systems for measurement signal acquisition and the control of actuating devices. The student knows the fundamentals of digital measurement automation systems as well as the components and actuating elements of measurement systems.	[SW2] presentation/project/paper/ report [SW3] text preparation/written work [SW5] implementation of a problem task

Subject contents

- Introduction to microcontroller-based measurement automation systems
- Handling digital input/output devices
- Acquisition of analog signals: A/D converters
- Presentation of measurement data: displays, UART communication
- Computer-based control of actuating devices: DC motors, servo drives
- Systems with graphical user interface
- Acquisition of measurement signals using data acquisition cards

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
active participation	0.0%	10.0%
short quiz	51.0%	10.0%
laboratory report	51.0%	80.0%

Recommended reading

Basic literature	**A.1. Used during classes:** - Instructor-provided instructions and materials **A.2. Recommended for self-study:** - S. Monk, Programming Arduino: Getting Started with Sketches. Second Edition. McGraw-Hill Education, 2016 - M. Evans, J. Noble, J. Hochenbaum, Arduino in Action. Manning Publications, 2011 - S. Monk, Programming Arduino Next Steps: Going Further with Sketches. Second Edition. McGraw-Hill Education, 2018
Supplementary literature	- W. Tłaczała, Środowisko LabView w eksperymencie wspomaganym komputerowo. PWN, 2017 - M. Chruściel, LabView w praktyce. BTC, 2008 - P. Horowitz, H. Winfield, Sztuka elektroniki, WKŁ, 2018
eResources addresses	

Example issues/ example questions/ tasks being completed	Design and implement a simple microcontroller-based system for acquiring an analog signal, processing it, and presenting the results on a computer or display.
Work placement	Not applicable

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