University of Gdańsk

Subject card

Subject name and code	Electronics in Physics Experiment, PG_00182343						
Field of study	Physics						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
Education level	Master's studies		Subject group	Obligatory subject group in the field of study 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	2		Language of instruction	Polish			
Semester of study	4		ECTS credits	3.0			
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	45.0	75	
Subject objectives	The aim of the course is to introduce students to the fundamentals of computer-based measurement automation systems and to develop skills in acquiring, processing, analyzing, and presenting experimental measurement results.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[FIZMU2_W03] knows experimental, observational and numerical techniques to plan and perform a complex physics experiment or computer simulation	The student possesses knowledge and skills in electronics applied to physical experiments, can plan and conduct a physical experiment using electronic systems, perform measurements, and process the results.	[SW2] presentation/project/paper/ report [SW3] text preparation/written work [SW5] implementation of a problem task
[FIZMU2_U03] is able to make a critical analysis of the results of measurements, observations or theoretical calculations along with the assessment of the accuracy of the results	The student is able to: - select components for a measurement signal acquisition system, - write a program enabling the measurement of a physical quantity using a selected computer interface, - assemble a microcontroller-based system for recording and presenting measurement data, as well as controlling actuating devices.	[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
[FIZMU2_U02] has the ability to plan and carry out basic and advanced experiments or observations in specific areas of physics or its applications	The student is able to: - select components for a measurement signal acquisition system, - write a program enabling the measurement of a physical quantity using a selected computer interface, - assemble a microcontroller-based system for recording and presenting measurement data, as well as controlling actuating devices.	[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
[FIZMU2_W04] knows the principle of operation of measuring systems and research equipment specific to the area of physics related to the selected specialization or knows advanced methods of theoretical and mathematical physics	The student possesses knowledge in the metrology of basic physical quantities and the principles of measurement systems, including microcontroller-based data acquisition systems, enabling them to conduct experimental measurements and record results.	[SW2] presentation/project/paper/ report [SW3] text preparation/written work [SW5] implementation of a problem task
[FIZMU2_U05] has the ability to synthesize methods and ideas from various areas of physics and other exact and natural sciences; is able to notice that even distant phenomena are described by similar models	The student is able to apply knowledge of electronics and physics to the design and execution of physical experiments, integrate methods and tools from different areas of science to measure, analyze, and interpret experimental results, and recognize analogies between different physical phenomena and their models.	[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
[FIZMU2_W05] knows the theoretical foundations of computational methods and IT techniques used to model and simulate physical systems	The student: - knows modern microcontroller tools and computational packages for the acquisition, processing, analysis, and presentation of measurement signal results, - has knowledge in the methodology of digital acquisition of analog signals.	[SW2] presentation/project/paper/ report [SW3] text preparation/written work [SW5] implementation of a problem task

<table>
<tr><td>Subject contents</td><td>- 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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basics of programming in a selected high-level language. Knowledge of the fundamental laws of electric current flow.</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>laboratory report</td><td>51.0%</td><td>80.0%</td></tr><tr><td>active participation</td><td>0.0%</td><td>10.0%</td></tr><tr><td>short quiz</td><td>51.0%</td><td>10.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>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</td></tr><tr><td>Supplementary literature</td><td>- 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</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Design and implement a microcontroller-based system for the acquisition of a selected physical quantity, its processing, and the presentation of results on a computer or display.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.