



Subject card

Subject name and code	Measuring and measurement systems, PG_00062724						
Field of study	Technologies for Industry 5.0						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish Polish		
Semester of study	2		ECTS credits		6.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Division of Magnetic Properties of Materials -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marek Chmielewski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	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		85.0	150
Subject objectives	The purpose of the course is, first of all, to familiarize the student with the operation of basic power and control-measurement tools, based on modern digital technology, used in electronic laboratory practice as well as in non-laboratory conditions, to familiarize students with the technique of digital data processing and the determination of measurement uncertainty. The next objective will be the task of using control and measurement tools in the field of independent electronic prototyping. The student will get acquainted with the meaning and importance of constructing conditioning modules, understand the basic laws that apply in electronic metrology.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U05] interprets phenomena occurring around the technological process and processes occurring in the life cycle of devices and systems, makes a critical assessment of the functioning of existing solutions		The student will learn digital data processing techniques, gain the ability to critically analyze the obtained measurement results, be able to analyze the correctness of complex measurement processes, gain the ability to optimize in the field of metrology of measurement systems.		[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[K6_W05] demonstrates practical knowledge related to technological processes, utilized devices and systems, has knowledge regarding selected processes monitoring tools		The student will learn the capabilities of digital metrology used in modern measurement techniques. He or she will gain a working knowledge of the preparation of the elements and procedures necessary to carry out the measurement process, and will understand the importance of physical limitations in metrological processes.		[SW3] Assessment of knowledge contained in written work and projects		
Subject contents	The content of the course is, first, to acquire the student's ability to operate and use the following laboratory equipment: multi-section laboratory power supplies, digital universal multimeters, multi-channel digital oscilloscopes, function and arbitrary generators. In the second place, the student will obtain practical knowledge of the construction of electronic, simple prototype circuits using contact board-based techniques and PCB prototype boards, practice the process of planning an experiment, selecting the right measurement equipment, producing appropriate, content-compatible studies from the realized measurement experiment.						
Prerequisites and co-requisites	Not Required						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lab	80.0%	60.0%
	lecture	50.0%	40.0%
Recommended reading	Basic literature	Podstawy elektrotechniki i elektroniki, Marian Doległo ; Wydawnictwa Komunikacji i Łączności WKŁ Podstawy pomiarów; Grzegorz Tarapata, Jacek Dusza, Paweł Gąsio; Oficyna Wydawnicza Politechniki Warszawskiej Pomiary elektryczne i elektroniczne; Daniel Wilczkowski Michał Cedro; Wydawnictwa Komunikacji i Łączności	
	Supplementary literature	Not Required	
	eResources addresses	Adresy na platformie eNauczanie:	
	Example issues/ example questions/ tasks being completed	Analog-to-digital processing Digital universal meters Frequency analysis and electrical interference.	
Work placement	Not applicable		

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