



Subject card

Subject name and code	Non-electrical quantities measurement and sensors, PG_00062737						
Field of study	Technologies for Industry 5.0						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
Education level	first-cycle 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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			6.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Katedra Inżynierii Materiałów Funkcjonalnych WETI -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Piotr Jasiński					
	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 aim of the course is to present the different types of sensors and their mechanisms of operation						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W03] demonstrates knowledge on materials used in industrial technologies, their structure and fabrication, knows the principles of conducting research, analyzing it and creating technical documentation	Students will be familiar with the construction and principle of operation of sensors and transducers			[SW1] Assessment of factual knowledge		
	[K6_K03] effectively, clearly and unambiguously conveys information, describes activities and communicates their results and opinions of a specialist engineer using appropriate communication methods and tools	The student is able to communicate technical and scientific information effectively, using precise language and terminology appropriate to the audience and the context.			[SK1] Assessment of group work skills		
	[K6_U03] has the ability to plan, prepare and carry out engineering activities using practical knowledge and understanding of the specificity of materials, devices and tools, processes and technologies, and prepare a substantive report	Students will be able to select the appropriate transducer of physical quantities to meet the objective			[SU1] Assessment of task fulfilment		
Subject contents	Basic concepts measurand, measurement object, measurement transducer, measurement paths, measurement errors. Measurement transducers classification, metrological properties of sensors and their determination. Dynamic properties of transmitters. Resistance sensors in measuring systems. Temperature measurements. Basics of optical pyrometry. Humidity measurements. Stress measurements - strain gauges. Pressure measurements. Inductive sensors and their applications. Capacitive sensors and their applications. Impedance sensor measurement systems. Force and pressure measurements. Flow measurements. Pulse and code transducers. Optoelectronic transducers. Position and motion measurements. Seismic measurements. Vibration and vibration measurements.						
Prerequisites and co-requisites							

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lab	50.0%	30.0%
	Lecture -quiz	50.0%	70.0%
Recommended reading	Basic literature	DE SILVA, Clarence W. <i>Sensors and actuators: Engineering system instrumentation</i> . CRC press, 2015. NORTHROP, Robert B. <i>Introduction to instrumentation and measurements</i> . CRC press, 2018. KALANTAR-ZADEH, Kourosh. <i>Sensors: an introductory course</i> . Springer Science & Business Media, 2013	
	Supplementary literature	GHOSH, Arun K. <i>Introduction to measurements and instrumentation</i> . PHI Learning Pvt. Ltd., 2012.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	List the types of temperature sensors and describe the principle of operation of selected ones		
Work placement	Not applicable		

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