



## Subject card

Subject name and code	Metrology II, PG_00056027						
Field of study	Hydrogen Technologies and Electromobility						
Date of commencement of studies	October 2023	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	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Metrology and Information Systems -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marek Wołoszyk					
	Teachers						
Lesson types and methods of instruction	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	2.0		18.0		50
Subject objectives	Introduce students with the methods and tools for measuring electrical and nonelectrical quantities						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U02] can work individually and in a team, can communicate using various techniques in a professional environment, as well as document and analyze the results of their work, can estimate the time needed to perform the entrusted task	The student takes measurements individually or as part of a team. The student prepares and documents the results using various techniques. The student controls the completion of the task within the prescribed time.			[SU1] Assessment of task fulfilment		
	[K6_W05] has structured knowledge of measuring electrical and non-electrical quantities, documenting their results and calculating measurement uncertainty	The student prepares multiple measurement results (measurement series). The student takes measurements of basic electrical parameters and prepares their results. The student performs measurements of RLC parameters using bridge methods and specialized instruments. The student uses an electronic oscilloscope. The student takes measurements of displacement and temperature by electrical methods. The student analyses the recorded waveforms with the use of computer technique.			[SW3] Assessment of knowledge contained in written work and projects		
	[K6_K02] can work in a group taking on different roles in it	The student directs the work of the team or within the team takes measurements, documents them or prepares the results.			[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	<b>LABORATORY</b> Analysis of measurement data. Calibration. Measurement of RLC parameters. Oscilloscope measurement. Power measurement of three phase circuits. Measurement of sinusoidal and distorted waveforms. Computer processing of measurement signals. Electrical temperature measurements. Examination of selected displacement sensors.						
Prerequisites and co-requisites	Basic knowledge of electrical engineering and electrical circuit analysis. Knowledge of the Metrology I course.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		Practical exercise	60.0%
Recommended reading	Basic literature	1. Praca zbiorowa (red. Swędrowski L.): METROLOGIA. Skrypt do laboratorium. Wydawnictwo Politechniki Gdańskiej, 2009.	
	Supplementary literature	1. Chwaleba A., Poniński M., Siedlecki A.: Metrologia elektryczna. WNT, 2010. 2. Tumański S.: Technika pomiarowa. WNT, 2016. 3. Lisowski M.: Podstawy metrologii. Oficyna Wydawnicza Politechniki Wrocławskiej, 2011.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. Explain the concepts of median and modal values.  2. Measurement error of insensitivity in a Wheatstone bridge.  3. The methods and sensors used for the teperature measurements.		
Work placement	Not applicable		