



Subject card

Subject name and code	Measurements and Measurement Systems, PG_00055884						
Field of study	Miernictwo i systemy pomiarowe						
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	3	ECTS credits	4.0				
Learning profile	general academic profile	Assessment form	assessment				
Conducting unit	Partment of Metrology and Information Systems -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Anna Golijanek-Jędrzejczyk					
	Teachers	dr inż. Beata Pałczyńska dr inż. Michał Ziółko dr hab. inż. Anna Golijanek-Jędrzejczyk dr inż. Ariel Dzwonkowski					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 46281 Miernictwo i systemy pomiarowe [WIMiO][2025/26] https://enauczanie.pg.edu.pl/moodle/course/view.php?id=46281						
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	45	6.0	49.0	100		
Subject objectives	Familiarizing students with issues related to metrology and measurement systems.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems	Student explains the structure and principle operation of measurement systems. The student explains the rules of selection tools and measurement methods relevant to the task measuring. Student discusses development of the results measurement, evaluates errors and measurement uncertainty.	[SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania [SU4] Ocena umiejętności korzystania z metod i narzędzi [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU2] Ocena umiejętności analizy informacji [SU1] Ocena realizacji zadania
	[K6_W05] has structured knowledge in the field of electrical engineering and electronics, necessary to understand the basics of operation and selection of electrical machines, electricity transmission systems and power electronic devices	Student uses correctly with standard instruments analog and digital. The student carries out projects size measuring systems electric and non-electric. Student presents physical principles of operation and properties basic metrology transducers for measurements non-electrical quantities.	[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym [SW2] Ocena wiedzy zawartej w prezentacji [SW1] Ocena wiedzy faktograficznej
Subject contents	Course content – lecture Basic metrological concepts. Measurement methods. Fundamentals of the calculus of errors i development of measurement results. Measuring converters for electrical quantities. Analog and digital meters. Ways of extending the measuring ranges. Measurements of basic electrical quantities (voltage and current, resistance, inductance, capacitance, frequency, phase shift, power and energy in single and three-phase circuits). Measurements of non-electrical quantities by electrical methods. Electrical temperature measurements. Resistance and thermoelectric thermometers, pyrometers. The use of thermovision in measurements. Tensometric measurements of mechanical quantities. Measurement systems - classification, structure and application.		
Prerequisites and co-requisites	Basic knowledge of electrical engineering and physics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory.	60.0%	50.0%
	Written test - lecture.	60.0%	50.0%
Recommended reading	Basic literature	1. Parchański J.: Miernictwo elektryczne i elektroniczne, WSiP, Warszawa, Wydanie ósme 2006. 2. Chwaleba A., Poniński M., Siedlecki A.: Metrologia elektryczna, WNT, Warszawa 2012. 3. Gawędzki W.: Pomiary elektryczne wielkości nieelektrycznych, Wydawnictwo AGH, Kraków, 2010. 4. Czabanowski R.: Sensory i systemy pomiarowe, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2010	
	Supplementary literature	1. Alan S Morris Reza Langari: Measurement and Instrumentation. Theory and Application. Elsevier, 2012. ISBN: 978-0-12-381960-4. 2. Handbook of Measurements: Benchmarks for Systems Accuracy and Precision. CRC Press, 2015. Print ISBN: 978-1-4822-2522-8. 3. Raghavendra, N.V.; Krishnamurthy, L.: Engineering Metrology and Measurements. Published by Oxford University Press, 2013. ISBN 9780198085492.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Causes of errors: systematic, random and gross. Ways to reduce these mistakes. 2. How is the measurement uncertainty of type A and type B defined? 3. Give the diagram and the method of balancing the Wheatstone bridge. 4. What is phase measurement with a dual-channel oscilloscope by comparison method? 5. Present the systems for measuring active and reactive power in a three-phase, four-wire system unbalanced. 6. Present the systems for measuring active and reactive power in a three-phase, three-wire system symmetrical.		

Practical activities within the subject	Not applicable
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