GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Metrology I, PG_00038336		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
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 inż. Beata Pałczyńska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	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	10.0	60.0	100

Subject objectives

Acquiring fundamental knowledge on the theory of measurement as well as methods and measurementsystems used in automatics

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U04] has the ability to self-educate, among other things, in order to improve professional qualifications	correctly selects standard analog and digital instruments.	[SU4] Assessment of ability to use methods and tools
[K6_W03] has structured knowledge of tools and methods for measuring electrical quantities, documenting their results and assessing errors and uncertainties	configures the measuring equipment for automation systems.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture
LECTURE Definitions of measurement, sensor, transducer, measurement standard. Measurement errorsand their types. Inaccuracy: systematic, random, insensibility. Definition of uncertainty type A and type B.Elaboration of experimental measurement results. The static and dynamic transducers properties. Principlesof analog measurements of current, voltage, power, energy, RLC, frequency. Standards of base electricalquantities. Bridge and compensation methods. ADC methods. Digital measurements of voltage, frequencyand time. Digital multimeters. The basis of electrical measurements of non-electrical quantities. Analog anddigital oscilloscope. Smart transducers.

Prerequisites and co-requisites

Basic electrical circuits analysis and physics theory knowledge.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	60.0%	100.0%

<table>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. 1. Chwaleba A., Poniński M., Siedlecki A.: Metrologia elektryczna. WNT, warszawa 2014
2. 2. Stabrowski M.: Miernictwo elektryczne. Cyfrowa technika pomiarowa. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej
3. 3. Maśnicki R., Mindykowski J., Metrologia, Wydawnictwo Akademii Morskiej w Gdyni, Gdynia 2015
4. 4. Nawrocki W.: Sensory i systemy pomiarowe. Poznań: Wydawnictwo PP
5. 5. Miłek M.: Pomiary wielkości nieelektrycznych metodami elektrycznymi. Wyd. Pol. Ziel.</td></tr>
<tr><td>Supplementary literature</td><td>1. 1. Praca zbiorowa.: Przetworniki cyfrowe sygnałów elektrycznych. Podstawy teoretyczne. Warszawa: WNT
2. 2. Skubis T., Podstawy metrologicznej interpretacji wyników pomiaru, Wydawnictwo Politechniki Śląskiej, Gliwice 2004
3. 3. Świsulski D., Komputerowa technika pomiarowa, Agenda Wydawnicza PAK, Warszawa 2005</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Causes of errors: systematic, random and thick. Ways to reduce these errors.

2. How is the measurement uncertainty type A and type B defined?

3. Enter the diagram and method of balancing a Wheatstone bridge.

4. What is a two-channel oscilloscope phase measurement by comparison?

5. Introduce systems for measurement of active and reactive power in three-phase four-wire unbalancedcircuit.

6. Introduce systems for measurement of active and reactive power in three-phase three-wire balancedcircuit.

7. Describe the principle of operation of an effective transmitter of multiply-dividing system.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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