GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Metrology - laboratory, PG_00048809		
Field of study	Electronics and Telecommunications		
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 Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sylwia Babicz-Kiewlicz	
	Teachers	dr inż. Sylwia Babicz-Kiewlicz	

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

The aim is to teach: performing measurements of basic electrical quantities: voltage, current, frequency, resistance, capacitance, inductance; operating and making measurements with a digital oscilloscope; setting up, making measurements, processing of measurement data on computer-controlled measurement systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions	Student organizes the measurement system and measures the parameters of selected a / c converters. Measures high and low resistances and impedance parameters of RLC elements. Analyzes the measurement results and evaluates the accuracy of the measurement.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	Student calibrates analogue and digital electric meters. Measures basic electrical values: voltage, current, resistance, power and electricity. Examines the measuring capabilities of a digital oscilloscope. Measures signal parameters: time, frequency, phase shift. Student measures parameters of selected a / c converters. Measures high and low resistances and impedance parameters of RLC elements. Analyzes the measurement results and evaluates the accuracy of the measurement.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>1. Introduction: syllabus, characteristic of lab (one student - one stand, computer monitoring of student"s activity), principles of work and re-ports 2. Familiarization with basic instruments 3. Investigation and calibration of basic measuring instruments of electrical quantities, analog and digital having a PC link 4. Measurements of basic electrical quantities: voltage, current, resistance, power and electrical energy (using electronic P/f converter) 5. Study of a digital storage oscilloscope 6. Use of oscilloscopes to measure basic electrical quantities: voltage, pulse parameters, observation of device characteristics, observation of waveforms in digital circuits 7. Investigation of electronic timer-counter features 8. Use of digital methods and oscilloscope for measurements of time, frequency and phase 9. Investigations of properties and modes of operation of measuring sys-tem: bench multimeter, arbitrary function generator, hand-held multimeter 10. Investigation of dual slope integration ADC and voltage to frequency converter in above mentioned system 11. Investigation and calibration of AC/DC transducers: average-responding, peak-responding, AC low and high frequencies 12. Measurement of the RMS value of different types of waveforms with true RMS/DC conversion technique, average-responding instrument and with DSP method 13. Measurements of high and very low resistances with Wheatstone and Thomson bridges as well as using DMM with 4-wire Kelvin connectors 14. Measurements of impedance parameters of RLC components 15. Work out of outstanding exercises 16. Acceptation of student"s works</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>It is obligatory to read the Health and Safety Rules and the Regulations of the Metrology Laboratory. Teacher determines the form of verification. Without familiarizing yourself with the Health and Safety Rules and the Laboratory Regulations, it is not possible to start classes in the metrology laboratory.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Preliminary tests and reports for each exercise</td><td>50.0%</td><td>100.0%</td></tr>
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</td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Stabrowski M.: Cyfrowe przyrządy pomiarowe. PWN. 2. Nawrocki W.: Komputerowe systemy pomiarowe, WKiŁ</td></tr>
<tr><td>Supplementary literature</td><td>1. Dusza J. i inni: Podstawy miernictwa. Wyd. Politechniki Warszawskiej 2. Guide to the Expression of Uncertainty in Measurement. Wydanie polskie:Wyrażenie niepewnosci pomiaru, Przewodnik, Główny Urząd Miar</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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