



Subject card

Subject name and code	Metrology - laboratory, PG_00049311						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
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	Metrology and Electronic Systems Department -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Sylwia Babicz-Kiewicz				
	Teachers		dr inż. Sylwia Babicz-Kiewicz dr inż. Stanisław Galla				
Lesson types	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						
	eNauczanie source addresses: Moodle ID: 3096 Metrologia laboratorium EiT/ACiR/IBM 2026/2027 https://enauczanie.pg.edu.pl/2025/course/view.php?id=3096						
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		0.0		20.0	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 an analogue and 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_U08] while identifying and formulating specifications of engineering tasks related to the field of study and solving these tasks, can:n- apply analytical, simulation and experimental methods,n- notice their systemic and non-technical aspects,n- make a preliminary economic assessment of suggested solutions and engineering work n	The student organizes a measurement system and measures the parameters of selected A/D converters. Measures high and low resistance and impedance parameters of RLC elements. Analyzes the measurement results and assesses the accuracy of the measurement.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K6_U12] can analyze the operation of components, circuits and systems related to the field of study, as well as measure their parameters and examine technical specifications, and plan and conduct experiments related to the field of study, including computer simulations and measurements, and interpret obtained results and draw conclusions	The student calibrates analog and digital electrical meters. Measures basic electrical quantities: voltage, current, resistance, power, and electrical energy. Explores the measurement capabilities of a digital oscilloscope. Measures signal parameters: time, frequency, and phase shift. The student measures the parameters of selected analog-to-digital converters. Measures high and low resistances and impedance parameters of RLC elements. Analyzes measurement results and assesses measurement accuracy.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions	Knows, understands and is able to apply the basic laws related to electronics and signal processing	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
Subject contents	Course content – laboratory 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 analog and 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		

Prerequisites and co-requisites	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.		
	Progi % na poszczególne oceny:		
	<0;60>% 2		
	(60; 68>% 3		
	(68; 76>% 3,5		
	(76; 84>% 4		
	(84; 92>% 4,5		
	(92; 100>% 5		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tests	0.0%	30.0%
	Homeworks	0.0%	10.0%
	Activity	0.0%	60.0%
Recommended reading	Basic literature	1. Stabrowski M.: Cyfrowe przyrządy pomiarowe. PWN. 2. Nawrocki W.: Komputerowe systemy pomiarowe, WKiŁ 3. Materiały pomocnicze do wykładu na www.eti.pg.gda.pl/katedry/kose/dydaktyka	
	Supplementary literature	1. Dusza J. i inni: Podstawy miernictwa. Wyd. Politechniki Warszawskiej 2. Guide to the Expression of Uncertainty in Measurement. Wydanie polskie:Wyrażenie niepewności pomiaru, Przewodnik, Główny Urząd Miar	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Practical activities within the subject	Not applicable		

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