GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Metrology, PG_00064175		
Field of study	Transport		
Date of commencement of studies	October 2026	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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Electrified Transportation -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sławomir Judek	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	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	3.0	17.0	50

Subject objectives

Achievement by the student:
knowledge in the field of modern measuring methods, in particular with regard to the transport system;
skills engineering approach to the problem of metrology, and in particular the use of basic methods and procedures for the organization and operation of the measuring systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] has knowledge of physics, mechanics, electrical engineering, hydromechanics, thermodynamics, materials science, and measurement techniques necessary to understand the phenomena occurring in transportation, as well as the principles of construction and operation of infrastructure and means of transport	The student defines quantities and units. Measures selected physical quantities using direct and indirect methods. Uses conventional analog, digital and oscilloscope devices. Justifies the choice of class, range and type of instrument for a measurement task. Estimates measurement uncertainty.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U06] able to plan and conduct simple laboratory and operational experiments and simulations in the area of transport; able to interpret the results and formulate conclusions	The student is able to perform a measurement procedure in accordance with the instructions, process the results, and prepare a report.	[SU2] Assessment of ability to analyse information

Subject contents

Course content – lecture
LECTURE Quantity, unit, value, the system of units. Basic terms the theory of measurement uncertainty. Interval of uncertainty. General and specific procedures for estimating uncertainty. Measurement methods and tools. Signal processing and measurement transducers. Standards. Analog measurements. Analog-digital converters. Digital measurements. Measurements of electrical quantities. Measurements of geometrical quantities, motion parameters, forces and stresses, pressure and flow, temperature, vibration, noise. Measurements using GPS technology. Vision method 2D and 3D.
LABORATORY
Measurements: direct, indirect, single and multiple. Measurements of electrical quantities. Observations, imaging and oscilloscope measurements. Measurements of light intensity. Temperature measurements. Motion parameters measurements. Speed measurements. Checking the measuring equipment by comparison with the standard.

Prerequisites and co-requisites

Basic knowledge on mathematics and physics.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium.	60.0%	60.0%
	Reports of the laboratory experiments.	60.0%	40.0%
Recommended reading	Basic literature	Piotrowski J.: Podstawy miernictwa. WNT, Warszawa, 2002. Parchański J.: Miernictwo elektryczne i elektroniczne. Warszawa: WSiP, 1995. Chwaleba A., Poniński M., Siedlecki A.: Metrologia elektryczna. WNT, Warszawa, 2003. Czajewski P., Poniński M.: Zbiór zadań z metrologii elektrycznej. Warszawa: WNT, 2000. Raghavendra N. V., Krishnamurthy L.: Engineering Metrology and Measurements. Oxford University Press, 2013. Judek S., Skibicki J.: Metrologia w transporcie. Laboratorium. Gdańsk: Wydawnictwo Politechniki Gdańskiej, 2015.	
	Supplementary literature	Pr. zb.: Poradnik Inżyniera Elektryka, t. I. Warszawa: WNT, 2005. Pr. zb.: Elektrotechnika i elektronika dla nieelektryków. Warszawa: WNT, 2007. BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML.Guide to the Expression of Uncertainty in Measurement. International Organization for Standardization, Geneva 1995. BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML.International Vocabulary of Basic and General Terms in Metrology Second Edition 1993. International Organization for Standardization, Geneva.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Determine the uncertainty in single, direct measurement with an analog instrument. 2. Determine the uncertainty in single, direct measurement with an digital instrument. 3. Determine the uncertainty in indirect single measurement. 4. Present the measurement result in accordance with applicable standards, including its uncertainty.		
Practical activites within the subject	Not applicable		

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