GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electrical Measurements of Non-Electrical Values, PG_00038472		
Field of study	Electrical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2023/2024
Education level	second-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	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Metrology and Information Systems -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marek Wołoszyk	
	Teachers	dr inż. Michał Ziółko dr inż. Marek Wołoszyk	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	15.0	0.0	45

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	45	10.0	20.0	75

Subject objectives

Acquiring knowledge on the theory of aquisition and processing measurement signals as well as methods and measuring instruments used for nonelectrical measurements.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_W02	Student recognizes methods and equipment used in measurement of non-electrical quantities. Student matches appropriate tools for specific measurement tasks. Student applies the rules to eliminate the impact of external factors on the measurement accuracy. Student calibrates sensors and measurement circuits. Student analyzes the received measurement results.	[SW3] Assessment of knowledge contained in written work and projects
K7_U05	Student matches appropriate tools for specific measurement tasks. Student designs measurement systems for determining non-electrical quantities. Student analyzes the received measurement results.	[SU1] Assessment of task fulfilment
K7_K03	Student is able to work individually and in a group, knows how to estimate the time needed to carry out the task, and is able to implement the work schedule.	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills

Subject contents	LECTURE Classification of sensors and converters used in non-electrical quantities measurement. Static and dynamic properties of measurement sensors and converters. Sensors out-signal standards and rules of matching the signals with measurement systems. Elimination of external noises that disturb work of measurement sensors. Electrical measurement of temperature. Geometrical quantities measurement (dimension, displacement, level...). Movement parameters measurement (linear and rotational speed,...). Electrical measurement of forces and stresses. Measurement of pressure, flow and volume. Electrical measurement of environmental and physycal parameters. PROJECT During the project the student should develop a fragment of a measurement system for some industrial installation containing the measurement of at least four non-electrical quantities. The project should include a detailed selection of sensors including the development of ways of communicating these sensors with primary system and should contain an overall concept of a measurement system. LABORATORY Principles of development and documentation of measurement results. Elimination of the influence of external factors on the sensor - auto-calibration and linearization of characteristics. Water level measurements. Displacement measurements. Inclinometric measurements. Pressure measurements. Temperature measurements.
Prerequisites and co-requisites	Basic metrology knowledge.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written test	60.0%	30.0%
Laboratory exercises	60.0%	30.0%
Project	60.0%	40.0%

Recommended reading

Basic literature	1. Praca zbiorowa pod red. J. Piotrowskiego: Pomiary czujniki i metody pomiarowe wybranych wielkości. Warszawa, WNT, 2009. 2. Zakrzewski J.: Przetworniki i czujniki pomiarowe. Wyd. Politechniki Śląskiej, Gliwice 2004. 3. Nawrocki W.: Sensory i systemy pomiarowe. Wyd. Politechniki Poznańskiej, 2006.
Supplementary literature	1. Miłek M.: Pomiary wielkości nieelektrycznych metodami elektrycznymi. Wyd. Politechniki Zielonogórskiej, 1998.
eResources addresses	Adresy na platformie eNauczanie: POMIARY ELEKTRYCZNE WIELKOŚCI NIEELEKTRYCZNYCH [2023/24] - Moodle ID: 36014 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36014

Example issues/ example questions/ tasks being completed	1. Project of measurement system used to control the chosen parameters of the Jet Grouting drilling rig. 2. Project of measurement system used to monitor environmental conditions of breeding fish pond.
Work placement	Not applicable