GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modern Interdisciplinary Metrology and Measurement Data Analysis, PG_00073940		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
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	3.0
Learning profile	general academic profile	Assessment form	assessment
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 hab. inż. Anna Golijanek-Jędrzejczyk	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	20.0	0.0	0.0	0.0	20.0	40

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	40	5.0	30.0	75

Subject objectives

To develop the skills needed to design a measurement experiment, correctly estimate measurement uncertainty, and interpret results, taking into account modern digital and sensor technologies—regardless of the engineering discipline.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U03] is able to prepare and deliver a presentation on the results of an engineering task and own research	Develops and presents the results of metrological analyses of measurement systems.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K7_K02] can interact and work in a group assuming various roles and identify priorities for the achievement of a specific task	Works in a team, taking on various roles within it.	[SK1] Assessment of group work skills
[K7_K101] acknowledges the importance of knowledge related to the field of study in solving cognitive and practical problems, critically assessing the information obtained	Applies subject-specific knowledge to problem-solving while critically evaluating information.	[SK5] Assessment of ability to solve problems that arise in practice
[K7_W101] is able to make an in-depth identification of key objects and phenomena related to the field of study, as well as theories that describe them and applicable analytical and design methods	Identifies key issues in the field, the theories that describe them, and analytical and design methods.	[SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture

The philosophy of measurement and metrology in the digital age. Practical analysis of measurement uncertainty and methods for estimating expanded uncertainty, as well as calculations for selected measurement systems. Digital management of measurement data. Methods for analysing, visualising, interpreting and reporting measurement results. Modern methods for improving the quality and reliability of measurement results: identification and mitigation of the effects of disturbances, error compensation, correction of measurement channel characteristics, and self-calibration methods. Practical aspects of applying selected solutions. Advanced EMC measurement and testing techniques across various industrial sectors. Processing of measurement signals (DSP, noise reduction, cloud computing). Digital twin. Smart sensors and transducers (MEMS, IoT sensors). Non-contact diagnostics, non-destructive testing and future developments. From reliable measurement to a safe product – quality, accreditation, certification and legal requirements in the modern economy.

Course content – seminar

The seminar focuses on carrying out metrological analyses in engineering and presenting the results obtained during the course. Students may choose a topic directly related to their field of study or explore an interdisciplinary issue. Each pair of students prepares a presentation on a selected measurement problem from their own or a chosen discipline.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>Presentation</td><td>60.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>J. R Taylor, An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements (3rd ed.). University Science Books, The MIT Press, 2022</td></tr><tr><td>Supplementary literature</td><td></td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>What quantities are measured in the system being presented, for what purpose and to what required accuracy?
What are the specific characteristics of the measurement environment (noise, vibrations, corrosive environment, temperature)?
Provide a description and explanation of how the measurement system works.
Identify the sources of measurement uncertainty.
What is the measurement uncertainty of the measured quantity?
Please interpret the measurement results obtained and their measurement uncertainties.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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