GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Metrology and Measurement Systems, PG_00040171		
Field of study	Mechanical Engineering		
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 Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	English
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Manufacturing and Production Engineering -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Aleksandra Mirowska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	15.0	0.0	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	7.0	48.0	100

Subject objectives

Recognition with the basic principles of metrology and preparing to conduct measurements of mechanical sizes with the analysis of the results. Rules for determining the accuracy, tolerate and fits of machine parts. Knowledge of the methods of measurement and measuring instruments.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W11	Student recognizes mechanical quantities subject to measurement. Determine measurement methods and systems.	[SW1] Assessment of factual knowledge
K6_U05	Student explains construction and principle of operation of measurement instruments. Student chooses suitable measuring instrument for measure given quantity. Student measures. Student analyses results of measurements. Student calculates measuring errors.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

Subject contents

Course content – lecture
Lectures: Basic concepts in metrology: measurement, units of measurement, standards and instruments. Accuracy and uncertainty. Geometrical Product Specifications - GPS. Basics of tolerances, deviations and fits. Geometric tolerances. General tolerances. Tolerances of linear and angular dimensions without individual tolerance markings. Fundamentals of measurement (repeatability and reproducibility of the measuring instrument). Texture of surfaces. Methods and metrological equipment and principles of its selection. Laboratory: Measurements of external, internal, mixed and intermediate dimensions. Measurements of angles, . Measurements of surface texture and contours. Measurements using altimeters. 2D measurements. Coordinate measuring technique. Exercises: Measurements and their uncertainty (Measurement errors, uncertainty, uncertainty budget and statistical processing of measurement results). Tolerances and fits. Dimensional chains. Tolerancing of component dimensions.

Prerequisites and co-requisites		
Assessment methods and criteria		

Subject passing criteria	Passing threshold	Percentage of the final grade
Exercises	50.0%	30.0%
Lecture	50.0%	40.0%
Laboratory	50.0%	30.0%

Recommended reading	Basic literature	1. W. Jakubiec, J. Malinowski: Metrologia wielkości geometrycznych. WNT, Warszawa 2018. 2. S. Białas, Z. Humienny, K. Kiszka: Metrologia z podstawami specyfikacji geometrii wyrobów (GPS). Oficyna wydawnicza PW, Warszawa 2014. 3. S. Adamczak, W. Makieła: Metrologia w budowie maszyn. WNT, Warszawa 2021 4. T. Sałaciński: Ćwiczenia laboratoryjne z metrologii. Oficyna wydawnicza PW, Warszawa 2015. 5. S. Hudson: Metrology Handbook, States Academic Press, 2022..
	Supplementary literature	1. E. Ratajczyk: Współrzędnościowa technika pomiarowa. OWPW, Warszawa 2005 2. J. Jezierski: Analiza tolerancji i niedokładności pomiarów w budowie maszyn. WNT Warszawa 2003 3. A. Boryczko: Podstawy pomiarów wielkości mechanicznych. Wydawnictwo PG, Gdańsk 2010 4. A. Meller, P. Grudowski: Laboratorium metrologii warsztatowej i inżynierii jakości. http://www.wbss.pg.gda.pl , podręczniki (format PDF)
	eResources addresses	
Example issues/ example questions/ tasks being completed	Accuracy vs. precision. Define and compare.; Define the basic parameters of roughness.; Types and examples of measurement errors.; Difference between error and uncertainty in measurement	
Practical activites within the subject	Not applicable	

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