



Subject card

Subject name and code	Technical and Computer Metrology, PG_00064119						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
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		Polish		
Semester of study	2		ECTS credits		7.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Stefan Dzionk				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	30.0	0.0	0.0	75
	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	75		13.0		87.0	175
Subject objectives	Recognition with the basic principles of metrology and preparing to conduct measurements of mechanical and geometrical quantities 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_U07] is able to assess whether proposed methods and tools can be used in practice to solve simple engineering task related to machine design, manufacturing and utilization		The student selects an appropriate measuring instrument to measure a given quantity measured using CNC measuring systems. The student conducts simulation analyses, prepares a measurement program in a computer environment, and performs measurements. The student analyzes the measurement results. The student calculates errors and uncertainties of measurements. The student has knowledge of methods, errors and uncertainty of measurement, specification of product geometry and assessment of their accuracy and surface structure.		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K6_K02] is aware of importance of professional dealing and to fulfill ethics obligations, he/she understands other (nontechnical) abilities of mechanical engineering professional, their influence on the society and security of environment, he/she is aware of importance of social cooperation		The student explains the structure and principles of operation of measuring instruments. The student selects an appropriate measuring instrument to measure a given measured quantity. The student measures basic geometric quantities.		[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills [SK2] Assessment of progress of work		

Subject contents	Basic concepts in metrology: measurement, units of measurement, standards and instruments. Accuracy and uncertainty. Geometric structure of the product (Geometric Product Specifications - GPS). Basics of tolerances, deviations and fits. Geometric tolerances. General tolerances. Tolerances for linear and angular dimensions without individual tolerance markings. Basics of measurements (repeatability and reproducibility of the measuring device). Surface texture. Metrological methods and equipment and principles of its selection. Laboratory: Measurements of external, internal, mixed and intermediate dimensions. Measurements of angles, cones, . Surface texture and contour measurements. Measurements using altimeters. 2D measurements. Coordinate measurement technique (manual and CNC measuring machines). Exercises: Measurements and their uncertainty (Measurement errors, uncertainty, uncertainty budget and statistical analysis of measurement results). Tolerances and fits. Dimensional chains. Tolerance of component dimensions, interchangeability.		
Prerequisites and co-requisites	Basic knowledge of technical drawing		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	60.0%	30.0%
	Tutorial	60.0%	30.0%
	Written exam	60.0%	40.0%
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. E. Ratajczyk a. Woźniak: Współrzędnościowa technika pomiarowa. OWPW, Warszawa 2016 4. S. Adamczak, W. Makiela: Metrologia w budowie maszyn. WNT, Warszawa 2021 5. T. Sałaciński: Ćwiczenia laboratoryjne z metrologii. Oficyna wydawnicza PW, Warszawa 2015. 6. T. Sałaciński: Elementy metrologii wielkości geometrycznych. Przykłady i zadania. Oficyna wydawnicza PW, Warszawa 2013.	
	Supplementary literature	1. J. Jezierski: Analiza tolerancji i niedokładności pomiarów w budowie maszyn. WNT Warszawa 2003 2. A. Boryczko: Podstawy pomiarów wielkości mechanicznych. Wydawnictwo PG, Gdańsk 2010 3. A. Meller, P. Grudowski: Laboratorium metrologii warsztatowej i inżynierii jakości. http://www.wbss.pg.gda.pl ,podręczniki(format PDF)	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Types of fit machine parts and their uses? Classification of measurement errors? Presentation of measurement methods.		
Work placement	Not applicable		

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