



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	<table border="1" data-bbox="448 535 1487 674"> <thead> <tr> <th data-bbox="448 535 794 573">Subject passing criteria</th> <th data-bbox="794 535 1141 573">Passing threshold</th> <th data-bbox="1141 535 1487 573">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 573 794 607">Laboratory</td> <td data-bbox="794 573 1141 607">60.0%</td> <td data-bbox="1141 573 1487 607">30.0%</td> </tr> <tr> <td data-bbox="448 607 794 640">Tutorial</td> <td data-bbox="794 607 1141 640">60.0%</td> <td data-bbox="1141 607 1487 640">30.0%</td> </tr> <tr> <td data-bbox="448 640 794 674">Written exam</td> <td data-bbox="794 640 1141 674">60.0%</td> <td data-bbox="1141 640 1487 674">40.0%</td> </tr> </tbody> </table>			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%
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Recommended reading	Basic literature	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<p>Types of fit machine parts and their uses?</p> <p>Classification of measurement errors?</p> <p>Presentation of measurement methods.</p>														
Work placement	Not applicable														

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