



Subject card

Subject name and code	Advanced measuring systems, PG_00064944						
Field of study	Zaawansowane systemy pomiarowe						
Date of commencement of studies	February 2025		Academic year of realisation of subject		2025/2026		
Education level	second-cycle studies		Subject group		Specialty subject group Subject group related to scientific research in the field of study		
Mode of study	Part-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Division of Manufacturing and Production Engineering -> Institute of Manufacturing and Materials Technology -> 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	9.0	0.0	9.0	0.0	0.0	18
	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	18		5.0		27.0	50
Subject objectives	The aim of the course is to introduce students to modern measurement systems, including CMM, confocal and interferometric microscopy, and the use of these methods based on the geometric specifications of a product.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U03] plans and carries out experimental investigations to determine the parameters of devices, processes or systems in the field of Mechanical Engineering and Mechanical Engineering, appropriately selects methods, techniques and tools, interprets results and estimates measurement errors		The student has extensive knowledge of advanced measurement systems, is able to select the appropriate measurement methods related to the task problem, and correctly analyzes the results obtained.		[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania		
	[K7_W13] explains the main principles of individual and teamwork organization, including various forms of entrepreneurship utilizing knowledge from the field of engineering and technical sciences and disciplines relevant to the course of study		The student is able to evaluate existing technical solutions in plants and understands the need to adapt technology to changing trends and needs.		[SW1] Ocena wiedzy faktograficznej [SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym		
	[K7_W03] demonstrates a well-structured and theoretically grounded knowledge of the key issues in Mechanical Engineering to enable the design and diagnosis of mechanical systems, processes and devices		The student is able to design a quality control process for complex mechanical components and interpret measurement results in terms of the manufacturing technology used for machine parts.		[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym		

Subject contents	Course content – lecture The essence of coordinate measurements, the basics of CMM machine construction and their parameters, measuring systems, measuring heads and methods of determining their accuracy, non-contact measuring heads, measurement procedures and standard computer software, Production measuring machines, accuracy of measuring machines and methods of determining it, coordinate measuring arms, industrial computed tomography, confocal microscopy, interferometric microscopy. Geometric model, shape tolerances, datums, datum elements and mappings of datum elements, methods for determining measurement datums, tolerances of direction, position, shape of a specified contour or shape of a specified surface with or without a datum, spatial description of surface roughness. Functional selection, designation, and interpretation of geometric tolerances. Tolerances of selected complex geometric elements. Course content – laboratory Measurement of various geometric features using coordinate measuring techniques, planning measurements using various techniques, determining the geometric structure of surfaces using confocal and interferometric techniques. Use of coordinate measuring machines to control dimensional and geometric deviations. Differences between EN-ISO standards and other standards.		
Prerequisites and co-requisites	Fundamentals of metrology, technical drawing, manufacturing techniques		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	60.0%	60.0%
	Laboratory	60.0%	40.0%
Recommended reading	Basic literature	1. E. Ratajczyk: Współrzędnościowa technika pomiarowa. OWPW, Warszawa 2005 2. Piotr Kiszka, Piotr Niesłony, Wit Grzesik: Programowanie obrabiarek CNC. PWN Warszawa 2020. 3. Hybrydowe metody obróbki materiałów konstrukcyjnych. PWN Warszawa 2021. 4. Wacław Skoczyński: Sensory w obrabiarkach CNC. PWN Warszawa 2018. 5. Adamczak, S., Makiela, W. (2014). Metrologia w budowie maszyn: zadania z rozwiązaniami. Wydawnictwa NaukowoTechniczne.	
	Supplementary literature	Selected journals available online in the databases of Gdańsk University of Technology, concerning modern metrology, e.g.: 1. Measurement - https://www.sciencedirect.com/journal/measurement 2. Metrology - https://www.mdpi.com/journal/metrology	
	eResources addresses		

Example issues/ example questions/ tasks being completed	1. Present the general concept of external and internal dimensions. 2. Specify the shape and position tolerances for the mechanical component presented. 3. Select the technology for manufacturing the part for the assumed dimensional and shape tolerances. 4. Based on the measurement data from the coordinate measuring machine, select the possible technologies used to manufacture the part. 5. Characterize the parameters used in the spatial description of surface roughness.
Practical activities within the subject	Not applicable

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