GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Advanced measuring systems and Geometric Product Specification, PG_00064717		
Field of study	Management and Production Engineering		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-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	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Aleksandra Mirowska	
	Teachers		

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	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	60	8.0	32.0	100

Subject objectives	To familiarize students with advanced measurement methods based on CMM, confocal microscopy, interferometric microscopy and other measurement methods. The course also aims to familiarize students with the proper specification of product geometries

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W12] identifies and interprets the main developmental trends and significant new achievements in the field of engineering and technical sciences and disciplines relevant to the course of study	Orientation in access to scientific and journal databases related to modern solutions used in metrology.	[SW1] Assessment of factual knowledge
	[K7_K11] is aware of importance of professional acting, the need for critical verification of acquired knowledge and consulting experts opinion in case of facing difficulties with individual problem solving	The student acquires knowledge from the literature on measurement and its accuracy. The student verifies the methods of measurement depending on the properties of the object being measured and the expected uncertainty of the measurement.	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_W01] explains and describes, on the basis of general knowledge in the field of scientific disciplines creating the theoretical basis for Management and Production Engineering, the structure and principles of operation of production systems and processes and their elements, as well as methods and means of their integration and control	Designing the quality control process for complex mechanical components, interpreting the results of geometric measurements in terms of the applied manufacturing technology of machine parts.	[SW3] Assessment of knowledge contained in written work and projects
	[K7_U02] formulates and tests hypotheses related to problems occurring in stationary and non-stationary systems as well as in production and technological processes combined with simple research problems	The student has an expanded knowledge of advanced measurement systems. The student has an expanded knowledge of geometric surface structure parameters and their interpretation.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	The importance of coordinate measuring machines, the basics of CMMs and their parameters, measuring systems, measuring heads and ways to determine their accuracy, non-contact measuring heads, measuring procedures and standard computer software, Production measuring machines, accuracy of measuring machines and ways to determine them, coordinate measuring arms, industrial computed tomography, confocal microscopy, interferometric microscopy. Geometric model, shape tolerances, bases, base elements and representations of base elements, ways of determining measurement bases, tolerances of direction, position, shape of determined outline or shape of determined surface with or without base, spatial description of surface roughness. Measurement of various geometric features by means of coordinate measuring technique, planning of measurements by techniques determination of geometric structure of the surface by means of confocal and interferometric techniques. Functional selection, determination and interpretation of geometric tolerances. Tolerances of selected complex geometric elements. Dimensional chains - analysis and synthesis. Application 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
		60.0%	40.0%
		60.0%	30.0%
		60.0%	30.0%

Recommended reading	Basic literature	1. Humienny, Z. (Ed.). (2004). Specyfikacje Geometrii Wyrobów (GPS): podręcznik europejski. WNT.
		2. Wieczorowski, M., & Gapiński, B. (2015). Odchyłki kształtu i położenia Parametry i metody pomiaru. Stal, Metale & Nowe Technologie.
		3. E. Ratajczyk , A Wożniak, Współrzędnościowe systemy pomiarowe, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2016.
		4. Adamczak, S., & Makieła, W. (2014). Metrologia w budowie maszyn: zadania z rozwiązaniami. Wydawnictwa NaukowoTechniczne.
	Supplementary literature	Selected journals available online in the databases of the Gdansk University of Technology on modern metrology, such as:
		1. Measurement - https://www.sciencedirect.com/journal/ measurement
		2. Metrology - https://www.mdpi.com/journal/metrology
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Present the general concept of external and internal dimension.2. For the presented mechanical component, determine the shape and position tolerances.3. Select the part manufacturing technology for the assumed dimension and shape tolerances.4. Based on the measurement data from the coordinate measuring machine, predict the possible technologies used to make the part.5. Characterize the parameters used in the spatial description of surface roughness.
Work placement	Not applicable