GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Advanced measuring systems, PG_00059489
Field of study	Management and Production Engineering

Date of commencement of studies	February 2024	Academic year of realisation of subject	2023/2024
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	2.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Zakład Technologii Maszyn i Automatyzacji Produkcji -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology

Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Dobrzyński
	Teachers	dr inż. Michał Dobrzyński dr inż. Aleksandra Laska

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	4.0	16.0	50

Subject objectives	Familiarisation with advanced measurement methods based on CMM confocal microscopy with interferometric and other methods.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K04] is aware of the social role of the university graduate, and especially understands the need to formulate and communicate to society - incl. through the mass media - information and opinions on technological achievements and other aspects of an engineer's activity; makes efforts to provide such information and opinions in a generally comprehensible manner, justifying different points of view	The student communicates using specialist vocabulary. The student explains the meaning of specialised terms and their metrological interpretation.	[SK4] Assessment of communication skills, including language correctness
	[K7_U09] is able to define the directions of further learning and implement the process of self-education	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 measurement.	[SU4] Assessment of ability to use methods and tools
	[K7_U04] is able to plan and carry out experiments, including measurements and computer simulations, interpret the obtained results and extract conclusions; can use analytical, simulation and experimental methods to formulate and solve engineering tasks	The student selects a measurement system for specific metrology tasks. The student analyses measurement results and determines the uncertainty range.	[SU2] Assessment of ability to analyse information
	[K7_W03] has an orderly, theoretically founded knowledge related to selected areas of production engineering.	The student has an extended knowledge of advanced measurement systems. The student has an extended knowledge of geometric surface structure parameters and their interpretation.	[SW1] Assessment of factual knowledge

Subject contents	Lecture Introduction, Essentials of coordinate measuring, Basic principles of CMMs and their parameters, Measuring systems, Measuring heads and how to determine their accuracy, Non-contact measuring heads, Measuring procedures and standard computer software, Production measuring machines, Accuracy of measuring machines and how to determine them, Coordinate measuring arms, Industrial computed tomography, Confocal microscopy, Interferometric microscopy. Laboratory Exercises: Measurement of different geometrical features by coordinate measuring technology, planning of measurements by techniques determining the geometrical structure of surfaces by confocal and interferometric techniques.

Prerequisites and co-requisites	Basic metrology course

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final test	60.0%	60.0%
	Laboratory report	60.0%	40.0%

Recommended reading	Basic literature	1. E. Ratajczyk , A Wożniak, Współrzędnościowe systemy pomiarowe, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2016. 2. W. Jakubiec, J. Malinowski: Metrologia wielkości geometrycznych, WNT, Warszawa 2018. 3. S. Białas, Z. Humienny, K. Kiszka: Metrologia z podstawami specyfikacji geometrii wyrobów (GPS), Oficyna wydawnicza PW, Warszawa 2014.
	Supplementary literature	Scientific journal articles: Measurement, Metrology and Measurement System, Measurement and Control, and others
	eResources addresses	Adresy na platformie eNauczanie: Zaawansowane systemy pomiarowe, W, ZiIP, st. II, sem. 1, letni, 2023/2024, PG_00059489 - Moodle ID: 37787 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37787 Zaawansowane systemy pomiarowe, W, ZiIP, st. II, sem. 1, letni, 2023/2024, PG_00059489 - Moodle ID: 37787 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37787

Example issues/ example questions/ tasks being completed	

Work placement	Not applicable