



Subject card

Subject name and code	Advanced measuring systems, PG_00059377						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional 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			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Technologii Maszyn i Automatykacji 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	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	6.0		51.0	75	
Subject objectives	The aim of the course is to familiarize students with advanced measuring devices used in production plants and the trends in their development.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W06] possesses organized, profound knowledge necessary for designing and optimization of complex technological processes, modelling and calculations using numerical methods, knows modern manufacturing methods and tools for designing manufacturing processes of machines, devices, their elements and components	The student will have knowledge in the field of designing measurement processes and their optimization and alignment.			[SW1] Assessment of factual knowledge		
	[K7_U07] is able to perform a preliminary economic analysis of the undertaken engineering actions within the range of design, production and operation of machines and technical devices	The student will be able to design a process using advanced measurement techniques and apparatus.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[K7_W07] possesses profound knowledge on the diagnostics and monitoring of the condition of devices, assemblies and technical systems, as well as measurement methods of process and operation control	The student will have knowledge in the field of metrology and quality control with the use of advanced measuring means.			[SW1] Assessment of factual knowledge		

Subject contents	Advanced measuring devices and systems. Vision Measuring Systems (2D/3D). Form Measurement(Surface Roughness and Contour Measuring Instruments). Advanced Optical Measuring Systems (focusvariation, interferometry, confocal techniques). Development of a programs with the use of coordinatedmeasuring machines (CMM). Advanced systems for measuring mechanical properties (e.g., nanoindentation).		
Prerequisites and co-requisites	Metrology		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lab test	50.0%	40.0%
	Test	50.0%	60.0%
Recommended reading	Basic literature	<p>E. Ratajczyk: Współrzędnościowa technika pomiarowa. OWPW,Warszawa</p> <p>S. Białas: Metrologia z podstawami specyfikacji geometrii wyrobów (GPS). OWPW, Warszawa</p> <p>M. Kot, W. Rakowski, J. Łyżniak, Modelling and Experimental Verification of Nanoindentation Tests on Coating-Substrate Systems = Modelowanie i eksperymentalna weryfikacja testów nanoindentacji dla układów powłoka-podłoże.</p>	
	Supplementary literature	W. Jakubiec: Metrologia wielkości geometrycznych. PWN	
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Zaawansowane systemy pomiarowe, W, MiBM, niestacjonarne, sem. 2 st. II, zimowy 2023/2024 - Moodle ID: 34229 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34229</p> <p>Zaawansowane systemy pomiarowe, W, MiBM, niestacjonarne, sem. 2 st. II, zimowy 2023/2024 - Moodle ID: 34229 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34229</p>	
Example issues/ example questions/ tasks being completed	<p>Coordinate measuring technique.</p> <p>ISO profile method.</p> <p>Olivier - Pharr model in indentation studies</p>		
Work placement	Not applicable		