



## Subject card

Subject name and code	, PG_00052093						
Field of study	Nanotechnology						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2022/2023		
Education level	first-cycle studies		Subject group		Optional subject group 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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		2.0		
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. Bogdan Ścibiorski				
	Teachers		dr inż. Bogdan Ścibiorski				
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		2.0		18.0	50
Subject objectives	To acquaint students with the basic techniques of manufacturing structural elements of technological devices and the quality requirements for various types of processing, including with an accuracy below 1 micrometer.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U02		The student analyzes simple machining processes by selecting the process parameters and tools.		[SU4] Assessment of ability to use methods and tools		
	K6_W07		The student knows the basic phenomena occurring during machining. The student is able to choose devices and tools depending on type of process and structure workpiece material		[SW1] Assessment of factual knowledge		
	K6_K04		The student makes reports on the course of the machining process by assessing the appearing there processes by interacting in a group of students.		[SK5] Assessment of ability to solve problems that arise in practice		
	K6_W09		The student knows the basic techniques measuring physical quantities and their possibilities in machining machine parts.		[SW1] Assessment of factual knowledge		
	K6_U04		The student is able to plan a simple one technological and critical process analyze its results		[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		

Subject contents	LECTURES: Aspects of accuracy in production, methods of measuring and determining the quality of workmanship due to the accuracy of machining, the basics of machining, the basics of manufacturing systems, basics planning of technological processes, computer-aided manufacturing. Tools used in typical technological processes of machine parts. Micro and nano coatings of cutting tools. The influence of nano-layers on the functional aspects of cutting tools. Finishing machining, including machining below 1 micrometer, abrasive machining, non-wastage technologies. Application of grinding and burnishing technology for parts of different classes.  LABORATORY: Basics of designing elements in CAD/CAM systems, basic systems manufacturing including a lathe manufacturing system, milling manufacturing system, finishing machining, production of gears, workshop measurements of various sizes and control of quality requirements.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquium	56.0%	80.0%
	Raports	56.0%	20.0%
Recommended reading	Basic literature	1. Feld M.: Podstawy projektowania procesów technologicznych typowych części maszyn, WNT, Warszawa, 2021. 2. Poradnik inżyniera. Obróbka skrawaniem, T. I-III, WNT, Warszawa 1993. 3. M. P. Groover: Fundamentals of modern Manufacturing, JOHN WILEY&SONS, INC. 4. S. Kalpakjian, S. R. Schmid: Manufacturing Engineering and Technology, Pearson Prentice Hall.	
	Supplementary literature	Meyer Kutz: Mechanical Engineers' Manufacturing and management, JOHN WILEY&SONS, INC	
	eResources addresses	Adresy na platformie eNauczanie: Nowoczesne techniki wytwarzania elementów urządzeń technologicznych, W/L, Nanotechnologia, zimowy 22/23 (PG_00033009) - Moodle ID: 24025 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24025">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24025</a>	
Example issues/ example questions/ tasks being completed	1. Characterize tool materials. 2. Describe the cutting process 3. Characterize machining allowances, 4. Bases in the manufacturing process, 5. Describe the relationship between the accuracy class of the manufactured elements and the surface structure 6. What is a technological base, 7. Operation, treatment in the manufacturing process, 8. Characterize machining, 9. Characteristics of the grinding process, 10. Abrasive grains and micro-grains		
Work placement	Not applicable		