



## Subject card

Subject name and code	, PG_00056113						
Field of study	Mechatronics						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group					
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	prof. dr hab. inż. Kazimierz Orłowski					
	Teachers						
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	0.0	0.0	30		
Subject objectives	Explanations of processes in mechanisms of machine tools, which affect their technical-operational features. The analyses of the structure, performance and maintenance of basic units and groups of machine tools. Joining knowledge from different domains.						
Learning outcomes	Course outcome	Subject outcome		Method of verification			
	[K6_U05] is able to use properly chosen tools to compare design solutions of elements and mechatronics systems according to given application and economic criteria (e.g. power demand, speed, costs)	Student is able to design a simple kinematics and its technical solution		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information			
	[K6_U02] is able to elaborate on specific mechatronic topics as well as topics from engineering and technical sciences and disciplines such as Mechanical Engineering, Automation, Electronics and Electrical Engineering	Can select the basic the means of production to be solved task assigned		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information			
	[K6_W10] has a basic knowledge about development trends in terms of engineering and technical sciences and scientific disciplines: Mechanical Engineering, Automation, Electronics and Electrical Engineering, adequate for Mechatronics course	Knows the basic technologies used in the manufacture of parts machines		[SW1] Assessment of factual knowledge			
Subject contents	<p>LECTURE: Technical-operational features of machine tools: productivity, accuracy, stiffness, safety, ergonomics, durability and reliability. Basic units of modern machine tools. Requirements, properties and structure of bodies, guiding systems and spindle units. Analysis of the kinematic system of a machine tool: concepts, kinematical couplings, kinematical accuracy. CNC machine tools with series and parallel connections in the system configuration. Drives of automated manufacturing machines. Evolution of application electric, pneumatic and hydraulic drives. Specification of requirements that drives of modern machine tools have to meet with. Classification, basic features and area of application of contemporary drives with electric motors. Definition and structure of a servodrive. Direct drives. Examples of drives of modern manufacturing machines.</p> <p>PRACTICAL EXERCISES: Kinematical accuracy of machine tools. Positioning accuracy of the table of the CNC miller. Dynamical investigations of machine tools. Design structure of numerical controlled machine tools. Positioning drives with stepping motors. Automated drives of manufacturing machines with AC motors. Power balance in manufacturing machines. Constructional structures of numerically controlled manufacturing machines.</p>						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercises	100.0%	30.0%
	Midterm colloquium	56.0%	70.0%
Recommended reading	Basic literature	Jemielniak K.: Automatyczna diagnostyka stanu narzędzia i procesu skrawania. Oficyna Wydawnicza Poli. Warsz. 2002. Kosmol J.: Serwonapędy obrabiarek sterowanych numerycznie. WNT1998. Honczarenko J.: Obrabiarki sterowane numerycznie. WNT Warszawa 2008	
	Supplementary literature	Grzesik W., Nlesłony P., Kiszka P.: Programowanie obrabiarek CNC. PWN Warszawa, 2020.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Final Test contains a number of specific questions with topic, i.e. classes. lectures and lab exercises		
Work placement	Not applicable		