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	Explanaitions 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 choosen tools to compare design solutions of elements and mechatronics systems according to given application and economic crtierions (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 curse	Knows the basic technologies used in the manufacture of parts machines	[SW1] Assessment of factual knowledge

Subject contents	LECTURE: Technicaloperational 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 athe 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. 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 steping motors. Automated drives of manufacturing machines with AC motors. Power balance in manufacturing machines. Constructional structures of numerically controlled manufacturing machines.

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., NIesłony P., Kiszka P.: Programowanie obrabiarek CNC. PWN Warszawa, 2020.	
	eResources addresses	Adresy na platformie eNauczanie:	
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		