



## Subject card

Subject name and code	Building, exploitation and control technological machines, PG_00040076						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-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	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Daniel Chuchała					
	Teachers	dr hab. inż. Daniel Chuchała prof. dr hab. inż. Kazimierz Orłowski dr inż. Aleksandra Suchta					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	22.0	0.0	15.0	0.0	0.0	37
	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	37	11.0		77.0	125	
Subject objectives	To familiarise the student with the construction, operation and basic principles of operation of process machine components. To analyse the influence of the choice of design solution and components on the features of the technical and operational features of a machine.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U08] is able to design a technological manufacturing process for typical elements of machines or devices, using analytical and numerical calculating tools	The student has knowledge of the construction of operating rules, including the possibilities and technological limitations of machine tools and other production devices.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W06] possesses elementary knowledge on automatics and robotics of mechanical systems	The student has elementary knowledge of drive units and control systems for cutting machine tools and other technological machines.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K6_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle	The student explains the impact of the design solution on the technical and operational features of technological machines and knows the basic principles of operation of their components.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
Subject contents	<p>LECTURE: The spatial-motor system of a technological machine. Classification of movements in machine tools. Kinematics of machine tool drive units: kinematic scheme, kinematic chains, stepped drives, kinematics systems for realisation of complex shaping movements. Spindles of machine tools, spindle bearings, examples of solutions. Feed drives, mechanisms for converting rotary motion into linear motion. Guides - varieties and examples of solutions. Clutches and brakes - tasks performed, varieties, examples of solutions. Bodies of technological machines - requirements and examples of construction.</p> <p>Mechanical components for the construction of modular machines. OUPN system of machine tools, static and dynamic rigidity, thermal deformations, typical machining errors caused by vibrations and deformations in cutting machines. Machine drives. Main features and fields of application of electric drives with asynchronous, synchronous, DC, stepper motors. Servo drives. Structure and principle of operation of axis drives of numerically controlled machines. LABORATORY: Kinematic accuracy of technological machines. Dynamic tests of technological machines. Determination of critical speeds of rotary tools with low inherent stiffness. Computer-aided selection of selected machine tool components. Conventional and CNC-controlled technological machines. Experimental determination of technological bases on a CNC milling machine. Tool length measurement on a CNC milling machine.</p>						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory exercises	100.0%	10.0%
	Final exam	56.0%	90.0%
Recommended reading	Basic literature	1. Honczarenko J.: Obrabiarki sterowane numerycznie. WNT. Warszawa 2008.2. Wrotny L.T.: Obrabiarki skrawajace do metali. WNT. 1979.3. Wrotny L.T.: Podstawy konstrukcji obrabiarek. WNT. 1973.4. Wrotny L. T.: Kinematyka i dynamika maszyn technologicznych i robotów przemysłowych. Oficyna Wydawnicza Poli. Warsz. 1996.	
	Supplementary literature	1. Collective work (Balul W.M. et al.): Obrabiarki do skrawania metali. WNT. 1974.2. Indicated websites of manufacturers and sellers of components for machine building.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	The final test contains many questions relating to the individual sub-topics presented in the lectures and exercises, e.g. methods of measuring tool length on a CNC milling machine.		
Work placement	Not applicable		