GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Systems and the means of productions, PG_00024831		
Field of study	Management and Production Engineering, Management and Production Engineering		
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	3.0
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. Krzysztof Doerffer	
	Teachers	dr inż. Mieczysław Siemiątkowski	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	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	45	0.0	0.0	45

Subject objectives	Presentation of the importance of technological machines as the basic means of production. To acquaint students with the construction and operation principles of the most important systems and units of technological machines. Acquainting with the issues of automation of technological machines.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K01		
K6_U11		
K6_U11		
K6_U09		
K6_U09		
K6_W13		
K6_W13		
K6_W06		
K6_W06		
	The student has knowledge of the construction and operation of technological machines and their basic units.	[SW1] Assessment of factual knowledge
	The student knows the keywords and concepts necessary to use the Internet resources in order to deepen the knowledge of the subject matter.	[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness
	The student presents the structure and principle of operation of an automatic control system with the use of a programmable microprocessor controller.	[SU1] Assessment of task fulfilment
	The student describes the method, equipment and software used in the exemplary problem of dynamic testing of a technological machine.	[SU1] Assessment of task fulfilment
	The student has knowledge of the possibilities and limitations of operation and development trends of basic units of technological machines.	[SW1] Assessment of factual knowledge

Subject contents

LECTURE: Definitions and terms concerning systems and means of production. Technological machines as the most important group of means of production. The space and movement system of a technological machine. Classification movements in machine tools. Kinematics of machine drive units: kinematic diagram, chains kinematic, stepped drives, kinematic systems for the implementation of complex shaping movements, comparison of the kinematic systems of a traditional and CNC machine tool. Main drives, machine tool spindles, spindle bearings, examples of solutions. Feed drives, mechanisms to convert a rotary motion to a linear one. Guides - varieties of guides, their features, examples of applications. Clutches and brakes - tasks, variants, examples of solutions. Bodies of technological machines - requirements, examples of structures. Mechanical components for building modular machines, examples and advantages of modular machines. Deformations, vibrations, static and dynamic stiffness, typical machining errors caused by vibrations and deformations in cutting machines. Automatic control systems of machines: traditional automatic control systems (cam, copy, stop, sequence and relay), programmable microprocessor controllers. Principle and applications of PLC, CNC, AC control. Technological machine drives - tasks and requirements. Comparison of the features and areas of application of electric, pneumatic and hydraulic drives. Applications of electric drives with asynchronous, synchronous, direct current and stepper motors. The concept of a servo drive. Structure and principle of operation of numerically controlled machine axis drives. Review of exemplary technological machines, including selected machine tools traditional and CNC cutting machines.

LABORATORY: Analysis of kinematic chains of gear hobbing milling machine. Structures of numerically controlled technological machines. PLC control in technological machines. Automatic positioning drive with asynchronous motor. Researching of dynamics of manufacturing machines. Analysis of technological possibilities and assessment of the condition of the WKA-25 drill. Rules for the operation and installation of rolling bearings in technological machines.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Final test	50.0%	90.0%
Laboratory exercises	100.0%	10.0%

Recommended reading	Basic literature	1. Honczarenko J.: Obrabiarki sterowane numerycznie. WNT. Warszawa 2008. 2. Wrotny L.T.: Obrabiarki skrawające 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 Politechn. Warsz. 1996. 5. Praca zbiorowa (Balul W.M. i inni): Obrabiarki do skrawania metali. WNT. 1974. 6. Selected web pages of manufacturers and sellers of components for machine building.
	Supplementary literature	1. Instructions for laboratory exercises. 2. Instructions for PLC controllers.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	The test is in the form of a guizu containing many questions related to the topics of lectures and exercises.	
Work placement	Not applicable	