GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058633
Field of study	Mechatronics

Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	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. Tomasz Seramak
	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	To acquaint students with modern solutions and design issues in the field of control and drives of automated technological machines.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U04] is able to utilise known methods and mathematical models, as well as computer simulations for analysis and evaluation of non-stationary continuous and discrete mechatronic systems and processes	The student has knowledge of computer aids used for calculations and selection of drive components, for tuning programmable drive parameters and for testing the motional accuracy of CNC machines.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
	[K7_W10] knows development trends and most important new achievements in technical sciences and science disciplines: Mechanical Engineering, Automation, Electronics and Electrical Engineering and related: Informatics and Materials Engineering	The student knows the most important achievements in the field of automatic control systems and techniques of electromechanical and direct servo drives, which are used in modern technological machines.	[SW1] Assessment of factual knowledge
	[K7_W06] has detailed, supported by the theory knowledge in terms of mechatronic design, mechatronic systems and machines, devices and process where they are used	The student has knowledge of the design issues of mechatronic systems related to the control technique and drives of cutting machine tools and other technological machines	[SW1] Assessment of factual knowledge
	[K7_W01] has extended knowledge in terms of selected areas of mathematics, including discrete and applied mathematics, optimisation methods, mathematical and numerical methods essential for: 1) modelling and analysis of nonstationary mechatronics, continuous and discrete time systems as well as physical phenomena; 2) description and analysis of mechatronic systems that include programmable devices 3) description and analysis of signal processing algorithms 4) synthesis of non-stationary mechatronic systems	The student has knowledge of mechatronic systems containing programmable systems and signal processing algorithms that are used in control systems and drives of technological machines.	[SW1] Assessment of factual knowledge

| Subject contents | LECTURE: Movement and space structures and kinematic systems of selected technological machines. Automatic control systems of machines. Programmable controllers of technological machines. Movement and motor control tasks in modern automatic technological machines. Requirements for drives and types of drives. Transducers and sensors for controlling drives, feedback of servo drives, measuring devices. Structure, properties and ranges of applications of AC, DC and stepper motors and servomotors. Rotary and linear motors for direct drives and their applications. Power electronic power supply and control units. Gear components and other mechanical elements in electromechanical drives of rotary and linear movements. Computer support in calculations and selection of drive components, in initial commissioning and in fine-tuning of drive parameters. Methods of assessing the motion accuracy of CNC and similar machines, measuring equipment and testing software.

 Topics of Laboratory Exercises: 1. Drive and control components for modern technological machines. 2. Structure and operation of the CNC machine tool. 3. Principles of selection and functional properties of sensors and measuring devices for automation of drives. 4. Structure and parameterization of an electromechanical switchable positioning drive with an asynchronous motor and PLC control. 5. Structure, parameterization and initial commissioning of the linear module drive with a stepper motor and CNC control. 6. Principles of selection, parameterization and operation of the inverter in a drive with a squirrel-cage asynchronous motor. 7. Principles of selection, parameterization and maintenance of a servo drive with a brushless AC motor. |
|---|---|

Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Reports on the all exercises	100.0%	10.0%
	Final test	50.0%	90.0%

Recommended reading	Basic literature	1. Blacharski W .: Set of presentations for lectures on "Control and drive technology". 2. Internet - use of key words and search engines given in the class (Google and others) 3. Internet - technical documentation, catalogs, technical articles and many other materials on the indicated websites. 4. Wrotny L.T: Podstawy konstrukcji obrabiarek i inne książki 5. Honczarenko J.: Roboty przemysłowe, budowa i zastosowanie. WNT. 2010. 6. Honczarenko J.: Obrabiarki sterowane numerycznie. WNT. 2009. 7. Kosmol J.:Serwomechanizmy obrabiarek sterowanych numerycznie. WNT. Warszawa, 1998. 8. Pritschow G.: Technika sterowania obrabiarkami. Ofic. Wyd. Pol. Wrocławskiej. Wrocław 1995.
	Supplementary literature	Magazines: - Sterowanie i Napędy - Control Engineering
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	The final test contains many control questions relating to the individual subtopics of the lectures and exercises.	
Work placement	Not applicable	

Document generated electronically. Does not require a seal or signature.