GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00053424
Field of study	Automation, Robotics and Control Systems

Date of commencement of studies	October 2020	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	4	Language of instruction	Polish
Semester of study	7	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering

Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jarosław Łuszcz
	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	5.0	40.0	75

Subject objectives	Understanding the basic physical phenomena related to the disturbances in the control and automation systems.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W10] has basic knowledge related to mechatronics and robotics systems	has basic knowledge in the field of device interference	[SW1] Assessment of factual knowledge
	[K6_W06] knows the structure of computers and microprocessors and the tasks of operating systems, has basic knowledge of the basics of computer software, drivers, microprocessor technology, design of simple algorithms and the operation of information networks	knows the causes of interference in control systems	[SW2] Assessment of knowledge contained in presentation
	[K6_U03] can prepare and present a presentation on the problems and results of an engineering task	is able to prepare and present studies on issues related to interference	[SU5] Assessment of ability to present the results of task
	[K6_U01] can obtain information from literature, databases and other sources; integrate the information obtained, interpret it and draw conclusions, formulate and justify opinions	is able to use literature sources to solve interference problems	[SU1] Assessment of task fulfilment

Subject contents	Sources and propagation of conducted and radiated disturbances. Electromagnetic emission and immunity of automation systems. Inductive and capacitive parasitic couplings. Characteristics of power and signal circuits in the field of EMC. Interference protection in analog, digital and mixed circuits. Typical causes of disturbances in control and automation systems. Interference reduction methods (filtration, decoupling, shielding). The role of grounding, shielding and equipotentialization in reducing interference. Crosstalk in signal transmission paths. Attenuation of interference in analog signal transmission paths (0-10V, 4-20mA). Attenuation of interference in digital signal transmission paths (RS232, RS485, Ethernet)
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Task report	50.0%	50.0%
	Lecture reports	50.0%	50.0%

Recommended reading	Basic literature	Spiralski L., Kołodziejski J., Konczakowska A., Hasse L. Zakłócenia w aparaturze elektronicznej. Charoy A.: Electromagnetic compatibility. Interference in electronic devices. Volume 1-4. Bogtin E.: Signal and Power Integrity - Simplified.
	Supplementary literature	Ott H. W. Metody redukcji zakłóceń i szumów w układach elektronicznych. Howard W. Johnson, Martin Graham: High-speed Signal Propagation: Advanced Black Magic.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Analysis of digital signal transmission interference in serial interfaces. Analysis of the transmission interference of 20 mA analog signals.	
Work placement	Not applicable	