



Subject card

Subject name and code	, PG_00053442						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject				2026/2027	
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				4.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jarosław Łuszcz				
	Teachers						
Lesson types	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		65.0	100
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_U09		selects power equipment taking into account the occurrence of interference			[SU5] Assessment of ability to present the results of task	
	K6_U10		designs simple electrical networks and installations, taking into account the occurrence of interference			[SU5] Assessment of ability to present the results of task	
	K6_W10		takes into account energy efficiency aspects in implemented projects.			[SW1] Assessment of factual knowledge	
	K6_K01		educates and self-improves knowledge of electrical engineering			[SK5] Assessment of ability to solve problems that arise in practice	
Subject contents	<p>Course content – lecture Lecture: 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)</p> <p>Laboratory: Testing conducted and radiated emissions of electrical devices. Testing the effectiveness of anti-interference filtration. Shielding effectiveness test.</p>						
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. Warszawa: Radioelektronik 1995. Charoy A.: Kompatybilność elektromagnetyczna : zakłócenia w urządzeniach elektronicznych. T. 1, Źródła, sprzężenia, skutki : zasady i porady instalacyjne. Warszawa: WNT 1999. Charoy A.: Kompatybilność elektromagnetyczna: zakłócenia w urządzeniach elektronicznych. T. 2, Uziemienia, masy, przewodowanie: zasady i porady instalacyjne. Warszawa: WNT 2000. Charoy A.: Kompatybilność elektromagnetyczna: zakłócenia w urządzeniach elektronicznych. T. 3, Ekranowanie: zasady i porady instalacyjne. Warszawa: WNT 2000. Charoy A.: Kompatybilność elektromagnetyczna: zakłócenia w urządzeniach elektronicznych. T. 4, Zasilanie, ochrona odgromowa, środki zaradcze: zasady i porady instalacyjne. Warszawa: WNT 2000. Bogatin E.: Signal and Power Integrity - Simplified. Prentice Hall 2018.	
	Supplementary literature	Ott H. W. Metody redukcji zakłóceń i szumów w układach elektronicznych. Warszawa: WNT 1979. Howard W. Johnson, Martin Graham: High-speed Signal Propagation: Advanced Black Magic. Pearson 2003.	
	eResources addresses		
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.		
Practical activities within the subject	Not applicable		

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