



## Subject card

Subject name and code	Electromagnetic Compatybility of Electrical Power Equipment, PG_00018269						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
Education level	second-cycle studies		Subject group				
Mode of study	Part-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	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	10.0	0.0	10.0	0.0	0.0	20
	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	20		5.0		25.0	50
Subject objectives	hours Providing knowledge about problems related to electromagnetic interference in electrical devices.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U03] is able to obtain information from literature, databases and other sources, also in English, draw conclusions, formulate and fully justify opinions. substantiate opinions; is able to identify directions for further learning and implement the process of self-education		applies systematized knowledge in the field of electrical energy quality issues		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_U02] is able to prepare and deliver a short oral presentation on a selected technical topic		presents the results of engineering research.		[SU5] Assessment of ability to present the results of task		
	[K7_W02] has an in-depth and structured knowledge of electrical measurements electrical measurements, the methods and equipment used for electrical measurements of non-electrical quantities, he/she knows the principles of testing operation tests of electrical equipment, has a structured knowledge of electricity quality issues		applies systematized knowledge in the field of electrical energy quality issues		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W06] has in-depth knowledge of industrial electronics, microprocessor control systems, programmable logic systems and printed circuit design and prototyping computer-aided prototyping		applies systematized knowledge in the field of electrical energy quality issues		[SW1] Assessment of factual knowledge		

Subject contents	LECTURE Sources and propagation of conducted and radiated disturbances. Electromagnetic emission and immunity of electrical devices. Specificity of electromagnetic compatibility of power electronic devices. Certification tests of electrical devices. Methods of reducing electromagnetic interference Basic anti-interference elements. Principles of designing electromagnetically compatible devices and installations. Analysis of typical problems related to EMC of electrical devices. Problems related to EMC in adjustable speed drive systems. Influence of electrical devices on the environment, living organisms and humans. LABORATORY Measurements of conducted and radiated electromagnetic disturbance emissions. Measurements of device resistance to impulse disturbances. Measurements of device resistance to high-frequency disturbances. Measurements of the effectiveness of anti-interference filters. Measurements of the effectiveness of electromagnetic shielding. Presentation of examples of mutual interference between electronic devices.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	50.0%	50.0%
	report	50.0%	50.0%
Recommended reading	Basic literature	Charoy, Alain i in. Kompatybilność elektromagnetyczna: Zakłócenia w urządzeniach elektronicznych. Tom 1, 2, 3 i 4. Warszawa: Wydawnictwa Naukowo-Techniczne, 1999. L. Hasse, J. Kołodziejwski, Z. Karkowski, A. Konczakowska, L. Spiralski: Zakłócenia w aparaturze elektronicznej. Warszawa: "Radioelektronik ", 1995. T. Więckowski, Badania kompatybilności elektromagnetycznej urządzeń elektrycznych i elektronicznych. Wrocław: Oficyna Wydawnicza Politechniki Wrocławskiej, 2001. Borecki, Michał i in. Kompatybilność elektromagnetyczna: pomiary i badania. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej, 2021. Kempski, Adam Józef, Elektromagnetyczne zaburzenia przewodzone w układach napędów przekształtnikowych. Zielona Góra: Oficyna Wydawnicza Uniwersytetu Zielonogórskiego, 2005.	
	Supplementary literature	Łuszcz, Jarosław. High Frequency Conducted Emission in AC Motor Drives Fed By Frequency Converters: Sources and Propagation Paths. John Wiley and Sons, Inc., Hoboken, N.J: 2018.  Sevgi, Levent. A Practical Guide to EMC Engineering / Levent Sevgi. Boston: Artech House, 2017.  Keller, Reto B. Design for Electromagnetic Compatibility--In a Nutshell: Theory and Practice / by Reto B. Keller. 1st ed. 2023. Cham: Springer Nature, 2023.  Smolenski, Robert. Conducted Electromagnetic Interference (EMI) in Smart Grids. 1st ed. 2012. London: Springer, 2012.  Sroka, Jan, Compendium on Electromagnetic Compatibility. First edition. Warszawa, Oficyna Wydawnicza Politechniki Warszawskiej, 2021.  Łuszcz, Jarosław, Motor Cable Influence on the Conducted EMI Emission of the Converter Fed AC Motor Drive. p. 77-95. (Book chapter 4) - Queensland University of Technology, Bentham Science Publisher, Australia 2011.  Ott, Henry W. Electromagnetic Compatibility Engineering. Rev. ed. Hoboken, N.J: John Wiley & Sons, 2009.  Zare Firuz Ed., Electromagnetic Interference Issues in Power Electronics and Power Systems. Editor. 1st ed. Sharjah, United Arab Emirates: Bentham Science Publishers, 2011.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		