



## Subject card

Subject name and code	Electromagnetic Compatibility of Electrical Equipment (EMC), PG_00041825						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group					
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	6	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		dr hab. inż. Jarosław Łuszcz				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	0.0	10.0	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	Identification of electromagnetic interference issues in electrical devices.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_K05	Is able to evaluate EMC hazards occurring in electrical installations..			[SK5] Assessment of ability to solve problems that arise in practice		
	K6_W11	Student knows the principles of designing electrical installations			[SW1] Assessment of factual knowledge		
	K6_W10	The student knows the principles of processing, use and rational use of electrical energy			[SW1] Assessment of factual knowledge		
	K6_W09	The student knows the basics of electricity generation, transmission and distribution			[SW1] Assessment of factual knowledge		
	K6_U10	The student is able to design simple low-voltage electrical installations			[SU1] Assessment of task fulfilment		
	K6_K01	The student is aware of the need for continuous education			[SK5] Assessment of ability to solve problems that arise in practice		
	K6_U05	The student has the necessary preparation to work in an industrial environment			[SU1] Assessment of task fulfilment		
K6_U09	The student is able to select power equipment for various load modes.			[SU1] Assessment of task fulfilment			
Subject contents	Sources and propagation of conducted and radiated disturbances. Electromagnetic emission and immunity of electrical devices. EMC in power electronics. EMC and LVD Directives, harmonized standards, certification tests of electrical devices. Electromagnetic interference limitation (grounding, shielding, filtration, separation, balancing). Basic anti-interference elements (capacitors, inductors, RFI filters, shields). Principles of designing electromagnetically compatible devices and installations. Sample analysis of typical problems related to EMC in electrical devices. Problems related to EMC in converter based drive systems. The influence of electrical equipment on the environment, living organisms and humans.						
Prerequisites and co-requisites	Any						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Dissertation	50.0%	50.0%
	Midterm colloquium	50.0%	50.0%
Recommended reading	Basic literature	<p>Charoy A.: Zakłócenia w urządzeniach elektronicznych: zasady i porady instalacyjne. Tomy: 1 - 4, WNT 1999, 2000.</p> <p>Konczakowska A., Spiralski L., Hasse L., Kołodziejki J.: Zakłócenia w aparaturze elektronicznej. Radioelektronik Sp. z o.o., Warszawa 1995.</p> <p>Więckowski T.W.: Badania kompatybilności elektromagnetycznej urządzeń elektrycznych i elektronicznych. Wrocław 2001.</p> <p>A. Kempki: Elektromagnetyczne zaburzenia przewodzone w układach napędów przekształtnikowych. Oficyna Wydawnicza Uniwersytetu Zielonogórskiego 2005</p>	
	Supplementary literature	<p>R. Smoleński: Conducted Electromagnetic Interference (EMI) in Smart Grids. Springer 2012.</p> <p>J. Łuszcz: High Frequency Conducted Emission in AC Motor Drives Fed By Frequency Converters: Sources and Propagation Path. Wiley 2018.</p>	
	eResources addresses	<p>Adresy na platformie eNauczanie:  KOMPATYBILNOŚĆ ELEKTROMAGNETYCZNA URZĄDZEŃ ELEKTRYCZNYCH [ET][I][Niestacjonarne][2023/24L] - Moodle ID: 28768  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28768">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28768</a></p>	
Example issues/ example questions/ tasks being completed	EMC test report.		
Work placement	Not applicable		