



## Subject card

Subject name and code	Electromagnetic Compatibility, PG_00048088						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Metrology and Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Stanisław Galla				
	Teachers		dr inż. Stanisław Galla				
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		2.0		18.0	50
Subject objectives	The student identifies the sources of electromagnetic disturbances. He determines means of permeating disorders. He makes a choice of anti-interference elements. He prepares the required technical documentation and takes measurements of basic characterizations of the inspected device in EMC.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W34] Knows the characteristics of telecommunications channels, methods of securing information, modulation systems, methods of access to the channel.		Student is able to identify the basic parameters of antennas. Can carry out basic electromagnetic compatibility tests. Can assess the results of electromagnetic compatibility tests obtained.		[SW1] Assessment of factual knowledge		
	[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions		The student is able to indicate the sources of disturbances in the systems, is able to indicate their penetration path, select anti-interference elements. Is able to complete technical documentation enabling meeting the requirements of electromagnetic compatibility.		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
Subject contents	1. Basic concepts. Electromagnetic compatibility, immunity, susceptibility, emission, disturbance transmitting. 2. Mechanisms and sources of disturbances. 3. Electromagnetic environment. 4. Disturbances caused by technical equipments. 5. Electrostatic discharges, mechanisms of generations and transmitting, methods of protection. 6. Basics of passive elements for interferences suppression. 7. Capacitors for suppressing disturbances. 8. Inductors and ferrites. 9. Separating transformers, and optocouplers. 10. Interferences suppression diodes. 11. Varistors basic principles of overvoltage protection. 12. EMI/RFI filters. 13. Basics of suppressing disturbances by use technique grounding and shielding. 14. Basics of grounding for high and low frequencies. 15. Noise in electronic devices. 16. Two pole noise parameters. Noise parameters of four poles. 17. Noise in passive electronic elements. 18. Noise of electronic devices. 19. Principles of low noise devices designs. 20. Law regulations, basic requirements of safety. 21. Basic principles and methods of emissions test. 22. Basic principles and methods of immunity test. 23. Interactions of electromagnetic fields on living organisms. 24. Estimating methods and measurement principles of electromagnetic fields and legal conditionality.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Practical exercise		50.0%		50.0%		
	Midterm colloquium		50.0%		50.0%		

Recommended reading	Basic literature	Więkowski T. W.: Badania kompatybilności elektromagnetycznej urządzeń elektrycznych i elektronicznych. Wydawnictwo Politechniki Wrocławskiej. Wrocław 2001 Praca zbiorowa: Praktyczny poradnik Certyfikat CE w zakresie kompatybilności elektromagnetycznej 2002. WEKA Sp. z o.o. Wydawnictwo Informacji Zawodowej, Warszawa 2000. Charoy A.: Kompatybilność elektromagnetyczna. Zakłócenia w urządzeniach elektronicznych. Tomy I - IV. Paul C.R.: Introduction to Electromagnetic Compatibility. J. Wiley and Sons Inc. New York. Hasse L., Kołodziejski J., Konczakowska A., Spiralski L.: Zakłócenia w aparaturze elektronicznej. Radioelektronik Sp. z o.o., Warszawa 1995. Ruszel.P.: Kompatybilność elektromagnetyczna elektronicznych urządzeń pomiarowych. Oficyna Wydawnicza Politechniki Wrocławskiej. Wrocław 2008. Wiliama T., EMC for Product Designers: Meeting the European EMC Directive Newnes, 2014
	Supplementary literature	No requirements
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	