



## Subject card

Subject name and code	Electromagnetic Compatibility of Medical Equipment, PG_00049348						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2025/2026		
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	4		Language of instruction		Polish		
Semester of study	7		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Adam Bujnowski				
	Teachers		dr inż. Adam Bujnowski				
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 goal of the subject is to familiarize students with the electromagnetic compatibility issues. There will be shown and categorized typical sources of noise signals and coupling methods. There will be shown basic norms related to the EMC and typical design approaches to improve devices functionality in presence of EMC disturbances.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W06] Knows and understands the basic processes occurring in the life cycle of devices, facilities and systems specific to a given field of study.		Student knows basic issues with distortion sources and coupling methods Student knows basic norm in area of EMC Student knows basic design rules to comply with EMC		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K6_U08] while identifying and formulating specifications of engineering tasks related to the field of study and solving these tasks, can:n- apply analytical, simulation and experimental methods,n- notice their systemic and non-technical aspects,n- make a preliminary economic assessment of suggested solutions and engineering work n		Student can analyse and identify EMC problems Student uses analytic tools to evaluate EMC problems		[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K6_K02] is ready to critically assess possessed knowledge and acknowledge the importance of knowledge in solving cognitive and practical problems		Student knows risk and analyses risk of lack of the EMC		[SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	Principal terms for electromagnetic compatibility		
	Norms and regulations in Poland, EU and worldwide		
	Distribution of electromagnetic waves		
	Interferences in electronic equipment, coupling and methods of coupling		
	Immunity measurement for ESD		
	immunity tests for strong magnetic fields		
	Immunity tests		
	Immunity tests for short electric pulses and electric discharges		
	Immunity tests for short interruptions and fallouts of electric supply		
	Immunity measurements in the EMC. Echoless chambers		
	Instrumentation for the EMC		
	Typical techniques of improving and assuring of the EMC		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory achievements	50.0%	50.0%
	final writing	50.0%	50.0%
Recommended reading	Basic literature	Paul C.R.: Electromagnetic Compatibility, John Wiley & Sons, 1992.  Perez R.: Handbook of electromagnetic compatibility, Academic Press, 1995.	
	Supplementary literature	Więckowski Tadeusz Wiesław: Badania kompatybilności elektromagnetycznej urządzeń elektrycznych i elektronicznych; Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2001.  Więckowski Tadeusz Wiesław: Pomiar emisyjności urządzeń elektrycznych i elektronicznych; Wrocław: Politechnika Wrocławska, 1997	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Show typical coupling methods		
	Explain selected sources of noise		
	Propose circuit for elimination of surges in the signal line		
	Explain importance of galvanic separation and show typical solution		
	Explain basic shielding techniques		

Work placement	Not applicable
----------------	----------------