



Subject card

Subject name and code	Generation and detection of magnetic fields, PG_00047940						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2023		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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Solid State Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marek Augustyniak				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		1.0		9.0	25
Subject objectives	Student knows basic definitions of magnetism and processes used for generation of static and alternative magnetic field. He recognises sources of magnetic fields and knows methods of field measurement. Student is able to understand principles of application of magnetic fields in medicine.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study		He/she can use, at least to a basic degree, computer tools to predict the distribution of magnetic fields obtained with different generation methods (coils, permanent magnets).		[SU1] Assessment of task fulfilment		
	[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study		He/she understands magnetic phenomena in materials at the macroscopic level, such as ferro-/ para- and diamagnetism, Lorentz force, Maxwell's equations taking into account the specificity of different frequency ranges, analogies between the flux of the magnetic field and electric current. He/she can list available magnetic field detectors and define the physical principle of their operation. He/she is able to independently acquire and critically verify new knowledge related to magnetic phenomena and their applications.		[SW3] Assessment of knowledge contained in written work and projects		

Subject contents	1. Introduction to magnetism. 2. Magnetic field descriptors and their definitions. 3. Properties of dia-para and ferromagnetic materials. 4. Principles of methods of magnetic field generation. 5. Magnetic circuits. 6. Methods of magnetic field detection. 7. Application of magnetic fields in medicine.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	participatiion	50.0%	50.0%
	written egzam	50.0%	50.0%
Recommended reading	Basic literature	[1] Introduction to magnetism and magnetic materials; D. Jiles, Chapman and Hall, London, 1991	
	Supplementary literature	www.JMMM.com	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Magnetic field descriptors and their definitions. Properties of dia-para and ferromagnetic materials. Methods of magnetic field generation. Magnetic circuits. Methods of magnetic field detection. Application of magnetic fields in medicine.		
Work placement	Not applicable		

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