



## Subject card

Subject name and code	Medical physics, PG_00055760						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study 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			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		Michał Penkowski				
	Teachers		Michał Penkowski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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		8.0		37.0	75
Subject objectives	Getting to know the wave and quantum theory of electromagnetic radiation. Understanding the spectrum of E-M radiation with a division into the non-ionizing and ionizing range. Understanding the phenomena of interaction of E-M radiation with matter that are important in medical diagnostics. Discussion of the influence of electromagnetic fields - ionizing and non-ionizing on the human body. Learning about therapeutic methods using E-M radiation. Understanding spectroscopic methods used in atomic, molecular and structural studies of substances.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U05] he/she is able to use analytic and modelling methods to formulate and solve engineering tasks related to the mechanical-medical area		The student knows the basics of the operation of modern medical equipment - diagnostic and therapeutic		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W02] he/she has physics skills in the field of classical mechanics, acoustics, optics, electricity, magnetism, quantum physics and medical physics		The student is able to independently understand the physical basis of the phenomena important in diagnostics and therapy.		[SW1] Assessment of factual knowledge		
	[K6_U01] he/she is able to acquire knowledge and self-studying, he/she is able to find needed information in specialist books, databases and other sources, he/she is able to integrate information and draw conclusions, he/she is able to communicate by using different technics in work and outside		The student is able to analyze information on modern physics achievements in terms of their use in the design and construction of medical equipment. He knows and understands the trends in the development of medical sciences.		[SU2] Assessment of ability to analyse information		
Subject contents	Physical fields - types of fields, strength, intensity, and potential. The concept of the electromagnetic field. The wave theory of the electromagnetic field. Direct and alternating currents, radio waves, microwaves, infrared radiation, visible light, ultraviolet. The use of the wave range of radiation in medical techniques. Coulter counter, thermography, electrotherapy. Influence of non-ionizing E-M radiation on the human body. Quantum (photon) theory of E-M radiation. X-rays, gamma rays. Ionizing corpuscular radiation. The use of ionizing radiation in medicine. Fundamentals of radiodiagnosics and nuclear medicine. Basics of radiotherapy. Principles of protection against ionizing radiation. Fundamentals of spectroscopic methods in the structural studies of solids.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final test	60.0%	100.0%
Recommended reading	Basic literature	1. Jaroszyk, Biofizyka, PZWL, Warszawa, 2018  2. Malicki J., Śłosarek K., Planowanie leczenia i dozymetria w radioterapii, VIA MEDICA, Gdańsk, 2018  3. Hrynkiewicz A., Fizyczne metody diagnostyki medycznej i terapii, PWN, Warszawa 2013	
	Supplementary literature	-----	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		