GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Medical Physics, PG_00064135		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	Michał Penkowski	
	Teachers		

Lesson types

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_W01] has knowledge in the field of natural sciences, including mathematics, contemporary physics, chemistry, and human anatomy with physiology	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] 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
[K6_U04] is able to utilize empirical, analytical, simulation, and computer-based methods to formulate and solve engineering tasks in the field of medical and mechanical engineering	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

<table>
<tr><td>Subject contents</td><td>Course content – lecture
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 radiodiagnostics and nuclear medicine. Basics of radiotherapy. Principles of protection against ionizing radiation. Fundamentals of spectroscopic methods in the structural studies of solids.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Final test</td><td>60.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Jaroszyk, Biofizyka, PZWL, Warszawa, 2018

2. Malicki J., Ślosarek K., Planowanie leczenia i dozymetria w radioterapii, VIA MEDICA, Gdańsk, 2018

3. Hrynkiewicz A., Fizyczne metody diagnostyki medycznej i terapii, PWN, Warszawa 2013</td></tr>
<tr><td>Supplementary literature</td><td>----------</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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