

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058949								
Field of study	Nanotechnology								
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			4.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematic					ematics			
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marta Prześniak-Welenc							
	Teachers		dr inż. Marta Prześniak-Welenc						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study hours	30.0	0.0	15.0	0.0		0.0	45	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity Participation ir classes include plan		ı didactic Participation in ed in study consultation hours		Self-study SUM				
	Number of study hours	45		5.0		50.0		100	
Subject objectives	The aim of the course is to introduce students to the fundamentals and modern applications of nanotechnology in diagnostics, therapy, regenerative medicine, and cosmetology. Students will gain knowledge about the mechanisms of action of nanomaterials, their potential benefits and risks, as well as their use in modern disease treatment methods and cosmetics.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	K6_U10		The student is able to predict and assess the potential negative biological and ecological effects of the industrial production of nanostructures and their practical applications.			[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information			
	K6_U09		The student has the ability to design and implement processes for the production of nanostructured materials, taking into account their properties, synthesis methods, and applications in medicine and cosmetology.			[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment			
	K6_W07		The student has systematic knowledge of the methods of obtaining and properties of nanostructures, their applications in diagnostics, anti-cancer therapy, regenerative medicine, and cosmetology, as well as basic research techniques and aspects of nanotoxicology.			[SW2] Assessment of knowledge contained in presentation			

Subject contents	 Basic concepts and applications of nanotechnology in medicine and cosmetology. Discussion of nanomedicine and its potential applications in disease treatment. Introduction to classical cancer therapy methods and their evolution towards modern, targeted anti- cancer therapies. Analysis of issues related to nanotoxicology and the safety of nanomaterial applications. Presentation of modern drug and active substance delivery techniques, such as micelles, nanoemulsions, polymer nanoparticles, and phospholipids. Familiarization with the role of nanomaterials in cosmetology, including their use in cosmetic products and innovative active substance delivery methods, such as SmartLipids dermal delivery. Discussion of nanotechnology applications in diagnostics, tissue engineering, and regenerative medicine. 					
Prerequisites and co-requisites	Basics of nanotechnology					
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	Lecture	51.0%	60.0%			
	Lab	51.0%	40.0%			
Recommended reading	Basic literature	 Nanotechnologia w medycynie i kosmetologii : podręcznik akademicki : praca zbiorowa / pod red. Andrzeja Zielińskiego. Zieliński, Andrzej (1947-) Redakcja Wydawnictwo Politechniki Gdańskiej Nanotechnologia : chemia i medycyna / Kamila Żelechowska, Wydawnictwo Politechniki Gdańskiej 				
	Supplementary literature	Publications from the JCR list				
	eResources addresses	Adresy na platformie eNauczanie:				
		Nanotechnologie w medycynie i kosmetologii - Moodle ID: 45488 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=45488				
Example issues/ example questions/ tasks being completed	 Fundamentals of nanotechnology in medicine and cosmetology definitions, types of nanostructures, methods of their synthesis. Nanomedicine potential applications cancer therapy, drug delivery, diagnostics. History of cancer treatment and classical chemotherapy comparison with modern therapeutic methods. Targeted anti-cancer therapy mechanisms of action, nanocarriers for drugs. Nanotoxicology impact of nanomaterials on the body and the environment, potential risks. Tissue engineering and regenerative medicine application of nanomaterials in tissue regeneration. Nanomaterials in cosmetology application of nanoparticles in cosmetic products. Micelles, nanoemulsions, polymer nanoparticles, and phospholipids structure and properties. SmartLipids dermal delivery of active substances applications in cosmetology and pharmacy. Research methods for nanomaterials techniques for analyzing and characterizing nanostructures. 					
Work placement	Not applicable					

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