



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 Mathematics						
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	Project	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 in didactic classes included in study plan	Participation in 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	<ol style="list-style-type: none"> 1. Basic concepts and applications of nanotechnology in medicine and cosmetology. 2. Discussion of nanomedicine and its potential applications in disease treatment. 3. Introduction to classical cancer therapy methods and their evolution towards modern, targeted anti-cancer therapies. 4. Analysis of issues related to nanotoxicology and the safety of nanomaterial applications. 5. Presentation of modern drug and active substance delivery techniques, such as micelles, nanoemulsions, polymer nanoparticles, and phospholipids. 6. 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. 7. Discussion of nanotechnology applications in diagnostics, tissue engineering, and regenerative medicine. 		
Prerequisites and co-requisites	Basics of nanotechnology		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture	51.0%	60.0%
	Lab	51.0%	40.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Nanotechnologia w medycynie i kosmetologii : podręcznik akademicki : praca zbiorowa / pod red. Andrzeja Zielińskiego. Zieliński, Andrzej (1947-) Redakcja Wydawnictwo Politechniki Gdańskiej 2. Nanotechnologia : chemia i medycyna / Kamila Żelechowska, Wydawnictwo Politechniki Gdańskiej 	
	Supplementary literature	Publications from the JCR list	
	eResources addresses	Adresy na platformie eNauczenie: Nanotechnologie w medycynie i kosmetologii - Moodle ID: 45488 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=45488	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Fundamentals of nanotechnology in medicine and cosmetology definitions, types of nanostructures, methods of their synthesis. 2. Nanomedicine potential applications cancer therapy, drug delivery, diagnostics. 3. History of cancer treatment and classical chemotherapy comparison with modern therapeutic methods. 4. Targeted anti-cancer therapy mechanisms of action, nanocarriers for drugs. 5. Nanotoxicology impact of nanomaterials on the body and the environment, potential risks. 6. Tissue engineering and regenerative medicine application of nanomaterials in tissue regeneration. 7. Nanomaterials in cosmetology application of nanoparticles in cosmetic products. 8. Micelles, nanoemulsions, polymer nanoparticles, and phospholipids structure and properties. 9. SmartLipids dermal delivery of active substances applications in cosmetology and pharmacy. 10. Research methods for nanomaterials techniques for analyzing and characterizing nanostructures. 		
Work placement	Not applicable		

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