



## Subject card

Subject name and code	Bionanotechnology, PG_00033243						
Field of study	Nanotechnology						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
Education level	second-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	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Inorganic Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Agnieszka Pladzyk				
	Teachers		dr hab. inż. Agnieszka Pladzyk				
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	15.0	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		25.0	75
Subject objectives	The purpose of the course is to familiarize students with the achievements of nanotechnology in providing solutions for applications related to living organisms, as well as the use of biological systems to create nanostructures, etc. The content of the course is interdisciplinary, allowing students to understand the necessity of interpenetration of achievements from different scientific fields such as physics, chemistry, biology, genetic engineering, biomedical engineering and others for the continuous development of science.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_W02		The student has in-depth knowledge of nanotechnology in areas related to biology and biotechnology, and is familiar with their scientific and industrial developments.		[SW1] Assessment of factual knowledge		
	K7_U07		The student is able to specify medical applications of nanoparticles, describes the potential use of nanoparticles in agriculture and food industry.		[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	K7_U01		The student is able to review the literature on the specified topic, analyze the acquired data and prepare in a concise form a presentation		[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task		
	K7_W07		The student has knowledge of the negative impact on the environment of modern technological solutions, biologically modified materials, learns about the risks of the impact of solutions related to bionanotechnology on the ecosystem.		[SW1] Assessment of factual knowledge		

Subject contents	1. biological synthesis of nanoparticles (bacteria, plants, fungi, bacteriophages in nanoparticle synthesis) 2. nanoparticles in agriculture and food industry 3. application of nanotechnology in medicine: imaging and therapy. 4. metallic nanoparticles, magnetic nanoparticles and quantum dots in biomedical applications. 5. nanospheres and polymer nanocapsules 6. applications of bionanomaterials in orthopedic surgery and dentistry 7. biosensors and Lab-on-chip 8. molecular devices (myosin-actin, catenanes, rotaxanes).		
Prerequisites and co-requisites	The student has knowledge of chemistry, biology and physics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	prezentacja	60.0%	50.0%
	sprawdziany	60.0%	50.0%
Recommended reading	Basic literature	1. Bio-nanotechnology: a revolution in food, biomedical and health sciences / ed. by Debasis Bagchi [et al.]. 2. Nanobiotechnology: concepts, applications and perspectives / ed. by Christof M. Niemeyer and Chad A. Mirkin. 3. Super-resolved fluorescence microscopy: <a href="https://www.nobelprize.org/prizes/chemistry/2014/press-release/">https://www.nobelprize.org/prizes/chemistry/2014/press-release/</a>	
	Supplementary literature	1. Biomaterials: a nano approach / Seeram Ramakrishna [et al.]. 2. Concepts of Nanochemistry/ L Cademartiri, G.A. Ozin, polskie tłumaczenie A. Klonkowski, Nanochemia podstawowe koncepcje. 3. Bionanotechnologia w medycynie/ A. Mackiewicz	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. List three components of the structure of a biological membrane 2. Give three examples of the use of superparamagnetic nanoparticles 3. Give two specific examples of the use of nanotechnology in the food industry 4. List three areas that bionanotechnology covers 5. Draw a diagram of a biofuel cell and explain the principle of its functioning		
Work placement	Not applicable		