

**Subject card**

<b>Subject name and code</b>	Nanoparticles in medicine, cosmetology, biotechnology and protection environment, PG_00081432						
<b>Field of study</b>	Chemistry, Environmental Protection						
<b>Date of commencement of studies</b>	October 2024	<b>Academic year of realisation of subject</b>			2025/2026		
<b>Education level</b>	Bachelor's studies	<b>Subject group</b>			Optional subject group		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	2	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	3	<b>ECTS credits</b>			1.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Laboratory of Photocatalysis -> Department of Environmental Technology -> Faculty of Chemistry -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr inż. Beata Bajorowicz				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	0.0	0.0	15.0	0.0	0.0	15
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	15		2.0		8.0	25
<b>Subject objectives</b>	To familiarize students with selected properties of nanoparticles. To familiarize students with selected methods of producing nanoparticles on a laboratory and industrial scale. To familiarize students with selected applications of nanoparticles in medicine, biotechnology and environmental protection technologies.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.	The student understands the role that nanotechnology plays in the modern world. The student is aware of the need to work honestly and diligently.	[SK2] presentation/project/paper/report [SK4] test/exam - oral or written
	[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	The student is able to distinguish and compare the effects of using nanoparticles depending on their type. The student correctly uses the nomenclature in the field of nanotechnology.	[SU2] presentation/project/paper/report [SU4] test/exam - oral or written
	[CHEML3_U01] Identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge.	The student analyzes the potential impact of nanoparticles on organisms and the environment. The student evaluates nanoparticle synthesis strategies to obtain nanomaterials with specific properties.	[SU2] presentation/project/paper/report [SU4] test/exam - oral or written
	[CHEML3_W05] Has basic knowledge of the chemical specialisation studied.	The student describes the methods of obtaining selected types of nanoparticles. The student defines the basic properties of nanoparticles. The student characterizes the applications of selected types of nanoparticles in medicine, cosmetology, biotechnology and environmental protection.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report
Subject contents	Preparation and characterization of solutions of colloidal metal nanoparticles. The application of plant extracts for the synthesis of nanoparticles. Preparation of a cosmetic emulsion containing silver nanoparticles. Preparation and properties of quantum dots. Application of nanoparticles for the detection of melamine and cysteine.		
Prerequisites and co-requisites	Basics of general chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		51.0%	60.0%
		51.0%	40.0%
Recommended reading	Basic literature	1. K. Żelechowska, Nanotechnologia w praktyce, PWN, Warszawa, 2016 2. K. J. Kurzydłowski, M. Lewandowska, W. Łojkowski, Świat nanocząstek, PWN, Warszawa, 2022 3. L. Cademartiri, G. A. Ozin, Nanochemia: podstawowe koncepcje, PWN, Warszawa, 2011 4. K.J. Kurzydłowski, M. Lewandowska, Nanomateriały inżynierskie, konstrukcyjne i funkcjonalne, PWN, Warszawa, 2020 5. R.W. Kelsall, I.W. Hamley, M. Geoghegan, Nanotechnologie, PWN, Warszawa, 2012	
	Supplementary literature	Research articles recommended by lecturers.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Preparation methods of silver nanoparticles. 2. Melamine detection methods. 3. Optical properties of quantum dots. 4. Application of nanoparticles in medicine. 5. The use of nanoparticles in creams with a UV filter. 6. The use of plant extracts for the synthesis of nanoparticles.		
Work placement	Not applicable		

Document generated electronically. Does not require a seal or signature.