



## Subject card

Subject name and code	Chemistry of nanomaterials, PG_00052075						
Field of study	Nanotechnology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			4.0		
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 inż. Andrzej Okuniewski					
	Teachers	dr inż. Andrzej Okuniewski					
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		50.0	100
Subject objectives	The aim of the course is to provide students with basic knowledge in chemistry, essential for understanding the synthesis, properties, modification, and applications of nanomaterials. Students will learn to analyze and interpret the information contained in scientific literature, as well as become familiar with methods of synthesizing and characterizing nanomaterials. During the classes, they will also acquire the ability to present scientific topics in a clear and accessible manner.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_U01	The student is capable of independently deepening their knowledge in the field of nanomaterials chemistry by utilizing various sources of information, such as scientific articles and structural databases.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
	K6_W05	The student has a basic knowledge of chemistry, necessary for understanding the processes of synthesis, modification, and properties of nanomaterials. They understand the atomic structure, chemical bonds, chemical reactions, thermodynamic phenomena, as well as the basics of reaction kinetics, which are essential in the context of nanomaterials chemistry.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	K6_K05	The student is able to prepare and deliver a presentation in an understandable and visually appealing manner. In doing so, they use proper Polish terminology. They actively participate in discussions by asking questions and providing answers. They understand the principles of constructive criticism and are able to apply them to both their own presentations and those of others.	[SK1] Assessment of group work skills [SK4] Assessment of communication skills, including language correctness
	K6_U08	The student is able to clearly and attractively present the content of a scientific article of their choice from an English-language journal to a student forum.	[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task
	K6_W06	The student is familiar with various structural investigation methods and understands how the structure of materials influences their properties. They are capable of explaining the role of electronic structure and crystalline defects.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
Subject contents	<p><b>Lectures:</b> Obtaining nanostructures of various dimensions based on metallic, ceramic, semiconductor, magnetic, polymer and hybrid materials. Research and prediction of the structure and properties of nanomaterials. Surface modification methods. Elements of coordination, supramolecular, and quantum chemistry. The influence of structure on the properties of nanomaterials. Examples of the use of nanomaterials in science, medicine and everyday life. Calculation exercises.</p> <p><b>Seminars:</b> Students prepare individual presentations (along with a multimedia presentation) based on scientific articles published in last year's issue of the <i>Nanotechnology</i> journal.</p> <p>The detailed program of the lecture and seminars is available on the "eNauczenie" platform.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	seminars	60.0%	40.0%
	assessment	60.0%	60.0%
Recommended reading	Basic literature	<ul style="list-style-type: none"> <li>C. N. R. Rao, A. Mueller, A. K. Cheetham (ed.): The Chemistry of Nanomaterials. Synthesis, Properties and Applications. <i>Wiley-VCH</i>, Weinheim, 2004.</li> </ul>	

	Supplementary literature	<ul style="list-style-type: none"> <li>• L. V. Interrante, M. J. Hampden-Smith (ed.): Chemistry of Advanced Materials. <i>Wiley-VCH</i>, New York, 1998.</li> <li>• E. Roduner: Nanoscopic Materials. Size-Dependent Phenomena. <i>RCS Publishing</i>, Cambridge, 2006.</li> <li>• L. Cademartiri, G. A. Ozin: Nanochemia. Podstawowe koncepcje. <i>Wydawnictwo Naukowe PWN</i>, Warszawa, 2011.</li> <li>• K. J. Klabunde, R. M. Richards (ed.): Nanoscale Materials in Chemistry. <i>Wiley</i>, Hoboken, 2009.</li> </ul>
	eResources addresses	Adresy na platformie eNauczenie: Chemia nanomateriałów 2024/25 - Moodle ID: 43911 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=43911">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=43911</a>
Example issues/ example questions/ tasks being completed	Available on the eNauczenie platform.	
Work placement	Not applicable	

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