



## Subject card

Subject name and code	, PG_00058873						
Field of study	Nanotechnology						
Date of commencement of studies	October 2024	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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Wojciech Sadowski					
	Teachers	prof. dr hab. inż. Wojciech Sadowski					
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		2.0		18.0	65
Subject objectives	Properties of materials at the transition from macro to nano manufacturing techniques of nanomaterials and their applications.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W07] has systematic knowledge of the physical and chemical principles of nanotechnology (methods of obtaining nanostructures, types of nanostructures, their properties, basic research methods).	The student has systematic knowledge of the physical and chemical foundations of nanotechnology (methods of obtaining nanostructures, types of nanostructures, their properties).			[SW1] Assessment of factual knowledge		
	[K6_K05] can present effects of their own work, provide information in a clear manner, communicate and self-evaluate, and give constructive feedback on the work of others.	The student is able to convey information in a universally understandable way, perform self-assessment and constructively evaluate the effects of other people's work.			[SK4] Assessment of communication skills, including language correctness		
	[K6_U01] can learn independently, obtain information from literature, databases and other properly selected sources	The student is able to learn independently, obtain information from literature, databases and other properly selected sources.			[SU2] Assessment of ability to analyse information		

Subject contents	<p>Scope of nanotechnology research.</p> <p>Fundamentals description of materials in solid state physics ( quantum mechanics elements , crystallography ).</p> <p>Methods for producing nanomaterials and structures of bottom-up and top-down (CVD , PVD , LPE , MBE ) .</p> <p>Lithographic methods .</p> <p>Fullerenes, Nanotubes, Graphene - production , properties , applications.</p> <p>Research methods.</p> <p>Applications of nanomaterials.</p>		
Prerequisites and co-requisites	Fundamentals of Physics and Chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Colloquium lecture	50.0%	70.0%
	Examination	80.0%	30.0%
Recommended reading	Basic literature	<p>Introduction to Nanotechnology. Ch.P.Poole Jr., F.J.Owens. Wiley. 2003.</p> <p>Nanoelectronics and Information Technology. Advanced Electronic Materials and Novel Devices. Reiner Waser (Ed.) Wiley-VCH. 2003.</p>	
	Supplementary literature	<p>Nanoelectronics and Information Technology. Advanced Electronic Materials and Novel Devices. Reiner Waser (Ed.) Wiley-VCH. 2003.</p> <p>The Oxford Handbook of Nanoscience and Technology. Oxford Univ. Press. V.1,2,3. 2010.</p>	
	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Wstęp do nanotechnologii - Moodle ID: 44727  <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=44727">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=44727</a></p>	
Example issues/ example questions/ tasks being completed	<p>The differences in the properties of macro and nano-materials.</p> <p>Methods for the synthesis of nanomaterials.</p> <p>Applications of nanomaterials.</p>		
Work placement	Not applicable		

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