



## Subject card

Subject name and code	Synthesis methods of nanomaterials, PG_00052029						
Field of study	Nanotechnology						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group			Specialty 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			English		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład fizyki nanomateriałów -> Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marcin Łapiński					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	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	Teach of the basic methods of synthesis of 0,1,2,3 D nanomaterials.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U05] can plan and conduct experimental and critical research and analyze their results, draw conclusions and formulate reasoned conclusions – within their specialization.	The student is able to plan and conduct experiments. Critically analyze results and formulate motivated opinions.			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	[K7_W04] has practical and theoretical knowledge of physical and chemical experimental methods of nanotechnology.	The student has knowledge about the methods of synthesis nanomaterials. Can characterize physical and chemical methods of manufacturing.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K7_W02] has enhanced, theoretically supported, detailed knowledge of selected branches of nanotechnology and, according to the needs, within the scope of related fields of science and technology.	The student has a deep and detailed knowledge of the selected fields of nanotechnology. Student has also knowledge in the field of related fields of science or technology.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		

Subject contents	<p>Fundamentals of nanothermodynamic</p> <p>Synthesis methods of Zero-dimensional nanostructures</p> <p>Synthesis methods of One-dimensional nanostructures</p> <p>Synthesis methods of Two-dimensional nanostructures</p> <p>Nanostructures fabricated by physical techniques</p>		
Prerequisites and co-requisites	Basic knowledge in a field of physics and chemistry. Especially knowledge of thermodynamics and diffusion processes.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	grade from lecture	51.0%	67.0%
	grade from laboratory	51.0%	33.0%
Recommended reading	Basic literature	<p>[1] Guozhong Cao: Nanostructures and Nanomaterials. Synthesis, properties and applications. Imperial College Press, London, 2011</p> <p>[2] Lide Zhang, Xiaosheng Fang, Changhui Ye: Controlled Growth of Nanomaterials. World Scientific Publishing Co. 2007</p> <p>[3] Zheng Cui: Nanofabrication Principles, Capabilities and Limits. Springer. 2008</p> <p>[4] Microfabrication and Nanomanufacturing. Edited by Mark J. Jackson. CRS. 2006</p>	
	Supplementary literature	[1] Springer Handbook of Nanotechnology. Edited by Bharat Bhushan. Springer-Verlag Berlin Heidelberg 2010	
	eResources addresses	Adresy na platformie eNauczenie:	
Example issues/ example questions/ tasks being completed	Synthesis of nanostructures during lab classes		
Work placement	Not applicable		

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