



Subject card

Subject name and code	Experimental nanotechnology, PG_00063958						
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	Division of Nanomaterials Physics -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marcin Łapiński					
	Teachers	dr hab. inż. Marcin Łapiński mgr inż. Piotr Okoczek					
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	Teaching of selected experimental methods used in nanotechnology. Especially in the field of synthesis and study of the properties of nanostructures.						
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 can listed and described chemical and physical methods of manufacturing of nanomaterials. Choose proper measurement method for testing of nanomaterials.			[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K7_W07] has extended knowledge concerning potential negative biological and ecological effects resulting from using nanostructures and relevant safety rules.	The student is able to plan and safely carry out experiment. Can predict the risks associated with working with nanostructures.			[SW1] Assessment of factual knowledge		
	[K7_W06] Has extended knowledge on the methodology of physics laboratory work, supported with experience in laboratory work. Knows the rules of occupational health and safety to a degree sufficient for independent work at a research and measuring position.	The student is able to plan and safely carry out experiment			[SW1] Assessment of factual knowledge		
[K7_W04] has practical and theoretical knowledge of physical and chemical experimental methods of nanotechnology.	The student is able to describe chemical and physical methods of manufacturing of nanomaterials			[SW1] Assessment of factual knowledge			

Subject contents	Measurements methods: - microscopic methods, - structural methods and analysis of chemical composition, - spectroscopic methods with especially luminescence measurements, Properties of nanomaterials. Manufacturing of plasmonic platforms and luminescence glasses.		
Prerequisites and co-requisites	Synthesis methods of nanomaterials (NAN2A006)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture	51.0%	66.67%
	laboratory	51.0%	33.33%
Recommended reading	Basic literature	Nanostructures and Nanomaterials. Synthesis, Properties and Applications. Imperial College Press. Guozhong Gao. 2004. Nanoscale Science and Technology, Wiley, Robert Kelsall (Editor), Ian W. Hamley (Co-Editor), Mark Geoghegan (Co-Editor).	
	Supplementary literature	Introduction to Nanotechnology. Ch. P. Poole Jr., F. J. Owens. Wiley. 2003. Nanoelectronics and Information Technology. Adv. Electronic Materials and Novel Devices. Reiner Waser (Ed.) Wiley-VCH. 2003.	
	eResources addresses	Adresy na platformie eNauzanie: Synthesis Methods of Nanomaterials and Experimental nanotechnology - Moodle ID: 45236 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=45236	
Example issues/ example questions/ tasks being completed	Synthesis methods of thin films of luminescent materials. Measurements methods of the properties of glasses and thin oxide layers		
Work placement	Not applicable		

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