



Subject card

Subject name and code	Experimental nanotechnology, PG_00036986						
Field of study	Nanotechnology, Nanotechnology (joint Master's double-degree program)						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional 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	dr inż. Marcin Łapiński					
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_W07	The student is able to plan and safely carry out experiment			[SW1] Assessment of factual knowledge		
	K7_U05	The student can listed and described chemical and physical methods of manufacturing of nanomaterials			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	K7_U02	The student is able to plan and conduct the experiment			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	K7_K09	The student is able to plan the manufacturing process of nanomaterials.			[SK2] Assessment of progress of work		
	K7_W06	The student is able to plan and safely carry out experiment			[SW1] Assessment of factual knowledge		
	K7_W04	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,  - 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	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Subject passing criteria</th> <th style="width: 30%;">Passing threshold</th> <th style="width: 30%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>lecture</td> <td>51.0%</td> <td>66.67%</td> </tr> <tr> <td>laboratory</td> <td>51.0%</td> <td>33.33%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	lecture	51.0%	66.67%	laboratory	51.0%	33.33%
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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 & Experimental nanotechnology - Moodle ID: 38098 <a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=38098">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=38098</a>										
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											