



Subject card

Subject name and code	Experimental nanotechnology, PG_00036986						
Field of study	Nanotechnology						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2022/2023		
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_W04	The student is able to describe chemical and physical methods of manufacturing of nanomaterials			[SW1] Assessment of factual knowledge		
	K7_W07	The student is able to plan and safely carry out experiment			[SW1] Assessment of factual knowledge		
	K7_W06	The student is able to plan and safely carry out experiment			[SW1] Assessment of factual knowledge		
	K7_K09	The student is able to plan the manufacturing process of nanomaterials.			[SK2] Assessment of progress of work		
	K7_U02	The student is able to plan and conduct the experiment			[SU1] Assessment of task fulfilment [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		
K7_U05	The student can listed and described chemical and physical methods of manufacturing of nanomaterials			[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information			

Subject contents	<p>Properties of nanomaterials,</p> <p>Production methods: - bottom-up methods, top down methods</p> <p>- methods for obtaining 0D structures,</p> <p>- methods for obtaining 1D structures,</p> <p>- methods for obtaining 2D structures,</p> <p>- methods of obtaining 3D structures</p> <p>Measurements methods:</p> <p>- microscopic methods,</p> <p>- structural methods,</p> <p>- spectroscopic methods with especially luminescence measurements,</p>											
Prerequisites and co-requisites	Synthesis methods of nanomaterials (NAN2A006)											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 943 794 972">Subject passing criteria</th> <th data-bbox="794 943 1141 972">Passing threshold</th> <th data-bbox="1141 943 1477 972">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 972 794 1001">laboratory</td> <td data-bbox="794 972 1141 1001">51.0%</td> <td data-bbox="1141 972 1477 1001">33.33%</td> </tr> <tr> <td data-bbox="448 1001 794 1043">lecture</td> <td data-bbox="794 1001 1141 1043">51.0%</td> <td data-bbox="1141 1001 1477 1043">66.67%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	laboratory	51.0%	33.33%	lecture	51.0%	66.67%
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laboratory	51.0%	33.33%										
lecture	51.0%	66.67%										
Recommended reading	Basic literature	<p>Nanostructures and Nanomaterials. Synthesis, Properties and Applications. Imperial College Press. Guozhong Gao. 2004.</p> <p>Nanoscale Science and Technology, Wiley, Robert Kelsall (Editor), Ian W. Hamley (Co-Editor), Mark Geoghegan (Co-Editor).</p>										
	Supplementary literature	<p>Introduction to Nanotechnology. Ch. P. Poole Jr., F. J. Owens. Wiley. 2003.</p> <p>Nanoelectronics and Information Technology. Adv. Electronic Materials and Novel Devices. Reiner Waser (Ed.) Wiley-VCH. 2003.</p>										
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Experimental nanotechnology / Nanotechnologia Eksperymentalna - Moodle ID: 30184</p> <p>https://enauczenie.pg.edu.pl/moodle/course/view.php?id=30184</p>										
Example issues/ example questions/ tasks being completed	<p>Synthesis methods of thin films of luminescent materials.</p> <p>Measurements methods of the properties of glasses and thin oxide layers</p>											
Work placement	Not applicable											