



## Subject card

Subject name and code	Methods of synthesis of nanomaterials, PG_00052085						
Field of study	Nanotechnology						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
Education level	first-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	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
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	Overview the main methods of nanomaterials synthesis, in particular the deposition of thin films.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U10	Can anticipate and assess potential negative biological and ecological effects of producing nanostructures on an industrial scale and their practical applications			[SU1] Assessment of task fulfilment		
	K6_W06	Can a simple and accurate way to present scientific and technological problems associated with the production and applications of nanostructures professionals from related disciplines, and to initiate and coordinate interdisciplinary cooperation			[SW1] Assessment of factual knowledge		
	K6_W05	Basic knowledge of inorganic and organic chemistry, physical chemistry and chemical thermodynamics			[SW1] Assessment of factual knowledge		
	K6_U06	Can a simple and accurate way to present scientific and technological problems associated with the production and applications of nanostructures professionals from related disciplines, and to initiate and coordinate interdisciplinary cooperation			[SU1] Assessment of task fulfilment		
Subject contents	PVD and CVD methods						

Prerequisites and co-requisites	Introduction to Nanotechnology, Thermodynamic, Physical methods of material investigation I, Technology of manufacturing of nanomaterials		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture	50.0%	67.0%
	laboratory	50.0%	33.0%
Recommended reading	Basic literature	<p>Nanotechnologie. <a href="#">R.W. Kelsall (red.)</a>, <a href="#">I.W. Hamley (red.)</a>, <a href="#">M. Geoghegan (red.)</a>. Wyd. PWN, 2008.</p> <p>Nanochemia. Podstawowe koncepcje. <a href="#">Ludovico Cademartiri</a>, <a href="#">Goeffrey A. Ozin</a> <a href="#">Wydawnictwo Naukowe PWN</a>, 2012</p> <p>Introduction to Nanotechnology. Ch.P.Poole Jr., F.J.Owens. Wiley. 2003.</p> <p>Nanostructures &amp; Nanomaterials. Synthesis, Properties and Applications. Guozhong Cao. Imperial College Press. 2007.</p>	
	Supplementary literature	<p>Handbook of Innovative Nanomaterials. From Syntheses to Application. Ed. by X.Fang, L. Wu. 2012</p> <p>Nanoelectronics and Information Technology. Advanced Electronic Materials and Novel Devices. Reiner Waser (Ed.) Wiley-VCH. 2003.</p> <p>W.Przygocki, A. Włochowicz. Fulereny i nanorurki. WNT 2001</p> <p>Nanoengineering of Structural, Functional and Smart Materials. Ed. by M.J.Schulz et al. CRC Press, Taylor &amp; Francis Group, 2006.</p> <p>Nanochemistry. A Chemical Approach to Nanomaterials. G.A.Ozin et al. RSC Publishing, 2009.</p> <p>Nanomaterials Chemistry. Recent Developments and New Directions. Ed.by C.N.R.Rao et al. Wiley-VCH 2007.</p> <p>Encyklopedia of Nanoscience and Nanotechnology. Ed. by Hari Singh Nalwa. T.1-10, ASP. 2004</p>	
	eResources addresses	<p>Adresy na platformie eNauczanie:  Metody Syntezy Nanomateriałów - Moodle ID: 26156  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26156">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26156</a></p>	
Example issues/ example questions/ tasks being completed	Methods for the synthesis of thin films.		
Work placement	Not applicable		