



Subject card

Subject name and code	Microscopy methods in nanotechnology, PG_00036989						
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			Obligatory subject group in the field of study 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	1	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jakub Karczewski				
	Teachers		dr hab. inż. Jakub Karczewski				
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		25.0	75
Subject objectives	Understanding modern methods of imaging 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 is able to prepare perform and interpret experiment in the field modern imaging methods			[SU1] Assessment of task fulfilment		
	[K7_U02] has enhanced abilities in laboratory work.	The student is able to prepare perform and interpret experiment in the field modern imaging methods			[SU1] Assessment of task fulfilment		
	[K7_W04] has practical and theoretical knowledge of physical and chemical experimental methods of nanotechnology.	The student knows, understands and can perform measurements using SEM, AFM, STM microscopy			[SW1] Assessment of factual knowledge		
	[K7_W03] has general knowledge on current development directions and discoveries in physics, chemistry, technology and applications of nanostructures.	The student has knowledge of modern microscopic methods			[SW1] Assessment of factual knowledge		
Subject contents	optical microscopytunneling microscopyatomic force microscopyscanning electron microscopytransmission electron microscopy						
Prerequisites and co-requisites	Basic physics knowledge						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	50.0%	50.0%
	lecture exam	50.0%	50.0%
Recommended reading	Basic literature	Weilie Zhou Zhong Lin Wang "Scanning Microscopy for Nanotechnology Techniques and Applications"	
		V. L. Mironov "Fundamentals of Scanning Probe Microscopy"	
	Supplementary literature	Nanosurf easyScan 2 - operating instruction	
	eResources addresses	Adresy na platformie eNauzanie:	
Example issues/ example questions/ tasks being completed	principle of atomic force microscopy limitations of the SEM microscopy comparison of imaging methods of nanostructures		
Work placement	Not applicable		

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