



## Subject card

Subject name and code	, PG_00070383						
Field of study	Materials Engineering, Materials Engineering						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
Education level	first-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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			1.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Division of New Functional Materials For Energy Conversion -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jakub Karczewski					
	Teachers	dr hab. inż. Jakub Karczewski					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 5518 Metody mikroskopowe <a href="https://enauczanie.pg.edu.pl/2025/course/view.php?id=5518">https://enauczanie.pg.edu.pl/2025/course/view.php?id=5518</a>						
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	15	2.0		8.0		25
Subject objectives	Understanding modern methods of imaging materials.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U02] Can operate typical laboratory equipment and analyze material tests	The student is able to prepare and perform measurements of various materials using selected microscopic methods.			[SU4] Assessment of ability to use methods and tools		
	[K6_W02] has knowledge of physics and chemistry, useful for formulating and solving simple problems within the scope of materials science	The student knows the physical basis of operation of selected microscopic methods.			[SW1] Assessment of factual knowledge		
	[K6_W06] Knows selected methods, techniques, tools and materials used in solving simple engineering problems within the scope of materials engineering.	The student is able to correctly analyze and interpret the results obtained from material measurements using various microscopic methods.			[SW2] Assessment of knowledge contained in presentation		

Subject contents	Course content – lecture Understanding the theoretical foundations of microscope operation:  optical microscopy  tunneling microscopy  atomic force microscopy  scanning electron microscopy  transmission electron microscopy								
Prerequisites and co-requisites	knowledge of basic physics								
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 651 790 678">Subject passing criteria</th> <th data-bbox="802 651 1139 678">Passing threshold</th> <th data-bbox="1152 651 1469 678">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 685 790 712">exam</td> <td data-bbox="802 685 1139 712">50.0%</td> <td data-bbox="1152 685 1469 712">100.0%</td> </tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	exam	50.0%	100.0%		
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exam	50.0%	100.0%							
Recommended reading	Basic literature	<ul style="list-style-type: none"> <li>• Weilie Zhou Zhong Lin Wang "Scanning Microscopy Techniques and Applications"</li> <li>• V. L.Mironov"Fundamentals of Scanning Probe Microscopy"</li> </ul>							
	Supplementary literature	<ul style="list-style-type: none"> <li>• Nanosurf easyScan 2 - operating instruction</li> </ul>							
	eResources addresses								
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> <li>• principle of atomic force microscopy methods</li> <li>• limitations of SEM microscopy</li> <li>• comparison of nanostructure imaging</li> </ul>								
Practical activities within the subject	Not applicable								

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