GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00052090		
Field of study	Metody mikroskopowe w nanotechnologii		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
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	assessment
Conducting unit	Division of New Functional Materials For Energy Conversion -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
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	15.0	15.0	0.0	45

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=2289

Moodle ID: 2289 Metody mikroskopowe w nanotechnologii https://enauczanie.pg.edu.pl/2025/course/view.php?id=2289

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	6.0	49.0	100

Subject objectives

Understanding modern methods of imaging nanostructures.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W10	The student is able to prepare, perform and interpret an experiment in the field of modern maging methods.	[SW1] Ocena wiedzy faktograficznej
K6_K04	The student is able to plan and perform an experiment in the field of modern imaging methods in cooperation with a group.	[SK1] Ocena umiejętności pracy w grupie [SK4] Ocena umiejętności komunikacji, w tym poprawności językowej
K6_W09	The student knows and understands the principles of operation and is able to perform measurements using SEM, AFM, STM microscopy.	[SW1] Ocena wiedzy faktograficznej
K6_U04	The student is able to prepare, perform and interpret an experiment in the field of modern imaging methods.	[SU2] Ocena umiejętności analizy informacji [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU4] Ocena umiejętności korzystania z metod i narzędzi

<table>
<tr><td>Subject contents</td><td>Understanding the theoretical foundations of microscope operation:
• optical microscopy
• tunneling microscopy
• atomic force microscopy
• scanning electron microscopy
• transmission electron microscopy

Learn the practical use of microscopes:
• optical microscopy
• atomic force microscopy
• scanning electron microscopy

using knowledge of microscopic methods to independently create a concept, plan, and implement any scientific project using microscopic imaging</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>knowledge of basic physics</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>presentation of laboratory results</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>exam</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>• Weilie Zhou Zhong Lin Wang "Scanning Microscopy Techniques and Applications"
• V. L.Mironov"Fundamentals of Scanning Probe Microscopy"</td></tr>
<tr><td>Supplementary literature</td><td>• Nanosurf easyScan 2 - operating instruction</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>• principle of atomic force microscopy methods
• limitations of SEM microscopy
• comparison of nanostructure imaging</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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