

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Nanoscopy, PG_00048987								
Field of study	Corrosion								
Date of commencement of studies	February 2024		Academic year of realisation of subject			2024/2025			
Education level	second-cycle studies		Subject group			Obligatory subject group in the field of study			
						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			Polish			
Semester of study	2		ECTS credits			4.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Department Of Corrosion And Electrochemistry -> Faculty Of Chemistry -> Wydziały Politechniki Gdańskie					ki Gdańskiej			
Name and surname	Subject supervisor	dr hab. inż. Artur Zieliński							
of lecturer (lecturers)	Teachers		dr hab. inż. A	rtur Zieliński	-				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	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 ir classes include plan		I didactic Participation in consultation hours		Self-study SUM				
	Number of study hours	45		5.0		50.0		100	
Subject objectives	To familiarize students with various techniques of imaging and analysis of the surface of modern construction materials.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	K7_U05		The student can explain the presence of various topographic forms visible on the microscopic image.			[SU3] Assessment of ability to use knowledge gained from the subject			
	K7_U03		The student is able to interpret the image obtained by means of various microscopic techniques.			[SU2] Assessment of ability to analyse information			
	K7_W04		Student is able to choose a set of measurement methods to perform a specific task.			[SW1] Assessment of factual knowledge			
	K7_K01		Student is able to define the need for a specific microscopic examination and knows what tool should be used for this purpose.			[SK3] Assessment of ability to organize work			
Subject contents	Electron microscopy, atomic force microscopy in various modes, tunneling microscopy, electrochemical microscopy.								
Prerequisites and co-requisites	General knowledge of surface physicochemistry.								
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade				
	Kolokwium		60.0%		50.0%				
	Obecność, sprawozdania		100.0%			50.0%			

Recommended reading	Basic literature	Dror Sarid, Scanning Force Microscopy. With Applications to Electric, Magnetic, and Atomic Forces ISBN13: 978-0-19-509204-2				
		Robert Kelsall, Ian Hamley, Mark Geoghegan, Nanotechnologie, ISBN: 9788301155377				
		Sergei V. Kalinin, Alexei Gruverman, Scanning Probe Microscopy. Electrical and Electromechanical Phenomena at the Nanoscale, ISBN: 978-0-387-28667-9				
		Rebecca Howland, Lisa Benatar, STM / AFM. Mikroskopy ze skanującą sondą. Elementy teorii i praktyki. Warszawa 2002.				
	Supplementary literature	publications from the JCR list				
	eResources addresses	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	 Describe one advantage of tunneling electron microscopy. Describe one disadvantage of tunneling microscopy in relation to the electron microscopy. Why tunnel microscopy owes its extremely high resolution? How does the tunnel current depend on the probe's distance from the sample? 					
Work placement	Not applicable					

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