



Subject card

Subject name and code	Diffraction Methods in Bionanomaterials Research, PG_00069341						
Field of study	Nanotechnology						
Date of commencement of studies	October 2025	Academic year of realisation of subject				2026/2027	
Education level	first-cycle studies	Subject group					
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				2.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Division of Strongly Correlated Electronic Systems -> 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		prof. dr hab. inż. Tomasz Klimczuk				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	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	15	3.0		32.0	50	
Subject objectives	The course aims to familiarize students with diffraction methods used in structural research, as well as with tools for analyzing diffraction patterns and visualizing crystal structures.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W07] has systematic knowledge of the physical and chemical principles of nanotechnology (methods of obtaining nanostructures, types of nanostructures, their properties, basic research methods).		The student has knowledge of how various nanostructures are obtained, what their physical properties are, and how these properties can be studied.		[SW2] Assessment of knowledge contained in presentation		
	[K6_U02] can analyze and solve simple scientific and technical problems based on possessed knowledge, applying analytical, numerical, simulation and experimental methods.		Students solve scientific problems based on their knowledge. In doing so, they apply the methods they have learned in other subjects.		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_U04] can plan and conduct experiments, critically analyze their results, draw conclusions and formulate opinions. Has laboratory experience.		The student is ready for laboratory work. He plans and conducts experiments, carefully analyzes the results, draws conclusions, and forms brilliant opinions.		[SU2] Assessment of ability to analyse information		
Subject contents	<p>Course content – laboratory</p> <ol style="list-style-type: none"> 1. Introduction to the course. 2. Diffraction methods (single crystal testing technique, polycrystal testing technique, etc.). 3. Introduction to ICSD/FindIt and CoD databases. 4. Imaging of crystallographic structures using VESTA software. 5. Introduction to the Rietveld and LeBail methods. 6. Mathematical foundations of the Rietveld method. 7. FullProf Suite software package. 						
Prerequisites and co-requisites	Basic knowledge of crystallography. Computer skills are welcome.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	practical task	60.0%	40.0%
	final exam	60.0%	60.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Podręcznik FullProf https://www.psi.ch/sinq/dmc/ManualsEN/fullprof.pdf 2. L. B. McCusker, et al. <i>Rietveld refinement guidelines</i>, J. Appl. Cryst. (1999) vol. 32, 36-50 3. B. H. Toby, <i>R-factors: how good is good enough?</i>, Powder Diffraction (2006) vol. 21, 67-70 4. D. S. Sivia, <i>Elementary Scattering Theory For X-ray and Neutron Users</i>, Oxford University Press (2014) 5. H. M. Rietveld, A profile refinement method for nuclear and magnetic structures, Journal of Applied Crystallography (1969) vol. 2, 65-71 http://epswww.unm.edu/media/pdf/Rietveld-1969-ProfileRefinement.pdf 	
	Supplementary literature	none	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Using the Vesta program, draw and then discuss the details of the structure of the Mg ₁₀ Ir ₁₉ B ₁₆ compound.		
Practical activities within the subject	Not applicable		

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