



## Subject card

Subject name and code	Crystallography, PG_00020925						
Field of study	Nanotechnology						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2023/2024		
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	3		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Solid State Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Maria Gazda				
	Teachers		Daria Balcerzak  prof. dr hab. inż. Maria Gazda  Arkadiusz Dawczak				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	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		18.0		62.0	125
Subject objectives	Gaining knowledge on the fundamentals of crystallography and relations between the crystal structure and properties of materials.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W05		Has basic knowledge on inorganic materials		[SW1] Assessment of factual knowledge		
	K6_W06		Has basic knowledge on crystalline materials		[SW1] Assessment of factual knowledge		
	K6_U01		Is able to learn		[SU1] Assessment of task fulfilment		
	K6_U04		Is able to perform some experiments, e.g. XRD, density determination etc		[SU1] Assessment of task fulfilment		
Subject contents	Basic definitions, crystallographic equations; Symmetry of crystals, symmetry groups. •Examples of crystals, their characteristic features and structural properties . Reciprocal lattice: definitione and interpretation . •Methods of structural studies. •Structural defects - their influence on the selected properties.  •Chemical bonds. • Crystal growth , Morphology of crystals.  Physical properties of crystals. Anisotropy.						
Prerequisites and co-requisites	No requirements						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory - average mark	51.0%	30.0%
	Homework	30.0%	5.0%
	test	51.0%	65.0%
Recommended reading	Basic literature	Krystalografia, Bojarski i inni  Any textbook on crystallography	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczenie: Krystalografia - Nowy - Moodle ID: 23826 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=23826">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=23826</a>	
Example issues/ example questions/ tasks being completed	1. How many atoms belong to the cel shown in the figure 1? What is the coordination numer of larger atom?  2. Define Miller indices. Draw the planes (411), (002) and (100) in an orthorhombic crystal of cel parameters <b>a = 4 Å, b = 2 Å i c = 8 Å</b> . Give indices of the planes equivalent to (100).  3. Crystal has two mirror planes: one perpendicular to y and other to z. Determine points equivalent to $\frac{1}{4} \frac{3}{4} \frac{1}{2}$ .. What multiplicity has this point?  4. Calculate packing density for bcc structure.  5. What information may be obtained on the basis of X-ray diffraction investigation of a monocrystal?		
Work placement	Not applicable		

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