



## 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: definition 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	<p>1. How many atoms belong to the cel shown in the figure 1? What is the coordination numer of larger atom?</p> <p>2. Define Miller indices. Draw the planes (411), (002) and (100) in an orthorhombic crystal of cel parameters <math>a = 4 \text{ \AA}</math>, <math>b = 2 \text{ \AA}</math> i <math>c = 8 \text{ \AA}</math>. Give indices of the planes equivalent to (100).</p> <p>3. Crystal has two mirror planes: one perpendicular to y and other to z. Determine points equivalent to <math>\frac{1}{4} \frac{3}{4} \frac{1}{2}</math>. What multiplicity has this point?</p> <p>4. Calculate packing density for bcc structure.</p> <p>5. What information may be obtained on the basis of X-ray diffraction investigation of a monocrystal?</p>		
Work placement	Not applicable		