



## Subject card

Subject name and code	, PG_00048738						
Field of study	Materials Engineering, Materials Engineering, Materials Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
Education level	second-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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Solid State Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Michał Winiarski				
	Teachers		dr inż. Michał Winiarski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30		5.0		15.0	50
Subject objectives	The purpose of the subject is the extension of student's knowledge in the field of crystallography.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_W05		Student knows tools, methods and techniques necessary for solving problems in the field of materials engineering		[SW1] Assessment of factual knowledge		
	K7_U03		Student constructs a research hypothesis and conducts the experiment.		[SU2] Assessment of ability to analyse information		
	K7_U04		Student analyses the obtained data, which he prestents and discusses in the report.		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	K7_W01		Student has an extended knowledge in the field of materials engineering.		[SW1] Assessment of factual knowledge		

Subject contents	1. Introduction  2. Symmetry  symmetry operations, symmetry groups, projections  3. Crystals morphology  4. Experimental examination of the crystal structure    5. Elements of modern crystallography  quasicrystals, superstructures etc  6. Crystal growth  7. Properties of crystals  8. Elements of mineralogy		
Prerequisites and co-requisites	Required preceeding subject: Crystallography		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory reports	50.0%	50.0%
	midterm test	50.0%	20.0%
	final test	50.0%	20.0%
	homeworks	50.0%	10.0%
Recommended reading	Basic literature	1. Handbook of Crystallography For Electron Microscopists and Others,  A. G. Jackson, Cambridge 1991	
	Supplementary literature	1. Mineral Physics & Crystallography: A Handbook of Physical Constants, Thomas J. Ahrens, American Geophysical Union, 2013  2. Introduction to solid state physics, C. Kittel, (any year)	
	eResources addresses	Adresy na platformie eNauczanie: Krystalografia II - Moodle ID: 29142 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29142">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29142</a>	
Example issues/ example questions/ tasks being completed	1. Explain the crystal growing prosess with the chemical vapor transport (CVT) method.  2. What is the optical indicartix? Explain on the example of regular and orthorhombic systems.		
Work placement	Not applicable		