



## 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						
	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>						
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 presents 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	<p>1. Introduction</p> <p>2. Symmetry</p> <p>symmetry operations, symmetry groups, projections</p> <p>3. Crystals morphology</p> <p>4. Experimental examination of the crystal structure</p> <p>5. Elements of modern crystallography</p> <p>quasicrystals, superstructures etc</p> <p>6. Crystal growth</p> <p>7. Properties of crystals</p> <p>8. Elements of mineralogy</p>																	
Prerequisites and co-requisites	Required preceeding subject: Crystallography																	
Assessment methods and criteria	<table border="1" data-bbox="448 1099 1487 1272"> <thead> <tr> <th data-bbox="448 1099 798 1133">Subject passing criteria</th> <th data-bbox="798 1099 1141 1133">Passing threshold</th> <th data-bbox="1141 1099 1487 1133">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1133 798 1167">Laboratory reports</td> <td data-bbox="798 1133 1141 1167">50.0%</td> <td data-bbox="1141 1133 1487 1167">50.0%</td> </tr> <tr> <td data-bbox="448 1167 798 1200">midterm test</td> <td data-bbox="798 1167 1141 1200">50.0%</td> <td data-bbox="1141 1167 1487 1200">20.0%</td> </tr> <tr> <td data-bbox="448 1200 798 1234">final test</td> <td data-bbox="798 1200 1141 1234">50.0%</td> <td data-bbox="1141 1200 1487 1234">20.0%</td> </tr> <tr> <td data-bbox="448 1234 798 1272">homeworks</td> <td data-bbox="798 1234 1141 1272">50.0%</td> <td data-bbox="1141 1234 1487 1272">10.0%</td> </tr> </tbody> </table>			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%
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Recommended reading	Basic literature	<p>1. Handbook of Crystallography For Electron Microscopists and Others, A. G. Jackson, Cambridge 1991</p>																
	Supplementary literature	<p>1. Mineral Physics &amp; Crystallography: A Handbook of Physical Constants, Thomas J. Ahrens, American Geophysical Union, 2013</p> <p>2. Introduction to solid state physics, C. Kittel, (any year)</p>																
	eResources addresses																	
Example issues/ example questions/ tasks being completed	<p>1. Explain the crystal growing proces with the chemical vapor transport (CVT) method.</p> <p>2. What is the optical indicartix? Explain on the example of regular and orthorhombic systems.</p>																	
Work placement	Not applicable																	