



Subject card

Subject name and code	, PG_00048738						
Field of study	Materials Engineering, Materials Engineering						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
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_W01	Student has an extended knowledge in the field of materials engineering.			[SW1] Assessment of factual knowledge		
	K7_U04	Student analyses the obtained data, which he presents and discusses in the report.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	K7_U03	Student constructs a research hypothesis and conducts the experiment.			[SU2] Assessment of ability to analyse information		
K7_W05	Student knows tools, methods and techniques necessary for solving problems 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 preceding subject: Crystallography																	
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 1099 794 1133">Subject passing criteria</th> <th data-bbox="799 1099 1141 1133">Passing threshold</th> <th data-bbox="1145 1099 1482 1133">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1140 794 1173">homeworks</td> <td data-bbox="799 1140 1141 1173">50.0%</td> <td data-bbox="1145 1140 1482 1173">10.0%</td> </tr> <tr> <td data-bbox="453 1180 794 1214">final test</td> <td data-bbox="799 1180 1141 1214">50.0%</td> <td data-bbox="1145 1180 1482 1214">20.0%</td> </tr> <tr> <td data-bbox="453 1220 794 1254">midterm test</td> <td data-bbox="799 1220 1141 1254">50.0%</td> <td data-bbox="1145 1220 1482 1254">20.0%</td> </tr> <tr> <td data-bbox="453 1261 794 1294">Laboratory reports</td> <td data-bbox="799 1261 1141 1294">50.0%</td> <td data-bbox="1145 1261 1482 1294">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	homeworks	50.0%	10.0%	final test	50.0%	20.0%	midterm test	50.0%	20.0%	Laboratory reports	50.0%	50.0%
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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 & 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	Adresy na platformie eNauczanie:																
Example issues/ example questions/ tasks being completed	<p>1. Explain the crystal growing process with the chemical vapor transport (CVT) method.</p> <p>2. What is the optical indicatrix? Explain on the example of regular and orthorhombic systems.</p>																	
Work placement	Not applicable																	