



Subject card

Subject name and code	, PG_00058707						
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 none		
Semester of study	1		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Zakład ceramiki -> Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Tadeusz Miruszewski				
	Teachers		dr inż. Tadeusz Miruszewski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	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		10.0		70.0	125
Subject objectives	Learning about the phenomena, technologies and applications of electroceramics.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_W03		it is extended and deepened knowledge of electroceramics		[SW1] Assessment of factual knowledge		
	K7_U06		The student has knowledge of the design and testing of new ceramic materials.		[SU4] Assessment of ability to use methods and tools		
	K7_K01		Understands the need to update materials knowledge		[SK2] Assessment of progress of work		
Subject contents	<p>Preliminary news Technological issues of productionelectroceramics: Methods of producing ceramic powders; Ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods of forming ceramic elements;Ion conductive electroceramics: Point defects, Kroger-Vink notation; Diffusion and ionic conductivity; Methods of testing electrical properties (e.g.impedance measurements); Doped ZrO2and other oxygen ion conductors; Proton conductors; Materials with mixed electron-ion conductivity; Applications of electroceramics: gas sensors,accumulators, batteries and cellsElectro-conductive electroceramics: Electron transport in ceramics; Test methods for electroceramics: Structural research; Electrochemical research; Examples of interesting materials electroceramic: Perovskites and perovskite derivatives; Fluorite ceramics;</p>						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Excercises		50.0%		40.0%		
	Lecture		50.0%		60.0%		

Recommended reading	Basic literature	scientific publications
	Supplementary literature	jw
	eResources addresses	Podstawowe https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30115 - e-Learning course. Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	defects in ionic crystals diffusion mechanisms Kroger Vink notation SOFC	
Work placement	Not applicable	