

## Subject card

Field of study		DC 00050707								
Date of commencement of studies  Education level  second-cycle studies  Subject group  Subject group  Optional subject group Subject group Subject group Subject group related to seiner feed of study  Mode of study  Full-time studies  Mode of delivery  1 Language of instruction  Semester of study  1 Language of instruction  Semester of study  1 Learning profile  Semester of study  1 ECTS credits  Sconducting unit  Name and surname  of lecturer (lecturers)  Version types and methods of instruction  of instruction  Number of study  Number of study  Learning activity  and number of study hours  Learning activity  Learning activity  Learning activity  and number of study hours  Learning about the phenomena, technologies and applications of electroceramics.  Learning outcomes  Course outcome  K7_W03  K7_U06  The student hash knowledge  K7_W03  K7_U06  The student hash knowledge  North and testing of new ceramic materials.  North and testing of new ceramic materials knowledge  North and testing of new ceramic materials.  Subject contents  Preliminary news Technological issues of productionelectroceramics.  Wild Assessment of florupers of electroceramics in conductors, Perovskites and perovskite derivatives, Perovskites and electroceramics in conductors, Perovskites and perovskite derivatives, Presence and testing of new ceramic materials.  Learning outcomes  Course outcome  Subject outcome  Method of verification methods (or vice versa, methodsproduction of producing ceramic powders. Ceramic densification methods (or vice versa, methodsproduction of producing ceramic powders. Ceramic densification methods (or vice versa, methodsproduction of producing ceramic powders. Ceramic densification methods (or vice versa, methodsproduction of producing ceramic powders. Ceramic densification methods (or vice versa, methodsproduction of producing ceramic powders. Ceramic densification methods (or vice versa, methodsproduction of producing ceramic powders. Ceramic densification methods (or vice versa, methodsproduction of produci	Subject name and code	, PG_00058707								
Education level   second-cycle studies   Subject group   Optional subject group   Subject group pelated to scient research in the field of study   Year of study   1	Field of study	Materials Engineering, Materials Engineering Materials Engineering								
Subject group related to scient research in the field of study		February 2023					2022/2023			
Year of study	Education level	second-cycle studies		Subject group			Subject group related to scientific			
Semester of study   1	Mode of study	Full-time studies	Full-time studies		Mode of delivery			at the university		
Learning profile general academic profile Assessment form exam  Conducting unit Zaldade ceramiki. > Instytut Nanotechnologii i Inzymierii Materialowej. > Faculty of Applied Physics and Mathematics.    Name and surname of lecturer (lecturers)   Subject supervisor   dr inż. Tadeusz Miruszewski    Lesson types and methods of instruction   Learning hours included: 0.0    Learning activity and number of study hours   Learning hours included: 0.0    Learning activity   Learning activity   Participation in didactic classes included in study   Participation in Consultation hours   Sulf-study   SUM   Number of study   45   10.0   70.0   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   K7_W03   It is extended and deepened   K7_W03   K7_U06   The student has knowledge of the design and testing of new ceramic use methods and tools materials.   K7_L06   Understands the need to update   materials knowledge   Method of verification   Work   Assessment of progress of the powders; Ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods forming ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods forming ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods forming ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods forming ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods forming ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods forming ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods forming ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods for electroceramics: Perion delsification conductivity, Application, Definition o	Year of study	1		·						
Conducting unit	Semester of study	1		ECTS credits			5.0	5.0		
Name and surmame of lecturer (lecturers)   Subject supervisor   dr inż. Tadeusz Miruszewski	Learning profile	general academic pro	general academic profile		Assessment form			exam		
Teachers   Description   Teachers   Description   Descri	Conducting unit		stytut Nanotecl	nnologii i Inżyni	erii Materiałow	ej -> Fa	culty of	f Applied Phys	sics and	
Lesson types and methods of instruction  Number of study 30.0 15.0 0.0 0.0 0.0 0.0 10.0 145  Learning activity and number of study hours  E-learning activity and number of study hours  Learning about the phenomena, technologies and applications of electroceramics.  Learning outcomes  Course outcome Subject outcome Method of verification (SVT_W03 it is extended and deepened knowledge of the design and testing of new ceramic materials.  K7_W06 The student has knowledge of the design and testing of new ceramic materials.  K7_K01 Understands the need to update materials knowledge  K7_K01 Understands the need to update materials knowledge of the correct of the design and testing of new ceramic materials.  Prelliminary news Technological issues of productionelectroceramics: Methods of producing ceramic powders; Ceramic densification methods (or vice versa, methodsproduction of prorus or other oxygen ion conductors; Proton conductors; Materials with mixed electron-on conductivity; Application of electroceramics: gas sensors, accumulators, batteries and cells electro-conductive electroceramics: Electron transport in ceramics; Test methods for electroceramics: Providence macus research; Electrochemical research; Examples of interesting materialselectroceramic: Perovskites and perovskite derivatives; Fluoriceramics; State methods for electroceramics: State for the materials and cells electron-on conductivity; Application of electroceramics.  Prerequisites  Assessment methods  and criteria	Name and surname	Subject supervisor		dr inż. Tadeusz Miruszewski						
Number of study   30.0   15.0   0.0   0.0   0.0   0.0   45	of lecturer (lecturers)	Teachers		dr inż. Tadeusz Miruszewski						
Of instruction	Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory Proiec		t	Seminar	SUM	
Learning activity and number of study hours   Participation in didactic classes included in study plan   10.0   70.0   125			30.0	15.0	0.0	0.0	0.0		45	
Calasses included in study   Consultation hours   Number of study   Number of study   45   10.0   70.0   125		E-learning hours inclu	uded: 0.0							
Learning outcomes		Learning activity	classes includ				Self-study		SUM	
Course outcome   Subject outcome   Method of verification		1	nber of study 45		10.0		70.0		125	
Course outcome   Subject outcome   Method of verification	Subject objectives	Learning about the phenomena, technologies and applications of electroceramics.								
K7_W03										
K7_W03	Learning outcomes	Course out	como	Subi	oct outcomo			Mothod of yo	rification	
K7_U06   The student has knowledge of the design and testing of new ceramic use methods and tools materials.   K7_K01   Understands the need to update materials knowledge   [SK2] Assessment of progress of work				it is extended and deepened		[SW1] Assessment of factual				
Preliminary news Technological issues of productionelectroceramics: Methods of producing ceramic powders; Ceramic densification methods (or vice versa, methodsproduction of porous ceramics), Methods forming ceramic elements; lon conductive electroceramics: Point defects, Kroger-Vink notation; Diffusion a ionic conductivity; Methods of testing electrical properties (e.g. impedance measurements); Doped ZrO2ar other oxygen ion conductors; Proton conductors, Materials with mixed electron-ion conductivity; Application 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 materialselectroceramic: Perovskites and perovskite derivatives; Fluoritic ceramics;    Prerequisites		K7_U06		design and testing of new ceramic			[SU4] Assessment of ability to			
Preliminary news Technological issues of productionelectroceramics: Methods of producing ceramic powders; Ceramic densification methods (or vice versa, methodsproduction of porous ceramics); Methods forming ceramic elements; lon conductive electroceramics: Point defects, Kroger-Vink notation; Diffusion a ionic conductivity; Methods of testing electrical properties (e.g. impedance measurements); Doped ZrO2ar other oxygen ion conductors; Proton conductors; Materials with mixed electron-ion conductivity; Application 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 materialselectroceramic: Perovskites and perovskite derivatives; Fluorit ceramics;  Prerequisites  Assessment methods and co-requisites  Subject passing criteria Passing threshold Percentage of the final grade Excercises 50.0% 40.0%  Lecture 50.0% 60.0%		K7_K01						[SK2] Assessment of progress of work		
Assessment methods and criteria  Subject passing criteria  Passing threshold  Percentage of the final grade  Excercises  50.0%  Lecture  50.0%  60.0%		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 cells Electro-conductive electroceramics: Electron transport in ceramics; Test methods for electroceramics: Structural research; Electrochemical research; Examples of interesting materials electroceramic: Perovskites and perovskite derivatives; Fluorite								
and criteria         Excercises         50.0%         40.0%           Lecture         50.0%         60.0%										
Lecture 50.0% 60.0%		Subject passing criteria		Passing threshold		Percentage of the final grade				
		Excercises		50.0%		40.0%				
Pacammonded reading Basic literature scientific publications		Lecture		50.0%	50.0%		60.0%			
Neconimended reading passe increases	Recommended reading	Basic literature	Basic literature		scientific publications					

Data wydruku: 28.09.2023 10:50 Strona 1 z 2

	Supplementary literature	jw		
	eResources addresses	Podstawowe		
		https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30115 - e- Learning course.		
Example issues/ example questions/ tasks being completed	defects in ionic crystalsdiffusion mechanismsKroger Vink notationSOFC			
Work placement	Not applicable			

Data wydruku: 28.09.2023 10:50 Strona 2 z 2