



Subject card

Subject name and code	Functional Materials I, PG_00039798						
Field of study	Materials Engineering, Materials Engineering, Materials Engineering, Materials Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2021/2022		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study 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	2		Language of instruction		Polish no		
Semester of study	4		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Maria Gazda				
	Teachers		dr inż. Sebastian Wachowski dr inż. Kacper Dzierzgowski prof. dr hab. inż. Maria Gazda				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie: Materiały Funkcjonalne 1 - 2021/2022 - Moodle ID: 19937 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=19937						
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		2.0		28.0	75
Subject objectives	Learning the main groups of functional materials and related technologies and applications.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_K01		understands the need to improve professional and personal competences; is aware of its own limitations and knows when to turn to experts, is able to properly define priorities for the implementation of tasks set by himself or other		[SK2] Assessment of progress of work		
	K6_W03		has basic knowledge of functional materials and is able to connect the properties of materials with their structure and composition, knows the theoretical description of phenomena occurring in materials subjected to external factors		[SW1] Assessment of factual knowledge		
	K6_U02		can operate scales, furnaces, mills and perform analyzes, e.g. XRD		[SU1] Assessment of task fulfilment		
	K6_U01		can use properly selected analytical methods, as well as experimental methods and devices that enable measurement of the basic quantities characterizing functional materials		[SU1] Assessment of task fulfilment		

Subject contents	Introduction Introductory information - Revision: structure, defects, bonds and properties, thermodynamic basis; -Diffusion; Solid phase reactions. Functional materials due to their electrical properties: - Electronic and electrotechnical materials: metals; Electronic and electrotechnical materials: semiconductors; Superconductors; Dielectrics; Production and shaping of functional materials: -Manufacture of single crystals; Thin layers; Lithography, etching and other semiconductor technologies; Integrated circuit, connections between different materials; Other functional materials - Glass and airgels; Composites; Biomaterials;		
Prerequisites and co-requisites	no		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written test	50.0%	65.0%
	lab reports	50.0%	35.0%
Recommended reading	Basic literature	Materials science, Ashby	
	Supplementary literature	internet	
	eResources addresses	Podstawowe https://enauczenie.pg.edu.pl/moodle/course/view.php?id=19937 - Functional Materials Materiały Funkcjonalne 1 - 2021/2022 - Moodle ID: 19937 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=19937	
Example issues/ example questions/ tasks being completed	What determines the rate of diffusion?Diffusion mechanismsWhat determines the rate of a solid phase reaction?Name lithography methods, describe oneGlass strengthening methodse.t.c		
Work placement	Not applicable		