



Subject card

Subject name and code	Materials Engineering, PG_00038433						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
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		
Semester of study	3	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Mechatronics and High Voltage Engineering -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Arkadiusz Żak					
	Teachers	dr hab. inż. Arkadiusz Żak					
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						
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	3.0		27.0		75
Subject objectives	The aim of the course is to gain knowledge about present issues of material sciences with a special attention paid on materials used in electrical engineering as well as on novel intelligent materials.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U01	- can characterise the properties of electro-technical materials - can measure selected properties of electro-technical materials			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		
	K6_W04	- can evaluate selected aspects of the selection of electro-technical materials - can present arguments in favour of sustainable development in the field of material science			[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		

Subject contents	<p>Lecture: Material engineering and material science. Physical basics of electrical conductivity. Copper and aluminium - comparison of properties. Contacts. Metallic and non-metallic resistive materials, criteria of selection. High temperature superconductors. Semiconductors in power electronics. Electronic materials. Magnetic materials: anisotropic, isotropic, amorphous, nanocrystalline magnetic materials. Hard magnetic materials. Mechanisms of conductivity and polarisation of dielectrics. Organic and non-organic solids. Synthetic solids - physical and chemical basics. Thermoplastics, thermosets and elastomers. Liquid and gas insulating materials. Selection of electrical materials - computer techniques of selection.</p> <p>Laboratory exercises.</p> <ol style="list-style-type: none"> 1. Application of the optical microscope in the examination of technical objects 2. Analysis of the dielectric materials using the TSD method 3. Analysis of the electrical resistivity of insulation materials 4. Measurements of dielectric constant of the transformer oil 5. Investigation of the physical parameters of the metal oxide surge arresters 6. Investigation of the semiconductor materials 											
Prerequisites and co-requisites	Background in basic physics and electrical engineering.											
Assessment methods and criteria	<table border="1" data-bbox="450 638 1489 741"> <thead> <tr> <th data-bbox="450 638 794 674">Subject passing criteria</th> <th data-bbox="794 638 1139 674">Passing threshold</th> <th data-bbox="1139 638 1489 674">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="450 674 794 710">Laboratory exercises</td> <td data-bbox="794 674 1139 710">55.0%</td> <td data-bbox="1139 674 1489 710">50.0%</td> </tr> <tr> <td data-bbox="450 710 794 741">Colloquia during the semester</td> <td data-bbox="794 710 1139 741">55.0%</td> <td data-bbox="1139 710 1489 741">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Laboratory exercises	55.0%	50.0%	Colloquia during the semester	55.0%	50.0%
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Example issues/ example questions/ tasks being completed	Application of modern intelligent materials in electrical engineering.											
Work placement	Not applicable											