GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Materials Engineering, PG_00038433		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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		

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

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 temterature 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.

Laboratory exercises.

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

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Background in basic physics and electrical engineering.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory exercises</td><td>55.0%</td><td>50.0%</td></tr>
<tr><td>Colloquia during the semester</td><td>55.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Celiński Z.: Materiałoznawstwo elektrotechniczne. Warszawa: Oficyna Wyd. PW 2005.
2. Kolbiński K., Słowikowski J.: Materiałoznawstwo elektrotechniczne. Warszawa: WNT 1978.
3. Woynarowski Z., Sulikowski J., Augustyniak W.: Badanie materiałów elektrotechnicznych. Gdańsk, Wyd. PG, 1990.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Based on information available on the Interent</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Application of modern intelligent materials in electrical engineering.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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