GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physical Methods of Materials Investigation II, PG_00039814		
Field of study	Materials Engineering, Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
Education level	second-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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Solid State Physics -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marek Chmielewski	
	Teachers	dr inż. Marek Augustyniak dr inż. Marek Chmielewski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	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	2.0	3.0	50

Subject objectives

The aim of the course is to prepare the student for experimental work in the field of multi-path testing of materials using non-destructive diagnostic techniques used to study the physical properties of matter, structures of the matter and to defects detections procedures.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_W03	The student will know a variety of research techniques used in the field of measurement of the structure, the chemical composition, the atomic structure, student learns and classifies physical phenomena used the technic of measurement of the properties of the materials.	[SW1] Assessment of factual knowledge
K7_U03	The student performs and controls the measurement experiments to assess the quality of the tested materials and defines and identifies the defects existing in the material.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
K7_W05	Student learns the operation and construction of the measuring devices used in the field tests of materials and structures	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

Subject contents

The student will know non-destrucive methods based on measurement of physical quantities such as the value of induction and magnetic field, the intensity of Barkhausen noise effect, magnetostrictive and ultrasonic wave pulses for materials parameters describing. Students will know the methodology of the study of thin coatings, he will testing methods of flaw detection of materials based on the measurement of electrical resistivity, magnetic properties, acoustic properties and internal friction. Lecture: During the lecture will presents subjects listed below Method of defectoscopy: Radiological method Endoscopes method Magnetic field leakage method Ultrasound method Eddy Current Method Acoustic emission method Other methods Material investigation methods: Radiological method of material investigation Ultrasound method Electromagnetic method Mechanical spectroscopy method Hardness measurement method Stress determination methods Radiological method of stress determination Neutrongraphical method of stress evaluation Ultrasound method Magnetic method, Barkhausen effect method

Prerequisites and co-requisites

Not required

<table>
<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>Lecture</td><td>50.0%</td><td>40.0%</td></tr>
<tr><td>Labor</td><td>100.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Handbook of measurements of residual stresses; ed. J. Lu; The Fairmont Press, 1996. Articles from NDT&E Journal</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">not required</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Nondestructive investigation, Barkhausen effect</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
</table>