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 2021	Academic year of realisation of subject	2024/2025
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	4	Language of instruction	Polish polish
Semester of study	7	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 hab. inż. Leszek Piotrowski 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
K6_U08	The student creates reports from his/her work in a manner appropriate to scientific documentation, is able to control the completeness and sequence of the theses presented in the study, has the ability to make logical inferences and is able to record this information in a clear, stylistically correct manner.	[SU5] Assessment of ability to present the results of task
K6_K01	The student learns the importance of the correctness of the sentences of the world of science, can properly communicate your skills, being able to objectively convey information about their role in society, he understands the importance of science in daily life	[SK2] Assessment of progress of work
K6_W06	The student will know the capabilities of different measurement techniques, discovers and suggests the possibility of their effective use in areas other than those performed during the lab.	[SW3] Assessment of knowledge contained in written work and projects
K6_W02	The student will know: the physical basis of the description of the magnetic properties with a particular emphasis on the properties of hysteresis, definitions and description of the mechanical waves propagating in solid materials,will know influence of the permanent or changed in time magnetic field on the conductive materials.	[SW1] Assessment of factual knowledge
K6_U02	Implementation of laboratory tasks that require in-depth knowledge on the use and operation of modern measuring and recording systems. Acquisition of knowledge about the operation of programmable arbitrary generators, digital oscilloscopes, oscilloscope measurement cards, programmable measurement cards.	[SU1] Assessment of task fulfilment

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

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Labolatory	100.0%	60.0%
Lecture	50.0%	40.0%

Recommended reading

Basic literature	J. Deputat; Nieniszczące metody badania własności materiałów, Biuro Gamma, Warszawa, 1997. Badania metodami nieniszczącymi; Koli, Gdańsk, 1991. T. Piech; Badania magnetyczne, Biuro Gamma, Warszawa, 1998. Badania mechanicznych właściwości materiałów i konstrukcji, IPPT, SEM, Biuro Gamma, Zakopane, 1996 Handbook of measurements of residual stresses; ed. J. Lu; The Fairmont Press, 1996. A. Śliwiński; Ultradźwięki i ich zastosowanie; WNT, Warszawa, 1993. Anna Lewińska-Romicka Badania Nieniszczące Podstawy defektoskopii WNT Warszawa 2001
Supplementary literature	No recommendations
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Detection and registration of ultrasound pulses. Measurement of the magnetic field leakage and its use in the defect detection. . Barkhausen effect used in the field to determine the size for elastic deformation.
Work placement	Not applicable

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