

# SYLLABUS

## Course description

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Course code		Course	METODY BADAŃ MATERIAŁÓW	
MB/O/I/NST/C2B.2			METHODS OF MATERIALS TESTING	
Language of instruction		English		
Academic year		2023/2024		
field of study:		Mechanical engineering		
field of specialisation:		Designing and Manufacturing of Machines		
Educational level		first-cycle studies		
Education profile		General academic		
Mode of study		Part-time studies		
Semester(s)		7		
Affiliation with a group of classes		Specialization module		
Course status		Eligible		
Types of classes, instruction hours, ECTS credits		Types of classes	Number of instruction hours	Number of ECTS credits
		Lecture	8 [h]	3 ECTS
		Classes	8 [h]	
		Laboratory	12 [h]	
Linkage of the course	with the education profile	Associated with the conducted scientific activity in the discipline to which the field of study is assigned		0 ECTS
	with qualifications	It serves the student's acquisition of engineering competencies		3 ECTS
	with science discipline	Mechanical engineering		3 ECTS
Form of teaching		Traditional – classes organized at the University /classes conducted using online learning methods and techniques		
Prerequisites				
Department		Faculty of Mechanical Engineering		
Coordinator		dr inż. Wojciech Kucharczyk		
The website of the basic organizational unit		<a href="http://www.wm.uniwersytetradom.pl/">http://www.wm.uniwersytetradom.pl/</a>		
E-mail address, phone number of the coordinator		wojciech.kucharczyk@uthrad.pl, tel. 48 361 7680		

## LEARNING OUTCOMES, CURRICULUM CONTENT, TEACHING CLASSES, VERIFICATION OF LEARNING OUTCOMES

Learning Objective:	The aim of the course is to familiarize the student with the latest methods of testing engineering materials.
Curriculum Content:	<p><b>Lectures:</b> Materials research and measurements. Research of the crystal structure. Microscopic metallographic examinations. Macroscopic research. Physical and chemical research. Thermographic research. Mechanical properties testing. Non-destructive testing. Corrosion tests. DMA - dynamic mechanical analysis. DSC - differential scanning calorimetry. TGA - thermogravimetry. TMA - thermal mechanical analysis. DTA - differential thermal analysis. Ultrasonic flaw detection. Radiography - X-ray diffraction XRD. Sherography. FT-IR - infrared spectroscopy, AFM - Atomic Force Microscopy.</p> <p><b>Classes:</b> Development of methodology for quantitative measurements of alloy structure. Crack propagation - K<sub>c</sub>, DMA, DSC, DTA, TGA, TM chart analysis.</p> <p><b>Laboratory classes:</b> Hardness and microhardness tests of materials. Non-destructive testing. Research of resistivity of materials. Thermographic testing of materials. Macroscopic research. Corrosion tests. Quantitative structural research. Deflection temperature under load HDT.</p>
Didactic (educational) methods:	<p><b>Lecture</b> - giving method (informative lecture).</p> <p><b>Classes</b> - practical methods (calculation, project method, simulation).</p> <p><b>Laboratory</b> - practical method (laboratory classes).</p>
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	<p>The condition for passing the course is to achieve all the required learning outcomes specified for the subject.</p> <p><b>Lecture:</b> written colloquium - grade point average for partial questions.</p> <p><b>Classes:</b> final test - arithmetic average of grades from partial questions.</p> <p><b>Laboratory classes:</b> the arithmetic mean of the grades obtained by the student for each laboratory exercise (the grade from the exercise is the average of the grades from the preliminary colloquium and individually prepared report).</p>

Learning outcomes for the course in relation to the field of study learning outcomes and the type of classes				Methods of verifying learning outcomes	
Learning outcome number	Description of the learning outcomes for the course (PEU) A student who has passed the course ( W ) knows and understands / ( U ) can / ( K ) is ready to:	Field of study learning outcome (KEU)	Types of classes	Form of verification (credits)	Methods of testing and assessment
W1	Has basic knowledge of selected methods of testing engineering materials.	K_WG08	Lecture, Classes, Laboratory	Written test, evaluation of the work done	Arithmetic mean of sub-question scores
U1	Distinguishes between laboratory equipment and apparatus for testing materials.	K_UW10	Lecture, Classes, Laboratory	Written test, evaluation of the work done	Arithmetic average of grades from practical exercises
U2	He can conduct a study of the selected properties of materials.	K_UW10	Lecture, Classes, Laboratory	Written test, evaluation of the work done	Arithmetic average of grades from practical exercises
U3	He is able to draw the correct conclusions based on the obtained research results.	K_UW02 K_UW13	Lecture, Classes, Laboratory	Written test, evaluation of the work	Arithmetic average of grades from practical exercises

				done	
K1	Is ready to analyze the tasks assigned to implementation, in terms of defining priorities, serving the maximum efficiency of task performance, and the comprehensive effects of its implementation.	K_KK01	Lecture, Classes, Laboratory	Written test, evaluation of the work done	Arithmetic average of grades from practical exercises

Literature and teaching aids					
[1] Ever J. Barbero (Editor): Multifunctional Composites. ISBN: 978-1-51-680452-8, 2016. [2] Rucki M., Kucharczyk W., Żurowski W., Hevorkian E.: New Engineering Materials: A Handbook (w druku). Wyd. UTH Radom, Radom 2023. [3] Ochelski S.: Metody doświadczalne mechaniki kompozytów konstrukcyjnych. WNT, Warszawa, 2004. [4] Tordoff B., Bale H. (Editors): Engineering Materials: Metals and Alloys. Wiley-VCH GmbH. Weinheim. Germany 2022. [5] Więcek B., Pacholski K., Olbrycht R., Strąkowski R., Kałuża M., Borecki M., Wittchen W.: Termografia i spektrometria w podczerwieni. Zastosowania przemysłowe. Wydawnictwo Naukowe PWN. 2017. [6] DMA/SDTA861. Analiza mechaniczna. Informacja techniczna. Mettler-Toledo. 2012.					

Student workload required to achieve the assumed learning outcomes – the balance of ECTS credits			
Attendance, participation	Student workload [h].		
	Other contact hours (IGK)	Student's self- study hours Classes without a teacher (ZBN)	Classes
Participation in lectures	X	X	8 [h]
Participation in classes	X	X	8 [h]
Participation in laboratory classes	X	X	12 [h]
Meeting with teachers during their duty hours	5 [h]	X	X
Preparation for lectures / laboratory classes Preparation for credit (written test)	X	15 [h] / 15 [h] 12 [h]	X
Total student workload	5 [h] / 0,2 ECTS	42 [h] / 1,7 ECTS	28 [h] / 1,1 ECTS
ECTS credits for the course	75[h] / 3 ECTS		

Additional information, comments
<p>In the case of students with special needs, including disabilities, and chronic illnesses, the methods and forms of verification of learning outcomes specified above (in the syllabus) are adapted to the individual needs of these students, as appropriate.</p> <p>Detailed rules and forms of support for students with special needs, including those with disabilities and chronically ill, during classes, credits, and exams are specified in: University Regulations (Regulamin Studiów Uniwersytetu Technologiczno-Humanistycznego w Radomiu), Study Regulations (Zasady Studiowania), and Procedure for Ensuring Accessibility of the Educational Process to Students with Special Needs, Including Those with Disabilities and Chronically ill (Procedura dotycząca zapewnienia dostępności procesu kształcenia studentom ze szczególnymi potrzebami, w tym: z niepełnosprawnością, przewlekłe chorych).</p>