

# SYLLABUS

## Course description

Course code	Course	<b>POMIARY I ANALIZA SYGNAŁÓW</b>		
MB/O/I/ST/C1B.4		<b>MEASUREMENTS AND ANALYSIS OF SIGNALS</b>		
Language of instruction	English			
Academic year	2023/2024			
<b>field of study:</b>	Mechanical engineering			
<b>field of specialisation:</b>	CAE			
Educational level	first-cycle studies			
Education profile	general academic			
Mode of study	Full-time studies			
Semester(s)	6			
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	15 [h]	2 ECTS	
	Classes	... [h]		
	Project	15 [h]		
Linkage of the course	with the education profile	related to the conducted scientific activity in the discipline to which the field of study is assigned		0 ECTS
	with qualifications	it is used to acquire competences by the student engineering		2 ECTS
	with science discipline	Mechanical engineering		2 ECTS
Form of teaching	Traditional – classes organized at the University /classes conducted using online learning methods and techniques			
Prerequisites	mathematics, physics, electrical engineering and electronics, metrology and measurement systems, mechatronics and automation			
Department	Faculty of Mechanical Engineering UTH Rad.			
Coordinator	dr inż. Zbigniew Wołczyński			
The website of the basic organizational unit	www.wm.uniwersytetradom.pl			
E-mail address, phone number of the coordinator	z.wolczynski@uthrad.pl			

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

Learning Objective:	Knowledge of: computer measurement techniques, parameters measurement, parameters of the measuring device, measurement errors, the possibility of eliminating measurement errors, analysis the results obtained. Acquisition of skills: selection of parameters measuring devices and measurements, analysis of measurement results and errors, interpretation of results.
Curriculum Content:	Lecture: Computer used in measurements, measurement cards, measurement parameters, transducers of non-electrical quantities into electrical, archiving measurement data, IT tools for signal processing and analysis, an example of signal analysis using various IT tools Design: One design task for each student consisting of: <ul style="list-style-type: none"> <li>• selection of a computer measurement system, including selection of settings,</li> <li>• method of archiving measurement data,</li> <li>• analysis of measurement results using computer tools,</li> <li>• applications.</li> </ul>
Didactic (educational) methods:	<ul style="list-style-type: none"> <li>• problem methods (problem lecture, lecture conversational),</li> <li>• exposing methods (film, exhibition, show),</li> <li>• software methods (using a computer),</li> <li>• practical methods (laboratory exercises, demonstration)</li> </ul>
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The condition for passing the course is to achieve all the required learning outcomes specified for the subject. Lectures are passed on the basis of a written colloquium in the form of a multiple-choice test. Passing the project requires passing all stages of measurement design and analysis of results. The grade is an average of grades from individual stages and can be corrected by the grade for involvement during practical classes.

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 ( <b>W</b> ) knows and understands / ( <b>U</b> ) can / ( <b>K</b> ) 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 in the field of metrology, knows and understands the methods using a computer in the measurement of non-electrical quantities, often fast-changing, knows the calculation methods and IT tools necessary to analyze the results of the experiment.	K_WG12 K_WG15 K_WG16	Lecture	Test	Assessment credit
W2	Has elementary knowledge of numerical methods used in the analysis of mechanical systems and in the operation process	K_WG17 K_WG18 K_WG19	Lecture	Test	Assessment credit
U1	Can use computer methods to solve engineering tasks in the field of operation of machines and devices;	K_UW05	Project	Project evaluation	Assessment credit
U2	He can use computer measuring equipment and methods of estimating measurement errors	K_UW06	Project	Project evaluation	Assessment credit
K1	Is aware of the responsibility related to decisions made as part of engineering activities, especially in terms of own and other people's safety and environmental protection	K_KO04	Lecture Project	Test	Assessment credit

Literature and teaching aids
Zieliński T.: „Cyfrowe przetwarzanie sygnałów – Od teorii do zastosowań”, WKŁ, 2005 Lyons R.G.: „Wprowadzenie do cyfrowego przetwarzania sygnałów”, WKŁ, 1999 Winiecki W.: „Organizacja komputerowych systemów pomiarowych”, Oficyna Wydawnicza PW, Warszawa 1997 Lesiak P., Świsulski D.: „Komputerowa technika pomiarowa w przykładach”, Agenda wydawnicza PAK, Warszawa 2002

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	15 [h]
Participation in project	X	X	15 [h]
Meeting with teachers during their duty hours	2 [h]	X	X
Preparation for lectures Preparation for credit	X	18[h]	X
Total student workload	2 [h]/ 0,1 ECTS	18 [h]/ 0,7 ECTS	30 [h]/ 1,2 ECTS
ECTS credits for the course	2 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, przewlekle chorych).</p>

