

# SYLLABUS

## Course description

Course code	Course	<b>METROLOGIA I SYSTEMY POMIAROWE</b>		
MB/O/I/NST/B1.10		<b>METROLOGY AND MEASUREMENT SYSTEMS</b>		
Language of instruction	English			
Academic year	2023/2024			
<b>field of study:</b>	Mechanics and machine construction			
<b>field of specialisation:</b>	All			
Educational level	first-cycle studies			
Education profile	General academic			
Mode of study	Part-time study			
Semester(s)	3			
Affiliation with a group of classes	Core subjects			
Course status	obligatory			
Types of classes, instruction hours, ECTS credits	Types of classes	Number of instruction hours	Number of ECTS credits	
	Lectures	16 [h]	3 ECTS	
	Classes	0 [h]		
	Laboratories	12 [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 engineering competences by the student		3,5 ECTS
	with science discipline	Mechanical engineering		3,5 ECTS
Form of teaching	Traditional – classes organized at the University /classes conducted using online learning methods and techniques			
Prerequisites	Basic knowledge and skills in mathematics and machine construction			
Department	Faculty of Mechanical Engineering			
Coordinator	Tomasz Mazur PhD .Eng.			
The website of the basic organizational unit	<a href="http://www.wm.uniwersytetradom.pl">www.wm.uniwersytetradom.pl</a>			
E-mail address, phone number of the coordinator	Tomasz.mazur@uthrad.pl phone :76-86			

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

Learning Objective:	C1-the purpose of the lesson is to acquire the right choice skills methods and strategies for measuring and determining errors occurring during measurements
Curriculum Content:	The content of the classes is related to the research conducted scientific ones. Lecture: main news-fundamentals of measurement theory, definitions and basic concepts, units of measurement, types of dimensions and deviations, size tolerance, calculation/selection of standardized tolerances and deviations, calculation of gaps and indentations in shaft and hole joints, fixed hole or shaft principle, location of landings. Random measurement. Measurement of mechanical quantities-types of measurements, evaluation and measurement of static and dynamic errors, analysis of inaccuracies of static and dynamic measurements in measurements direct, indirect, and complex operations. Classical optimization method (in outline) using Lagrange's differential extremum. analysis of uncertainty of direct, indirect and complex measurements, display and reading errors, calculation of partial errors, calculation of random errors. Measurement systems-processing functions (Fourier transform, Laplace transform, transmission coefficient of the system operator, transmission coefficient of individual measuring elements in the system, examples of transformations). Laboratory exercises: measuring external dimensions. Measurement of internal dimensions. Measurement of complex contours (measuring microscopes). Angle measurements. Gear wheel measurements
Didactic (educational) methods:	Informational lecture (regular), practical exercises (laboratory)
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The condition for passing the subject is to meet all the required requirements. required learning outcomes defined for the subject. Lecture: a written test consisting in solving an accounting problem, taking into account the correctness of the result, the calculation method used, and the independence of work. Lab exercises: Arithmetic mean of scores with all submitted reports and possible theory tests, and all ratings must be positive

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	Classifies geometric values in size and shape and defines the method and strategy for measuring them	K_WG12	Lectures	Colloquium	final notes test written documents
U1	Can perform measurements basic dimensions geometric and define uncertainty dimensions	K_UW06	Laboratories	Reports	Continuous + control presence
K1	aware of the consequences accepting and conducting a survey measurement strategy	K_KO04	Laboratories	Evaluation verbal form verbal form	

Literature and teaching aids
1. Raghavendra, Krishnamurthy: Engineering Metrology and Measurements. Oxford University Press 2013 2. Mazda F. F.: Electronic instruments and measurement techniques. Cambridge University Press. 1987 3. Nawrocki W.: Measurement Systems and Sensors. Artech House Publishers, 20054. 4. Pallas-Areny R., Webster J.G.: Sensors and signal conditioning. John Willey& Sons, Inc., 2001

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	16 [h]
Participation in .... classes/laboratory classes	X	X	12 h]
Meeting with teachers during their duty hours	3 [h]	X	X
Preparation for lectures/classes/.... , Preparation for ... credit / exam	X	52 [h] 5 [h]	X
Total student workload	3 [h]/ 0,1 ECTS	57 [h]/2,3ECTS	28 [h]/ 1,1 ECTS
ECTS credits for the course	88 [h]/3.5 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>

