

SYLLABUS

Course description

Course code	Course	TEORIA EKSPERYMENTU		
MB/O/I/NST/B1.7		EXPERIMENT THEORY		
Language of instruction	English			
Academic year	2023/2024			
field of study:	Mechanical engineering			
field of specialisation:	All			
Educational level	first-cycle studies			
Education profile	General academic			
Mode of study	Part-time studies			
Semester(s)	2			
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	
	Lecture	[h]	2 ECTS	
	Classes	[h]		
	Project	16 [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		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	Basic knowledge and skills in algebra and mathematical statistics.			
Department	Faculty of Mechanical Engineering			
Coordinator	dr hab. inż. Wojciech Żurowski prof. UTH Rad.			
The website of the basic organizational unit	www.uniwersytetradom.pl			
E-mail address, phone number of the coordinator	wojciech.zurowski@uthrad.pl			

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

Learning Objective:	The aim of education is to acquire the ability to create experiment plans (in the general sense: production process, quality control) adapted to the conditions in which it is conducted and to the tasks to be carried out, as well as the acquisition of competences necessary for the statistical analysis of the results obtained. The aim of laboratory exercises is to show the mechanism of creating object functions and to prepare students to define them on their own.
Curriculum Content:	Definition of terms: experiment plan, object function and object model. Characteristics of the research object: input quantities, output quantities, constant and disturbing quantities. Decomposition of the research object. Classification and general characteristics of experimental designs. Chebyshev polynomials. The standardized form of the experiment design. The basic division of plans: determined, randomized and optimization. The structure of the composition plans: the core of the plan, star points and the center of the plan. Measures of location and dispersion of measurement results. The general population and its sample. Location measures: arithmetic mean, geometric mean, harmonic mean, mode and median. Measures of dispersion of measurement results: sample and population variance, corrected variance, sample standard deviation, corrected standard deviation. Distribution function and probability distribution function. Statistical interpretation of results: confidence interval, significance level and confidence level in a normal distribution. Approximation of the function of the research object and the method of verifying its adequacy. Least squares method.
Didactic (educational) methods:	Discussion of basic issues with the use of audiovisual means, verbal problem method. Computational issues implemented in the computer lab.
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The final grade is the average of the grade obtained from the practical project and the test of the ability to determine the basic parameters characterizing experimental data sets.

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	The concept and role of the theory of experiment in scientific research, production processes and quality control.	K_WG01	discussion of the issue	test	result of the test
W2	Classification and general characteristics of experimental designs. Plans: complete, monoselective, polyselective (fractional, orthogonal, rotational, optimal, special), randomized (complete, block, square).	K_WG01	discussion of the issue	multiple choice	result of the test
W3	Measures of location and dispersion of measurement results: mean values, sample variance, standard deviation, range.	K_WG01	discussion of the issue	test	result of the test
W4	Approximation of the function of the test object and verification of its adequacy (mean deviation, maximum squared deviation, mean squared deviation, sum of	K_WG01	discussion of the issue	multiple choice	result of the test

	squared deviations and multiple correlation coefficient).				
U1	Can calculate the average of a sample (arithmetic, geometric, harmonic, mode and median).	K_UW01	calculations in the computer lab.	test	test result
U2	He is able to select a function approximating the results of measurements, estimate its parameters and determine the measures of adequacy of this approximation.	K_UW02	calculations in the computer lab	multiple choice	test result
K1	He can cooperate with a team performing measurements or simulation calculations.	K_KK01	conversation		

Literature and teaching aids	
1.	M. Korzyński, Metodyka eksperymentu. Planowanie, realizacja i statystyczne opracowanie wyników eksperymentów technologicznych. Wydawnictwo Naukowe PWN, 2022
2.	B. Kacprzyński, Planowanie eksperymentów. Podstawy matematyczne, Wyd.Nauk.- Techn., Warszawa 1974
3.	Z. Polański, Planowanie doświadczeń w technice, PWN, Warszawa 1996.
4.	R. Górecka, Teoria i technika eksperymentu, skrypt Politechniki Krakowskiej, Kraków 1995.

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	X
Meeting with teachers during their duty hours	2 [h]	X	X
Preparation for lectures/classes/.... , Preparation for ... credit / exam	X	24/8 [h]	X
Total student workload	2 [h]/0,1 ECTS	32 [h]/1,3 ECTS	16 [h]/0,6 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, przewlekłe chorych).</p>