

# SYLLABUS

## Course description

Course code		Course	TRIBOLOGIA W BUDOWIE I EKSPLOATACJI MASZYN	
MB/O/I/ST/C2B.6			TRIBOLOGY IN MACHINE ENGINEERING	
Language of instruction		English		
Academic year		2023/2024		
<b>field of study:</b> <b>field of specialisation:</b>		Mechanical engineering		
		Designing and Manufacturing of Machines		
Educational level		first-cycle studies		
Education profile		General academic		
Mode of study		Full-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	15[h]	3 ECTS
		Classes	15[h]	
		Laboratory	15[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		General knowledge, skills acquired during studies in the field of physics, materials engineering, mechanical engineering		
Department		Faculty of Mechanical Engineering		
Coordinator		dr hab. inż. Wojciech Żurowski		
The website of the basic organizational unit		www.wm.uniwersytetradom.pl		
E-mail address, phone number of the coordinator		<a href="mailto:wojciech.zurowski@uthrad.pl">wojciech.zurowski@uthrad.pl</a>		

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

Learning Objective:	Gaining knowledge in the field of friction, wear and lubrication of machine elements and tools. Gaining knowledge in the field of reducing the negative effects of tribological processes.
Curriculum Content:	The basics of tribology. System analysis of tribological phenomena. Top layer of rubbing elements. Friction theories. Forms of wear. Lubrication theories. Microtribology. Nanotribology. Biotribology. Experimental studies of friction and wear - methods and devices. Design, technological and operational methods of counteracting the negative effects of friction. Bearing materials. Anti-wear technologies. Lubricants: types, operation, operation. Tribology in machine operation and technological processes. Energetic and ecological problems of tribology. Trends in the development of tribology and tribotechnics.
Didactic (educational) methods:	Conventional lecture with the use of multimedia presentation, verbal problem method.
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	Exam: Exam test.

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	Knows and understands the processes of friction, wear and lubrication of machine elements and tools.	K_WG(16)	lecture	pass	test
U1	He can use the knowledge in the field of reducing the negative effects of tribological processes.	K_UW(09)	lecture Laboratory exercises	for evaluation	design
U2	Can describe the technological, constructional and operational methods of counteracting the negative effects of friction.	K_UW(07)	Lecture Laboratory exercises	pass	test
K1	Is aware of the need to expand knowledge and is able to choose the right methods of expanding this knowledge. He understands the need to improve professional competences in relation to increasing the durability and reliability of machines	K_KR(04)	lecture Laboratory exercises	for evaluation	colloquium project

Literature and teaching aids	
1.	Hebda M.: Procesy tarcia, smarowania i zużywania maszyn. ITeE-PIB, 2007.
2.	Szczerek M., Wiśniewski M.(red.): Tribologia i tribotechnika. PTT, 2000.
3.	Lawrowski Z.: Tribologia – tarcie, zużywanie, smarowanie. PWN, 2006.
4.	Batchelor A.W., H. Stachowiak G.W.: Engineering Tribology, USA 2001.
5.	Szczerek M.: Metodologiczne problemy systematyzacji badań tribologicznych. ITeE, 1997.
6.	Leszek W.: Wybrane zagadnienia metodologii badań tribologicznych. PWN, 1990.
7.	Żurowski W.: Fizyczne i techniczne zagadnienia odporności na zużycie ciał stałych. UTHRad, 2019

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 .... classes/laboratory classes	X	X	15/15[h]
Meeting with teachers during their duty hours	2 [h]	X	X
Preparation for lectures/classes/.... , Preparation for ... credit / exam	X	15/15/12 [h]	X
Total student workload	2[h]/ 0,1 ECTS	28 [h]/1.1 ECTS	45[h]/ 1,8 ECTS
ECTS credits for the course	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>

