



Subject card

Subject name and code	Biotribology, PG_00065017						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	February 2025		Academic year of realisation of subject		2025/2026		
Education level	second-cycle studies		Subject group		Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Zakład Konstrukcji Maszyn i Inżynierii Medycznej -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Katarzyna Zasińska				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		6.0		14.0	50
Subject objectives	Introduction to tribology. Basic facts and problems related to the phenomenon of friction in its various forms. Fundamental techniques used in research on friction and wear. Significance of friction in technology - positive and negative role cases. Basic tribology of living organisms, in particular the vertebrae family. Biological structures with friction and wear. Types and specifics of friction and wear in living organisms. Wear in biological tribological systems/contacts. Tribological processes related diseases and their treatment. Artificial tribological systems applied in living organisms.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W03] has structured and well-founded knowledge covering issues in the field of medical engineering allowing to design medical devices, rehabilitation systems and to formulate research procedures		Basic knowledge in contemporary methods of treatment of tribo - related diseases in humans.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K7_W12] identifies and interprets the main developmental trends and significant new achievements in the field of engineering and technical sciences and disciplines relevant to the course of study		Competency in fundamentals of tribological processes in living organisms and similarities/ dissimilarities to the tribology of artificial mechanical systems.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study		Capacity to evaluate the impact of biotribological processes on the quality of health and living of humans.		[SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	Basic tribology.		
	Basic tribometrology.		
	Role of friction in technology.		
	Friction and wear in biological systems.		
	Degradation of biotribological systems and its consequences to the living organism.		
	Fundamentals of medical treatment of biotribological processes related diseases.		
Prerequisites and co-requisites	Finished course in technical mechanics.		
	Finished course in machine design.		
	Understanding of the fundamentals of the anatomy of the human being.		
	Interest in science and technology, and biology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test in lectured part	50.0%	50.0%
	lab reports grades	50.0%	50.0%
Recommended reading	Basic literature	Friction; an introduction to tribology by Bowden, Frank Philip, Tabor, David; https://archive.org/details/frictionintroduc0000bowd	
		Tribology in Machine Design, Tadeusz Stolarski, Elsevier	
		Human anatomy atlas	
		Principles of Human Joint Replacement: Design and Clinical Application 2nd ed. 2015 Editionby Frederick F. Buechel (Author), Michael J. Pappas (Author)	
	Supplementary literature	Catch 22, Joseph Heller	
		Hitchhiker's guide to the galaxy, Douglas Adams	
		O powstawaniu Polaków, Kazimierz Ulanowski	
		Who We Are and How We Got Here, David Reich	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Sliding friction - basic models, types, examples of sliding contacts in technology and biology		
	Synovial joint - basic structure, principal constituents, frictional regimes and mechanisms of development of the friction, lubrication.		
	Orthopaedic prosthetics - recommendations for treatment, typical prosthetic (exo and endo) procedures, comparison of natural and artificial joints, endoprosthesis survivability.		
Work placement	Not applicable		

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