



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	<p>Basic tribology.</p> <p>Basic tribometry.</p> <p>Role of friction in technology.</p> <p>Friction and wear in biological systems.</p> <p>Degradation of biotribological systems and its consequences to the living organism.</p> <p>Fundamentals of medical treatment of biotribological processes related diseases.</p>											
Prerequisites and co-requisites	<p>Finished course in technical mechanics.</p> <p>Finished course in machine design.</p> <p>Understanding of the fundamentals of the anatomy of the human being.</p> <p>Interest in science and technology, and biology.</p>											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 887 794 913">Subject passing criteria</th> <th data-bbox="799 887 1137 913">Passing threshold</th> <th data-bbox="1142 887 1481 913">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 920 794 947">test in lectured part</td> <td data-bbox="799 920 1137 947">50.0%</td> <td data-bbox="1142 920 1481 947">50.0%</td> </tr> <tr> <td data-bbox="456 954 794 981">lab reports grades</td> <td data-bbox="799 954 1137 981">50.0%</td> <td data-bbox="1142 954 1481 981">50.0%</td> </tr> </tbody> </table>			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%
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Recommended reading	Basic literature	<p>Friction; an introduction to tribology by Bowden, Frank Philip, Tabor, David; https://archive.org/details/frictionintroduc0000bowd</p> <p>Tribology in Machine Design, Tadeusz Stolarski, Elsevier</p> <p>Human anatomy atlas</p> <p>Principles of Human Joint Replacement: Design and Clinical Application 2nd ed. 2015 Edition by Frederick F. Buechel (Author), Michael J. Pappas (Author)</p>										
	Supplementary literature	<p>Catch 22, Joseph Heller</p> <p>Hitchhiker's guide to the galaxy, Douglas Adams</p> <p>O powstawaniu Polaków, Kazimierz Ulanowski</p> <p><i>Who We Are and How We Got Here</i>, David Reich</p>										
	eResources addresses	Adresy na platformie eNauczanie:										
Example issues/ example questions/ tasks being completed	<p>Sliding friction - basic models, types, examples of sliding contacts in technology and biology</p> <p>Synovial joint - basic structure, principal constituents, frictional regimes and mechanisms of development of the friction, lubrication.</p> <p>Orthopaedic prosthetics - recommendations for treatment, typical prosthetic (exo and endo) procedures, comparison of natural and artificial joints, endoprosthesis survivability.</p>											
Work placement	Not applicable											

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