



Subject card

Subject name and code	Biotribology, PG_00057496						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025		
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 hab. inż. Jacek Łubiński					
	Teachers	dr inż. Katarzyna Zasińska dr inż. Tomasz Seramak dr inż. Milena Supernak					
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	3.0		17.0	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 vertabrae 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_W05] He/she has in-depth knowledge related to the methods and techniques used in medicine	Basic knowledge in contemporary methods of treatment of tribo - related diseases in humans.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
	[K7_W08] He/she broad knowledge related to understand social, economic, legal, ecological and other outer techniques conditions of engineering activities in mechanical-medical engineering	Capacity to evaluate the impact of biotribological processes on the quality of health and living of humans.		[SW1] Assessment of factual knowledge			
	[K7_W04] He/she has in-depth knowledge related to the construction and utilization of machines used mechanical-medical engineering	Competency in fundamentals of tribological processes in living organisms and similarities/ dissimilarities to the tribology of artificial mechanical systems.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			

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="456 882 794 909">Subject passing criteria</th> <th data-bbox="799 882 1137 909">Passing threshold</th> <th data-bbox="1142 882 1469 909">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 916 794 943">lab reports grades</td> <td data-bbox="799 916 1137 943">50.0%</td> <td data-bbox="1142 916 1469 943">50.0%</td> </tr> <tr> <td data-bbox="456 949 794 976">test in lectured part</td> <td data-bbox="799 949 1137 976">50.0%</td> <td data-bbox="1142 949 1469 976">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	lab reports grades	50.0%	50.0%	test in lectured part	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											