



## Subject card

Subject name and code	Biotribology, PG_00057496						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
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		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. Atifitial tribological systems applied in living organisms.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[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_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.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		

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; <a href="https://archive.org/details/frictionintroduc0000bowd">https://archive.org/details/frictionintroduc0000bowd</a>  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  <i>Who We Are and How We Got Here</i> , David Reich	
	eResources addresses	Adresy na platformie eNauczanie: Biotribologia, W, IMM, II stopień, sem 02, zimowy 2023/2024 (PG_00057496) - Moodle ID: 34734 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34734">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34734</a>	
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
----------------	----------------