



Subject card

Subject name and code	Biotribology, PG_00057496						
Field of study	Medical and Mechanical Engineering, Mechanical and Medical Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2023/2024		
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	4		Language of instruction		Polish		
Semester of study	7		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Machine Design and Vehicles -> 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	0.0	0.0	0.0	15
	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	15		3.0		17.0	35
Subject objectives	The aim of the course is to acquaint students with the structure and functions of synovial joints in the human body, the role of friction, types of friction and their hypotheses, biomaterials used for frictional couples, types of tribological wear and lubrication in natural and artificial joints and tribological research of endoprostheses. To acquire the ability to make preliminary decisions on the selection of biomaterials for friction pairs, the technology of their manufacturing and planning of experiments and the selection of appropriate experimental methods in tribological research.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W13	The student knows the level of his competences and limitations in fulfilling professional tasks.	[SW1] Assessment of factual knowledge
	K6_W07	The student is able to identify and formulate specifications of simple and practical engineering tasks in the design, manufacture and exploitation of machinery.	[SW3] Assessment of knowledge contained in written work and projects
	K6_W04	The student has general knowledge of selected issues of the application of mechanical engineering in medicine, in particular in implants and dentures.	[SW1] Assessment of factual knowledge
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	K6_K01	The student knows the level of his competences and limitations in fulfilling professional tasks.	[SK2] Assessment of progress of work [SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work
	K6_W07	The student is able to identify and formulate specifications of simple and practical engineering tasks in the design, manufacture and exploitation of machinery.	[SW1] Assessment of factual knowledge
Subject contents	K6_W13	The student knows the level of his competences and limitations in fulfilling professional tasks.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	1. History of tribology. Basic issues of tribology. 2. Biotribology: genesis, meaning and problems. 3. Structure and functions of the most important synovial joints in human body. 4. Arthroplasty of orthopaedic joints. History of endoprostheses. 5. Biomaterials used for endoprosthesis components. 6. Types of friction in biotribology. 7. Processes and methods of lubrication. 8. Bio-nodes of friction in human body. 9. Tribological processes in natural and artificial joints. 10. Tribological investigations of endoprostheses. 11. Knee joint. 12. Hip joint. 13. Dentition - types of wear and forms of damage. 14. Skin rubbing. 15. Modern methods of manufacturing and surface modification of endoprosthesis components.		
	Prerequisites and co-requisites Knowledge of the anatomical structure of the main human joints. Having the ability to analyze simple biotribological systems.		
	Assessment methods and criteria	Subject passing criteria	Passing threshold
		Test	56.0%
			100.0%
	Recommended reading	Basic literature 1. Będziński R.: Biomechanika inżynierska - zagadnienia wybrane. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 1997. 2. Bowden F.P., Tabor D. Wprowadzenie do trybologii. Wydawnictwo NT, Warszawa, 1980. 3. Gierek A.: Zużycie tribologiczne. Wydawnictwo Politechniki Śląskiej, Gliwice, 2005. 4. Gierzyńska-Dolna M.: Biotribologia. Wydawnictwo Politechniki Częstochowskiej, Częstochowa, 2002. 5. Nałęcz M.: Biocybernetyka i inżynieria biomedyczna 2000 Biomechanika i inżynieria rehabilitacyjna (tom 5), Akademicka Oficyna Wydawnicza EXIT, Warszawa, 1999.	

	Supplementary literature	6. Lawrowski Z.: Tribologia. Tarcie, zużywanie i smarowanie, Wydawnictwo Politechniki Wrocławskiej, Wrocław, 2008. 7.Plaza S. i in.: Wstęp do tribologii i tribochemia. Wydawnictwo Uniwersytetu Łódzkiego. Łódź, 2005.
	eResources addresses	Adresy na platformie eNauczenie: Biotribologia, W, IMM, I stopień, sem 07, zimowy 2023/2024 (PG_00057496) - Moodle ID: 34733 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=34733
Example issues/ example questions/ tasks being completed	1. The role of friction in biomechanics. Types of friction and its hypotheses. 2. Contact mechanics in biotribology. 3. Friction, lubrication, tribological wear. Specifics of friction, wear and lubrication in the living environment. 4. Surface engineering in biotribology.	
Work placement	Not applicable	