



Subject card

Subject name and code	Methods of medical construction design, PG_00065007						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	February 2025	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	1	ECTS credits				4.0	
Learning profile	general academic profile	Assessment form				exam	
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Grzegorz Rotta				
	Teachers		dr inż. Grzegorz Rotta				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	30.0	0.0	45
	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	45		11.0		44.0	100
Subject objectives	Repetition and consolidation of knowledge on the design of mechanical machines and devices, with particular emphasis on factors typical for medical and rehabilitation equipment. The lecture includes a review of the most important information on the basics of designing and calculating mechanical structures, joints and the selection of typical elements of catalog machine parts. In addition, design aspects that affect the specificity of medical devices will be discussed in an extended way. Design projects of medical devices made by students will help in deeper understanding of new problems						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U01] uses acquired analytical, simulation and experimental methods as well as mathematical models to solve engineering problems in the field of medical engineering	The student is able to use analytical, simulation and experimental methods as well as mathematical models to carry out engineering tasks in the field of medical engineering.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[K7_U03] uses knowledge related to diagnostic techniques, medical and rehabilitation procedures, anatomy and physiology to formulate assumptions referring to design and research procedures	The student is able to use knowledge of diagnostic techniques, medical and rehabilitation procedures, and anatomy and physiology to formulate design assumptions.			[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	[K7_W04] has structured and well-founded knowledge covering issues in the field of mechanical engineering allowing to design medical devices, rehabilitation systems and to formulate research procedures	The student has knowledge enabling the design of standard and innovative medical devices and rehabilitation systems.			[SW1] Assessment of factual knowledge		
	[K7_K101] acknowledges the importance of knowledge related to the field of study in solving cognitive and practical problems, critically assessing the information obtained	The student understands the importance of knowledge in the field of medical sciences in solving cognitive and practical problems in mechanical-medical engineering.			[SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	<p>Definitions and classifications of medical devices, equipment and tools (3h) Repetition of Fundamentals of Machine Design (4h)</p> <ul style="list-style-type: none"> • Strength nomenclature, general strength, fatigue strength • Welds • Bolted connections • Shafts and axles • Rolling bearings <p>Materials Science and Production Technologies (2h)</p> <ul style="list-style-type: none"> • Features and applications of various groups of materials with an emphasis on medical applications • Traditional technologies: turning, milling, drilling, grinding, casting, welding, soldering, welding • Additive technologies • Electric gouging • Injection molding machines (syringe manufacturing, mass production, expensive molds) <p>Drives (2h)</p> <ul style="list-style-type: none"> • Types, classification and application (including in the Medical University) of electric motors • Inverters, inverters • Electric actuators • Electric battery drives (motors, actuators) <p>Design - methodology (4h)</p>											
Prerequisites and co-requisites	<p>Basic knowledge in:</p> <ul style="list-style-type: none"> - fundamentals of machine design - technical drawing - mechanics and strength of materials - materials science - ability to use the CAD program 											
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Subject passing criteria</th> <th style="width: 33%;">Passing threshold</th> <th style="width: 33%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Lecture test</td> <td>50.0%</td> <td>25.0%</td> </tr> <tr> <td>Design project</td> <td>50.0%</td> <td>75.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture test	50.0%	25.0%	Design project	50.0%	75.0%
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Design project	50.0%	75.0%										
Recommended reading	Basic literature	<p>Niezdziński: "Wzory, wykresy i tablice wytrzymałościowe", WNT, Warszawa (dowolne wydanie, sugerowane najnowsze)</p> <p>Skrypty PG z serii "Wykład z PKM z ćwiczeniami rachunkowymi"</p> <p>Dobrzański T. : " Rysunek techniczny maszynowy", WNT, Warszawa (dowolne wydanie, sugerowane najnowsze)</p>										

	Supplementary literature	Leonid W. Kurmaz, Oleg L. Kurmaz: "Podstawy konstruowania węzłów i części maszyn. Podręcznik konstruowania", Kielce, 2011 Leonid W. Kurmaz, Oleg L. Kurmaz: " Podstawy konstrukcji maszyn - projektowanie", PWN, Warszawa
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>Design projects</p> <ul style="list-style-type: none"> - wheelchair modernization (ergonomics, drive, etc.) - design of a medical / rehabilitation device carrying out a specific activity - a project of living / living facilities in an apartment / house of a person with a specific disability <p>Test:</p> <ul style="list-style-type: none"> - metals (other materials) used in medical devices - safety factor in the calculation of medical / rehabilitation devices - electric drives used in medical / rehabilitation devices 	
Work placement	Not applicable	

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