GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Engineering Problems in Rehabilitation, PG_00064141						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2028/2029			
Education level	first-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	3		Language of instruction	Polish			
Semester of study	6		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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		Dominika Szalewska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	0.0	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		5.0	50.0	100	
Subject objectives	To familiarize students with engineering issues in rehabilitation. Familiarizing with the methods and objectives of rehabilitation as a medical and socio-professional process, indications and contraindications for rehabilitation in cardiovascular diseases, in respiratory diseases, in diseases of the nervous system and diseases of the musculo-skeletal system. Facing students with rehabilitation planning principles, methods of improving and monitoring rehabilitation effects. Mastering the student's ability to use basic equipment and medical devices used in rehabilitation.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W06] has knowledge in specific areas related to the application of mechanical engineering in medicine or in the field of medical and rehabilitation devices	The student uses the correct anatomical nomenclature, presents basic knowledge in the field of anatomy, physiology and human pathophysiology. Explains the principles of basic apparatus and devices applicable in medical rehabilitation.	[SW1] Assessment of factual knowledge
	[K6_K02] is aware of importance of professional dealing and to fulfill ethics obligations, he/she understands other (nontechnical) abilities of mechanical engineering professional, their influence on the society and security of environment, he/she is aware of importance of social cooperation	The student is aware of the validity of the non-technical conditions and effects of engineering activities in rehabilitation. Understands the validity of the ability to work in the group, is aware of the role of the rehabilitation team and all professionals included in the team, i.e. medical doctors, nurses, physiotherapists, occupational therapists, psychologists, etc.	[SK5] Assessment of ability to solve problems that arise in practice
	[K6_U08] is able to assess the human body physic and functioning of the body organs and is able to use medical knowledge to solve mechanical-medical problems in the scope of the study	The student is able to analyze indications and contraindications to rehabilitation. He/she uses the elementary medical knowledge in motor rehabilitation engineering.	[SU2] Assessment of ability to analyse information
	[K6_U09] is able to use basic medical equipment and devices or has knowledge of medical imaging appropriate for the program	The student is able to use basic equipment and medical devices used in medical rehabilitation.	[SU2] Assessment of ability to analyse information

Subject contents	Course content – lecture Definition and goals of rehabilitation. Introduction to therapeutic methods in medical rehabilitation. Rehabilitation of patients with diseases of internal organs, including the cardiovascular and respiratory systems. Medical rehabilitation of patients with diseases of the nervous system. Rehabilitation of musculoskeletal disorders. Adapted physical activity. Clinimetry in rehabilitation; quality of life. Diagnostic and therapeutic devices in cardiac and pulmonary rehabilitation. Design and operation of spirometry devices and exercise-induced gas assessment in exhaled air. Devices used to measure or estimate physical capacity. Physical capacity and physical fitness. Methods of measuring muscle strength, models of muscle structure, biomechanical and structural parameters of the human musculoskeletal system, Hill's theory. Modern methods used in the rehabilitation of patients with heart failure. Rehabilitation of respiratory diseases. Rehabilitation of patients with diabetes and renal failure after cardiac surgery. Differences in the management of patients with various conditions. Devices for echocardiography, electrocardiography, and extended Holter ECG monitoring. The role of rehabilitation education. The rehabilitation management specialist as a new member of the rehabilitation team. Telemedicine in neurological and cardiac rehabilitation. Prosthetic limbs. Telemedicine in neurological and cardiac rehabilitation. Prosthetic limbs structure, types, applications, and control. Correct body posture and the most common postural defects in children and adults. Methods for assessing body posture. Auxiliary tests and devices used in rehabilitation. Physical therapy. The use of magnetic, electrical, mechanical, and thermal interactions in the rehabilitation of patients and devices used in this type of rehabilitation. Course content – exercises Definition and goals of rehabilitation. 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Prerequisites and co-requisites	Basic knowledge of the subjects: Human anatomy, Human physiology, Selected issues in neurology for engineers, Selected issues for engineers in cardiology, Selected issues in surgery and orthopedics for engineers.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Colloquium	60.0%	100.0%

Recommended reading	Basic literature	1. Kwolek A. (red.). Rehabilitacja medyczna Tom I i II, Wyd. Edra Urban&Partnen, Wrocław 2011. 2. Ryszard Piotrowicz, Anna Jegier, Dominika Szalewska i wsp. Rekomendacje w zakresie realizacji kompleksowej rehabilitacji kardiologicznej: stanowisko ekspertów Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego. Wydawnictwo AsteriaMed, 2017.

	Supplementary literature	1. The White Book (WB) of Physical and Rehabilitation Medicine (PRM) in Europe, 2018 2. Cifu D., Lew H.: Braddoms Rehabilitation care: a clinical handbook. Elsevier, 1st edition 2017. 3. Giermek i wsp.: Wyroby medyczne. Zaopatrzenie indywidualne, Wyd. PZWL, Warszawa 2016.
	eResources addresses	
Example issues/ example questions/ tasks being completed	List the stages of rehabilitation after a myocardial infarction. List the methods of rehabilitation after ischemic stroke. Name the members of the rehabilitation team. Indicate devices used for functional diagnostics of patients with cardiovascular diseases. Indicate the medical equipment needed in the rehabilitation of patients after hemorrhagic stroke.	
Practical activites within the subject	Not applicable	

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