

# Mobility Rehabilitation - opis przedmiotu

Informacje ogólne	
Nazwa przedmiotu	Mobility Rehabilitation
Kod przedmiotu	06.9-WM-ER-IB-41_18
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	WM - oferta ERASMUS
Profil	-
Rodzaj studiów	Program Erasmus
Semestr rozpoczęcia	semestr zimowy 2023/2024

Informacje o przedmiocie	
Semestr	1
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	

Formy zajęć					
Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	30	2	-	-	Egzamin
Projekt	30	2	-	-	Zaliczenie na ocenę

## Cel przedmiotu

The aim of the course is introduction to the rehabilitation engineering a specially to the construction of medical equipment, rehabilitation equipment of basic rehabilitation methods.

## Wymagania wstępne

Physics, Mechanics and Strength of Materials, Electronics and Electrical engineering, Fundamentals of Engineering Design, Biomechanics, Sensors and Measurements, Electronic Medical Apparatus

## Zakres tematyczny

### Lecture:

1. Introduction to rehabilitation engineering, history of rehabilitation, basic definitions, phases of the rehabilitation process, role of rehabilitation engineering. (2 hours.)
2. Medical, social and vocational rehabilitation. (2 hours.)
3. Introduction to physiotherapy: basics of physiotherapy, therapeutic massage, climatotherapy, balneotherapy, kinesiotherapy. (4 hours)
4. Basics of kinesiotherapy - types of movements, types of exercises. (4 hours)
5. Orthotic equipment. foot orthoses, knee orthoses, hip joint orthoses, lower limb orthoses, lower limb orthotics. (4 hours)
6. Prosthetic equipment: upper limb prostheses, hand prostheses, forearm prostheses, muscle tension measurements, measurements of non-electrical quantities in medical diagnostics and control. (4 hours)
7. Lower limb prostheses, gait kinematics, locomotion, lower limb prosthetics, foot prostheses, dynamic foot prostheses, lower leg prostheses, thigh prostheses, hip prostheses, functional stimulation of the lower limbs (4 hours)
8. Standing and stabilizing equipment, standing frames, auxiliary equipment (2 hours)
9. Sensors in rehabilitation devices, selected rehabilitation devices (2 hours)
10. Modern solutions of intelligent rehabilitation devices. (2 hours.)

### Project:

1. Device concept - Literature examples of solutions. Sketches with a description of the elements, their functions and methods of production. Assessment of the advantages and disadvantages of individual proposals. The final concept accepted for implementation. Construction assumptions. (4 hours)
2. 3D model – solid model of the solution, description of the structure and functions of individual elements. 3D view of the assembly and individual parts. Report on the interpenetration of elements. (6 hours)

3. Calculations of force distribution - Analysis of force distribution in the system in selected positions. Determination of forces and moments loading structural elements and nodes. Load diagrams of the designed system. Determining the reactions acting on structural elements as well as the load on the limb. Justification for the adopted burdens. Drive selection. (4 hours)
4. Strength calculations - Calculations of selected structural nodes containing views and load patterns. Indication of design changes forced by structural strength considerations. (4 hours)
5. Assessment of the solution in terms of ergonomics and rehabilitation - Assessment of the structure in terms of ergonomics. Checking whether the structure meets the design assumptions. Suggestions for therapeutic exercises using the device. (2 hours.)
6. Selection of materials - list of elements, semi-finished products, parts and components for purchase. Cost estimate including purchases (according to online prices) and costs estimated. (4 hours)
7. Technical documentation - technical drawings of parts and assemblies. (4 hours)
8. Manufacturing and assembly technology - Description of the technology of manufacturing the elements, description of the assembly procedure. Description of the startup process. (2 hours.)

## Metody kształcenia

Conventional lecture, project method, discussion, work with a source document, work in group

## Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
The student has knowledge of the importance of technical measures in the lives of people with disabilities, acquire skills and experience in teamwork and is aware of the ongoing development of rehabilitation equipment and prosthetic devices		<ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• Egzamin pisemny/ustny: Warunkiem zaliczenia części wykładowej jest uzyskanie pozytywnej oceny pisemnych lub ustnych odpowiedzi na pytania egzaminacyjne dotyczące teoretycznych zagadnień przedmiotu.</li> </ul>	<ul style="list-style-type: none"> <li>• Wykład</li> </ul>
The student has the ability to organize work in a project team		<ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• Ocena postępów w realizacji projektu</li> </ul>	<ul style="list-style-type: none"> <li>• Projekt</li> </ul>
Able to choose a design solution in terms of cost performance, formulate a conceptual design for the chosen design of rehabilitation equipment and in accordance with a preset specification, taking into account the non-technical aspects of the design a simple device for rehabilitation		<ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• Ocena na podstawie raportów</li> </ul>	<ul style="list-style-type: none"> <li>• Projekt</li> </ul>
Apply principles of safety rehabilitation equipment and prosthetic devices		<ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• bieżąca kontrola na zajęciach</li> </ul>	<ul style="list-style-type: none"> <li>• Projekt</li> </ul>
Able to identify the device by its purpose, on the basis of knowledge and analysis of the functioning and indicate a device which assists the rehabilitation of selected diseases		<ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> </ul>	<ul style="list-style-type: none"> <li>• Wykład</li> <li>• Projekt</li> </ul>
Knows the basic equipment used in the process of rehabilitation, has a basic knowledge of the development of modern techniques of rehabilitation, has information in the field of rehabilitation equipment recycling, and has a basic knowledge of the problems of people with disabilities		<ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> </ul>	<ul style="list-style-type: none"> <li>• Wykład</li> <li>• Projekt</li> </ul>

## Warunki zaliczenia

**Lecture:** The condition for passing is obtaining a positive grade in a written exam.

**Project:** The condition for passing the course is obtaining a positive summative assessment, which consists of: formative assessment based on the assessment of the degree of implementation of individual stages of the project, assessment for presentation and assessment for answers to questions related to the project. The assessment is made individually for each group member.

The project will grade based on:

1. Implementation of an individual project in groups of 1-2 people
2. Submitting reports according to the agreed points of the project implementation schedule
3. Giving the presentation
4. Submission of final project documentation

The final grade is determined based on the arithmetic mean of the grades from the lecture and project.

## Literatura podstawowa

1. Powell, Wendy, Rehabilitation: Innovations and Challenges in the Use of Virtual Reality Technologies, New York : Nova Science Publishers, Inc. 2017
2. Esposito, Salvatore M., Lagana, Raimondo, Rehabilitation : Practices, Psychology and Health, New York : Nova Science Publishers, Inc. 2012
3. L.H.V. van der Woude, F. Hoekstra, S. de Groot, K.E. Bijker, R. Dekker, P.C.T. van Aanholt, F.J. Het, Rehabilitation: Mobility, Exercise and Sports, Amsterdam : IOS Press. 2010
4. Chad A. Noggle, Raymond S. Dean, Mark T. Barisa, ABPPNeuropsychological Rehabilitation, New York : Springer Publishing Company. 2013
5. Leisman Gerry, Merrick Joav, Neuroplasticity in Learning and Rehabilitation, New York : Nova Science Publishers, Inc. 2016

## Literatura uzupełniająca

1. R. Bartlett, Introduction to Sports Biomechanics - Analysing Human Movement Patterns, Routledge, 2007
2. Susan B. O'Sullivan, Thomas J. Schmitz, George Fulk, Physical Rehabilitation, F.A. Davis Company, 2019
3. Rory a Cooper, Douglas A. Hobson, Hisaichi Ohnabe, An Introduction to Rehabilitation Engineering, Taylor & Francis INC International Concepts, 2006
4. Hoffman, Shirl J.; Knudson, Duane V., Introduction to Kinesiology 5th Edition With Web Study Guide, Human Kinetics Publishers, 2017

## Uwagi

Zmodyfikowane przez dr hab. inż. Tomasz Klekiel, prof. UZ (ostatnia modyfikacja: 14-05-2024 12:16)

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