



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Support engineering for disabled people

### Course

Field of study

Year/Semester

Construction and operation of means of transport

Area of study (specialization)

Profile of study

general academic

Level of study

Course offered in

First-cycle studies

Polish

Form of study

Requirements

part-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

18

Tutorials

Projects/seminars

9

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr Jarosław Gabryelski email :

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Responsible for the course/lecturer:

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### Prerequisites

KNOWLEDGE: basic knowledge in the field of technology,

SKILLS: logical thinking, using information obtained from the library, the Internet, standards, catalogs,

SOCIAL COMPETENCES: understanding the need to acquire the transferred knowledge, basics of teamwork skills

### Course objective

Gaining basic knowledge about: construction, operation and the importance of development and design of technical means for people with disabilities and seniors

### Course-related learning outcomes

Knowledge

1. Has basic knowledge in the field of biomechanics



2. Is aware of the latest trends in machine construction, i.e. the processes of designing and constructing machines, increasing the safety and comfort of operation, using modern construction materials

#### Skills

1. Can obtain information from literature, the Internet, databases and other sources. Can integrate the information obtained, interpret and draw conclusions from it, and create and justify opinions
2. Can formulate requirements for elements of machine systems

#### Social competences

1. Understands the need and knows the possibilities of continuous training
2. Is aware of the importance and understands the non-technical aspects and effects of a mechanical engineer's activity and its impact on the environment, as well as responsibility for decisions

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written credit - test

Exercises: credit on the basis of a test, own homework and activity during classes

#### Programme content

- Problem departments of rehabilitation engineering and assistive technology
- Technical means used in medical, social and vocational rehabilitation
- Concept of disability
- Contemporary reasons for the development of research and design of technical means in rehabilitation engineering
- Statistics and reasons for the need for rehabilitation engineering measures
- Designing for people with disabilities - design process, working team - design, design rules, examples
- Biomechanics - definition, areas of activity
- Human movement potential - elements, functions
- Biokinematic chain, number of degrees of freedom, human movement system, instantaneous biomechanism
- Center of gravity
- Basic features and structure of assistive devices (determination of geometry and kinematics on the basis of human anthropometric features, methods and methods of controlling devices, selection of materials)



- Wheelchair - definitions and classification,
- Wheelchairs - functions, structure, development trends
- Design modular design and series of types of construction on the example of a manual wheelchair
- Designing an active wheelchair frame (dimensions, structure of structural nodes)
- Requirements for the use of a wheelchair (ways of supporting the human body, perfect body position, support of the spine)
- Energy efficiency and dynamics of the wheelchair
- Means of individual and collective transport of people with disabilities
- Support devices in public transport - division, functions, description, applications
- Principles of universal design
- Principles of constructing technical means for people with disabilities and in old age
- Rehabilitation devices acji (wheelchairs, passenger car, means of public transport, hospital beds, means for standing upright, lifts, medical equipment for rehabilitation)

### Teaching methods

1. Lecture with a multimedia presentation (a form of an informative lecture with elements of a problematic and conversational lecture)
2. Exercises - credit based on a test, own homework and activity during classes (the use of classic problem methods, case study, discussion, practical exercises)

### Bibliography

#### Basic

- Introduction to rehabilitation engineering, ed. M. Zabłocki, Wyd. WMRIIT, Poznań 2017
- Designing for seniors and people with disabilities, research, analyzes, assessments, constructions, ed. B. Branowski, Wyd. WMRIIT PP, Poznań 2015
- Innovative concepts and product designs for people with disabilities and the elderly, ed. B. Branowski, Wyd. CIRITT PP, Poznań 2013
- SydorM., Selection and use of a wheelchair, Publishing House of the University of Life Sciences in Poznań, Poznań 2003

#### Additional

- Biomechanics and rehabilitation engineering, ed. R. Będziński and others, Wyd. Akademicka Oficyna Wydawnicza EXIT, Warsaw 2004



- Pańniczek R., Selected supporting and physiotherapeutic devices in the rehabilitation of paralysis of the central nervous system and amputation of limbs, Oficyna Wydawnicza Politechniki Warszawskiej, Warsaw 1998
- Marciniak J., Szewczenko A., Hospital and rehabilitation equipment, Wydawnictwo Politechniki Śląska, Gliwice 2003

### Breakdown of average student's workload

	Hours	ECTS
Total workload	85	3,0
Classes requiring direct contact with the teacher	45	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	40	1,5

<sup>1</sup> delete or add other activities as appropriate