



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Support engineering for disabled people [N1MiBP1>IWON]

### Course

|                                       |                   |
|---------------------------------------|-------------------|
| Field of study                        | Year/Semester     |
| Mechanical and Automotive Engineering | 1/2               |
| Area of study (specialization)        | Profile of study  |
| –                                     | general academic  |
| Level of study                        | Course offered in |
| first-cycle                           | Polish            |
| Form of study                         | Requirements      |
| part-time                             | compulsory        |

### Number of hours

|           |                    |       |
|-----------|--------------------|-------|
| Lecture   | Laboratory classes | Other |
| 18        | 0                  | 0     |
| Tutorials | Projects/seminars  |       |
| 9         | 0                  |       |

### Number of credit points

3,00

### Coordinators

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### Lecturers

### Prerequisites

Knowledge: basic knowledge of technology Skills: logic thinking, the use of information obtained from internet, standards, catalogues Social competences: bases skills action in team, understanding of the need for an example of knowledge.

### Course objective

Getting basic knowledge about: structure, action and the importance of development and technique design of means dedicated to disabled persons and older age people

### Course-related learning outcomes

Knowledge:

Has elementary knowledge of the impact of technology changes on the organization of social life as well as the health and psyche of individuals in human-machine contact.

Has basic knowledge in the field of chemistry, in the construction of the periodic table of elements and their properties, the theory of chemical bonds, organic and inorganic compounds, types of chemical reactions, chemical analysis: in the scope enabling understanding of lectures on metal and non-metal materials, protection sciences environment, fuels and lubricants, building materials and soil,

biomechanics and biological materials processed by agricultural and food machinery.  
Is aware of the latest trends in machine construction, i.e. automation and mechatronization, automation of machine design and construction processes, increased safety and comfort of operation, the use of modern construction materials.

#### Skills:

Can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions.  
Can organize and substantively manage the process of designing and operating a simple machine from a group of machines from the group covered by the selected diploma path.  
Can interact with other people as part of teamwork (also of an interdisciplinary nature).

#### Social competences:

Is ready to critically assess his knowledge and received content.  
Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on his own.  
Is willing to think and act in an entrepreneurial manner.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: written test - colloquium

Laboratory classes: credit based on a test, homework and activity during classes

### Programme content

Problem section of rehabilitation engineering and assistive technology

Technique measure in medical, social and professional rehabilitation

Concept of disability

Contemporary reasons research and design technique measure in rehabilitation engineering

Statistics and reasons request for technique measures rehabilitation engineering

Design for people with disabilities – design process, design work team, design principles, examples.

Biomechanics – definition, space of work

Human operational potential – elements, functions

Biocinematic chain, number of degrees of freedom, locomotor system of human, moment

biomechanism

Center of gravity

Basic features and structure of supporting devices ( definition geometry and cinematics based on anthropometrical features of human, control methods of devices, choosing materials).

Wheelchairs – definition and classification

Wheelchairs – functions, structure, progress and tendencies

Modular construction, construction series based on manual wheelchair:

Design of frame active wheelchair (dimensions, structure of construction nodes).

Requirements regarding using type active wheelchair (support of spine, support of human body, ideal position of body)

Energy efficiency and wheelchair dynamics.

Individual means of transport and collective disabled persons.

Devices supporting in means of transport – functions, application, universal design principles.

Principles of construction technical measures dedicated to disabled persons and older age people.

Rehabilitation devices (wheelchairs, car, means of collective transport, hospital beds, rehabilitation equipment, lifts, medical rehabilitation gear)

### Course topics

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 Center of gravity  
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## Teaching methods

1. Lecture with a multimedia presentation (a form of an information lecture with elements of a problem-based and conversational lecture)
2. Laboratory classes - credit based on a test, own homework and activity in the classroom (using the classic problem method, case study, discussion, practical exercises)

## Bibliography

Basic  
 Wprowadzenie do inżynierii rehabilitacyjnej, red. M. Zabłocki, Wyd. WMRIIT, Poznań 2017  
 Projektowanie dla seniorów i osób z niepełnosprawnościami, badania, analizy, oceny, konstrukcje, red. B. Branowski, Wyd. WMRIIT PP, Poznań 2015  
 Innowacyjne koncepcje i konstrukcje produktów dla osób niepełnosprawnych i w starszym wieku, red. B. Branowski, Wyd. CIRiTT PP, Poznań 2013  
 Sydor M., Wybór i eksploatacja wózka inwalidzkiego, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, Poznań 2003  
 Additional  
 Biomechanika i inżynieria rehabilitacyjna, red. R. Będziński i inni, Wyd. Akademicka Oficyna Wydawnicza EXIT, Warszawa 2004  
 Paśniczek R., Wybrane urządzenia wspomagające i fizjoterapeutyczne w rehabilitacji porażen ośrodkowego układu nerwowego i amputacjach kończyn, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1998  
 Marciniak J., Szewczenko A., Sprzęt szpitalny i rehabilitacyjny, Wydawnictwo Politechniki Śląskiej, Gliwice 2003

## Breakdown of average student's workload

|   | Hours | ECTS |
|---|-------|------|
| Total workload  | 75    | 3,00 |
| Classes requiring direct contact with the teacher   | 27    | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 48    | 2,00 |