# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Medical and rehabilitation robots [S2IBio1>RMiR]

## Course

Field of study
Biomedical Engineering

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

## Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

## Number of credit points

2,00

## Coordinators

dr inż. Marcin Wiśniewski
marcin.wisniewski@put.poznan.pl

## Lecturers

## Prerequisites

Knowledge: basic in the field of robotics, technical mechanics, machine and device construction, and material engineering. Skills: logical thinking, using information obtained from the library, magazines and the Internet. Social competencies: The student is open to launching new biomedical technologies, understands the need to learn and acquire new knowledge

## Course objective

The aim of the course is to acquire knowledge about the use and construction of medical and rehabilitation robots, learn about key issues related to their design and safety requirements during their construction and use.

## Course-related learning outcomes

Knowledge:
1. The student has knowledge about the construction and use of medical and rehabilitation robots.
2. The student knows the guidelines for designing medical robots.
3. The student has knowledge about safety related to the work, use and design of medical robots.

Skills:
1. The student can determine the basic elements of construction of medical and rehabilitation robots.
2. The student knows and can characterize the basic guidelines for designing medical and rehabilitation robots.

Social competences:
1. The student is aware of the role of engineering knowledge and its importance for society and the environment.
2. The student is able to present and make people aware of the importance of conducted analyses and calculations in public life.
3. The student is able to define priorities for the implementation of a specific task.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Formative assessment:
a) laboratory: based on an assessment of the current progress of laboratory tasks,
b) lecture: based on answers to questions about the material discussed in previous lectures.
Summative assessment:
a) laboratory: credit on the basis of tasks performed during the laboratory and exercise report. The student must get a positive grade from the report / exercise.
b) lecture: credit on the basis of a test consisting of open or closed questions, scored on a scale of 0-4; colloquium is passed after obtaining at least 51% of points. Discussing the results of the colloquium. The testing colloquium is carried out at the end of the semester.

## Programme content

Lecture
Issues related to the construction, structure, design and application of medical robots.
Lab
Practical exercises in the principles and methods of programming industrial/medical robots

## Course topics

Lecture:
1. A robot and a manipulator.
2. Telemanipulators.
3. Telemanipulators - precision of movements.
4. Medical robots - safety.
5. Knowledge necessary to design robots.
6. Stages of robot design.
7. Informatisation and digitization in surgery.
8. Surgery - operating phases.
9. Medical robots.
10. Rehabilitation robots.
11. Advantages and disadvantages of using medical robots.
Lab:
1. Understanding the health and safety rules at work, laboratory regulations and construction of the Fanuc M16-iB robot.
2. Basics of Fanuc M16-iB programming.
3. Performing the assembly of the femoral implant (lateral and medial phlegm).
4. Robotic medical illustration.

## Teaching methods

1. Lecture: presentation illustrated with examples given on the board, problem solving.
2. Laboratory exercises: conducting experiments, solving tasks, discussion.

## Bibliography

Basic
1. Podsędkowski L. "Roboty Medyczne" WNT 2010.
2. Honczarenko J. Roboty przemysłowe. Budowa i zastosowanie. WNT, Warszawa 2010.
3. Morecki A., Knapczyk J., Kędzior K. Teoria mechanizmów i manipulatorów. Podstawy i przykłady zastosowań w praktyce. WNT 2001’
Additional
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## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 50 | 2,00 |
| Classes requiring direct contact with the teacher | 30 | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 20 | 1,00 |