COURSE DESCRIPTION CARD - SYLLABUS

Course name

Computer Control of Medical Devices

Course

Field of study

Biomedical engineering

Area of study (specialization)

UMR

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

English

Requirements

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

30

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Knowledge: Basic knowledge of mechatronics, automation, electrical engineering, electronics, computer control, sensors, drives.

Skills: Microcontroller skills, programming in C++ language, PLC application and programming, design of basic electronic circuits.

Social competencies: Understanding the importance of electronics for the development of the country's economy. Awareness of necessity for broadening knowledge and skills.

Course objective

Introduction to the design, operation, design and programming of computer based controlers, especially in medical devices.

Course-related learning outcomes

Knowledge

1. Construction of computer controllers, including PCs, IC, PLC and the real time operating systems
2. Knowledge of signal transmission in computer controllers
3. Knowledge about new sensors and advanced actuators
4. Knowledge about interface methods used in automation
5. Programming of computer systems
6. Basics of operating system structure

Skills

1. Ability to use of new sensors and drive
2. Ability to programming various type of mechatronic system
3. Ability to integrate different mechatronic devices in complex production system
4. Gain knowledge from different sources

Social competences

1. Understanding the requirement of learning by whole life; ability to inspire and organize learning process of other people.
2. s aware of the role of electronics in modern economy and its importance for the development of society and the environment.
3. Ability to think and act in a creative and enterprising way.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- basis of a test consisting of open questions.

Laboratory:

- programming in c and Python with used of Raspberry Pi system

- practical verification of properties of advanced computer systems.

Receiving additional points for class activity, especially for:

- ability to cooperate with others in the team working practically on particular tasks in laboratory,

- making use of elements and techniques surpassing lecture and laboratory material.

Project:

Making own control system for chosen medical device

Programme content

The structure of a computer based control system. Real Time Operating System structure. Physical basis of new sensors used in mechatronic devices. New actuators and servo drives used in mechatronics. Advanced control methods used in mechatronics. Communication interfaces (RS232, Powerlink), Programing in Python and C language. Examples of algorithms and control programs. Examples of various type of drivers, eg.: diagnostic station, ECG etc.

Teaching methods

Lecture/Labolatory

Bibliography

Basic

1. O'Reilly Media, Getting Started with Raspberry Pi, O'Reilly Media, 2011.

2. William Shotts, The Linux Command Line, 2015.

Additional

1. O'Reilly Media, Getting Started with Raspberry Pi, O'Reilly Media, 2011.

William Shotts, The Linux Command Line, 2015.

Breakdown of average student's workload

	Hours	ECTS
Total workload	65	3,0
Classes requiring direct contact with the teacher	40	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	25	1,0

[1] delete or add other activities as appropriate