COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer control of medical devices [S2IBio1E-UMiR>KSUM]

Course

Field of study
Biomedical Engineering

Year/Semester
1/2

Area of study (specialization)
Medical and Rehabilitation Devices

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

4,00

Coordinators

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Lecturers

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:

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Lecture: Credit on the basis of a written exam taking into account the issues of the lecture and laboratory exercises. Passing after exceeding the threshold of 60% of the total number of points.
Laboratory: Credit on the basis of correct execution of exercises and completion of a report for the indicated classes.
Project: Implementation of the author"s control system of the selected medical device (writing a program, making technical documentation).

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.

Course topics

none

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	100	4,00
Classes requiring direct contact with the teacher	47	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	53	2,00