COURSE DESCRIPTION CARD - SYLLABUS

Course name
Microprocessor controllers [S1IBio1E>SM]

Course

Field of study
Biomedical Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-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

dr hab. inż. Dominik Rybarczyk
dominik.rybarczyk@put.poznan.pl

Lecturers

Prerequisites

Basic information on electronics, automation, computer science, digital circuit techniques. Design of discrete electronic circuits. C programming

Course objective

Acquainting with the structure and operation of microprocessor systems. Design and programming of 8 - bit microprocessor control systems for devices, based on the platform, eg Arduino.

Course-related learning outcomes

Knowledge:
He/She knows the structure and operation of 8-bit microcontrollers, their types, types, possibilities and technical parameters of hardware and software
He/She knows the handling of ports, AC and CA converters, counters and timers, serial transmission
He/She knows what they are and how to handle interrupts
He/She knows the rules of connecting external elements to microcontrollers
Has basic knowledge of 32-bit microcontrollers

Skills:
Is able to design a mechatronic device driver using an 8-bit microcontroller, eg Arduino
Can program an Arduino microcontroller in C language
Can write a program for I / O, counters, interrupts and serial transmission

Social competences:
Understands the need for lifelong learning; can inspire and organize the learning process of other people
He/She is aware of the role of microprocessor basec controllers in modern engeneering and its importance for society and the environment
Can 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:

EXAM: Passed on the basis of an examination consisting of 5 general questions (for a correct answer to each question - 1 point. Grading scale: less than 2.6 points - 2, 2.6 ÷ 3.0 - 3.0, 3.1 ÷ 3.5 points - 3.5, 3.6 ÷ 4.0 points - 4.0, 4.1 ÷ 4.5 points - 4.5, 4.6 ÷ 5.0 points - 5.0 very good)
Laboratory: Credit based on the correct implementation of exercises and reports on each laboratory exercise according to the instructions of the laboratory teacher. Before the exercises, short entrance tests, and after the exercises, a written final test. In order to pass the laboratories, all exercises must be passed (positive grade from the answers and the report).

Programme content

1. Introduction to the construction of microprocessors and microcontrollers. Basics of their structure and programming.
2. Ports, construction and connection of simple elements, setting and programming.
3. Types and declarations of variables in microcontrollers. The use of conditional statements and loops in port handling.
4. Bidirectional serial communication, operation and programming
5. Counters and timers: construction and programming. PWM method
6. AC and CA converter in microcontrollers: construction, programming
7. Interrupts in microcontrollers and their programming
8. Microcontroller as a controller - examples. 32-bit microcontrollers

Lab:
Lab.
1. Basics. The environment and hardware for programming. The basics of programming a microcontroller, eg Arduino
2. Basics of I / O programming
3. I / O port support
4. Communication, serial transmission
5. Counters and timing systems
6. Interrupt handling programming

Course topics

none

Teaching methods

Lectures and presentations. Examples of programs and their implementation

Bibliography

Basic:
Exploring Arduino, Tools and Techniques for Engineering, Jeremy Blum
How to get started with Arduino in 1 day or less, Brian Jenkins 2018

Additional:
C Programming with Arduino, A. Smith, 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00