COURSE DESCRIPTION CARD - SYLLABUS

Course name

Microprocessor controllers

Course

Field of study

Mechatronics

Year/Semester

3/5

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Mechanicznej

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

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tel. 61 647 5910

Wydział Inżynierii Mechanicznej

ul. Piotrowo 3, 60-965 Poznań

Prerequisites

Basic knowledge of the automation, computer science, electronics, digital circuits. Ability to calculate electrical circuits. Programming in C language, electronic devices assembly. Group work. Understands the need for learning.

Course objective

Design and programming of microprocessor device control systems

Course-related learning outcomes

Knowledge

1. Knows the construction and operation of 8-bit microcontrollers, their types, types, capabilities and technical parameters of hardware and software.

2. Knows the construction and service of ports, AC and CA converters, counters and time and transmission systems.

3. Knows the rules for connecting external components to microcontrollers.

4. Knows the basics of architecture of 8-bit microcontrollers.

Skills

1. Can choose a microcontroller for a specific task

2. Is able to design a mechatronic device driver using an 8-bit microcontroller

3. Is able to develop a printed circuit board and assemble the electronic system

4. Is able to program the microcontroller in C language, debug and start the controller

5. Is able to prepare in Polish and English the development of problems in the field of electronic design and microcomputer control.

Social competences

1. Understands the need for lifelong learning; can inspire and organize the learning process of others.

2. Student is aware of the role of microprocessors in modern economy and its importance for society and the environment.

3. Is able to set priorities for the implementation of a specific task.

4. Is aware of the social role of the engineer.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:
687/5000

Lecture: Credit based on an exam consisting of 5 general questions (for the correct answer to each question - 1 point. Grading scale: below 2.6 points - ndst, 2.6 ÷ 3.0 - dst, 3.1 ÷ 3.5 points - dst+, 3.6 ÷ 4.0 points - db, 4.1 ÷ 4.5 points - db +, 4.6 ÷ 5.0 points - bdb).

Laboratory: Credit based on the correct performance of the exercises and a report on each laboratory exercise according to the instructions of the laboratory teacher. Before the exercise, short entrance tests, after the exercise a written final test. To pass the lab, all exercises must be passed (positive assessment of answers and reports).

Project: The way the project was carried out.

Programme content

Construction and principle of operation of the AVR atMega microcontrollers, external and internal peripherals of microcontrollers, input / output operations, communication interfaces, Designing microcontroller systems, internal and external interruptions mcu, measurements using ADC, PWM control, Programming in GCC language.

Basic concepts in the field of controllers. Types of embedded controllers for mechatronic devices. Microprocessors and microcontrollers. Construction and operation of microcontrollers. Memory and I / O addressing. Support for input and output operations. Interrupts. Timer and counter systems. Serial communication. AC and CA converters. Other elements of microcontrollers. ATmega microcontrollers. Runtime and software environment for microcontrollers. Basic list of microcontroller orders. Programming microcontrollers in the C language. Microcontroller operation system: power supply, reset, oscillator. Elements of microcontrollers: discrete inputs and outputs (ports) and analogue, counters, watchdog, PWM, time circuits, RTC, serial transmission systems. Examples of microcontroller system design. Connecting switches, diodes, lamps, relays, valves, motors.

Teaching methods

1. Lecture: multimedia presentation, presentation illustrated with examples given on a board, discussion and problem analysis.

2. Laboratory exercises: practical exercises, problem solving, discussion, teamwork.

Bibliography

Basic

1. Embedded Systems , Ganssle J. , Esevier , 2004

2. Mikrokontrolery AVR ATmega w praktyce , Baranowski B. , BTC , 2005

3. Mikrokontrolery AVR, Język C, Podstawy programowania , Kardaś M. , Atnel, 2011

4. Sztuka programowania mikrokontrolerów AVR - przykłady, Andrzej Pawluczuk, BTC, 2007

5. Język C dla mikrokontrolerów AVR. Od podstaw do zaawansowanych aplikacji, Tomasz Francuz, Helion, 2011

Additional

1. Układy Mikroprocesorowe , Krzyżanowski R. , MIKOM PWN , 2007

2. Mikrokontrolery STM32 w sieci Ethernet , Pęczarski M. , BCT , 2011

3.Język C dla mikrokontrolerów AVR. Od podstaw do zaawansowanych aplikacji, Tomasz Francuz, Helion, 2015

4. AVR. Praktyczne projekty, Tomasz Francuz, Helion, 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1,0

[1] delete or add other activities as appropriate