**Microcontrollers (ECTS credits: 6)**

Language: the course is offered in English, Serbian and Hungarian.

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**Course description:**

This course deals with the Arduino platform with Atmel microcontroller. Students are first introduced to the Integrated Development Environment (IDE) for the Arduino projects. Programming language C is used for programming the microcontroller. In the later phase of the course, peripheries are connected to the board (7-segment display, LCD, various sensors). Students also learn how to debug the projects using the Serial Monitor.

This short course covers the following topics, considering Microcontrollers:

1. Introduction
2. Hardware organization of the microcontroller
3. Registers, program counter
4. Instructions
5. Memory organization
6. Hardware elements of the microcontroller. Analog-to-digital converter
7. Communication protocols
8. The concepts of interrupts
9. Timer modules
10. LEDs, pushbuttons, 7-segment displays
11. Liquid Crystal Displays (LCD). Signals of the LCD. Writing to the LCD
12. PWM module of the microcontroller
13. Connecting servo motors and DC motors to the microcontroller
14. Sensors (temperature, humidity, ultrasound)
15. Matrix keyboard

**Aims:**

After completing this course students will be able to develop their own projects using Atmel microcontrollers on Arduino platform. Basic connections will be covered in detail, as well as some more advanced hardware. The software will be developed in C programming language. Students will be able to connect various electronic components and sensors to connect to the microcontroller and to program them.