



COURSE DESCRIPTION CARD - SYLLABUS

Course name

32-bit microcontrollers

Course

Field of study

MECHARTONICS

Area of study (specialization)

-

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

practical

Course offered in

English

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Phd Eng. Dominik RYBARCZYK

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

Piotrowo 3, 60-965 Poznań

Prerequisites

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

Skills Microcontroller skills, programming in C++ language, 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 32-bits microrcontrollers.



Course-related learning outcomes

Knowledge

1. Construction and basic parameters of 32-bit microcontrollers [K_W03]
2. Knowledge of signal transmission in computer controllers [K_W03]
3. Knowledge about interface methods used in electronics [K_W03]
4. Programming of microcontrollers [K_W03]

Skills

1. Analysis of the structure and capabilities of various types of microcontrollers, especially STM32 family [K_U28]
2. Ability to programming in C language [K_U30]
3. Ability to integrate different mechatronic devices in complex production system [K_U31]
4. Designing electronic systems based on 32-bit microcontrollers [K_U01]

Social competences

1. Understanding the requirement of learning by whole life; ability to inspire and organize learning process of other people. - [K_K01]
2. s aware of the role of electronics in modern economy and its importance for the development of society and the environment. [K_K02]
3. Ability to think and act in a creative and enterprising way. [K_K04]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- credit on the basis of a test consisting of both open and test questions. Scale of estimate: 51-60% - 3,0 (C), 61-70% - 3,5 (C+), 71-80% - 4,0 (B), 81-90% - 4,5 (B+), 91-100% - 5,0 (A).

Programme content

1. Architecture of 32-bit microcontrollers programming environments, basic registers, support for external interrupts
2. Counter systems in 32-bit microcontrollers and their applications, support for PWM output, support for basic SysTick counter, support for incremental encoders
3. Analog-to-digital converters, interrupt handling from the ADC converter, DMA controller, examples of applications,
4. Serial interfaces used in 32-bit UART / USART microcontrollers, examples of applications, SPI interface, TFT and OLED display support



- 5. I2C interface, inertial sensors, basics of signal filtration: Kalman filter, alpha / beta filter
- 6. RTOS real-time operating system in 32-bit microcontrollers

Laboratory:

- 1. Digital input / output support / programming environment support / external interrupts
- 2. External interrupts
- 3. UART communication
- 4. ADC converter / DMA controller
- 5. OLED display / SPI interface
- 6. Accelerometer / I2C interface

Teaching methods

Lecture/Labolatory

Bibliography

Basic

- 1. Paprocki K. „Mikrokontrolery STM32 w praktyce”.
- 2. Gońka K., „PODSTAWY .NET MICRO FRAMEWORK DLA MIKROKONTROLERÓW STM32 W JĘZYKU C#”.
- 3. Brzoza-Woch R., Schenk Ch. „Mikrokontrolery AT91SAM7 w praktyce”.

Additional

- 1. Technical data on internet, datasheets etc.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	20	1,0

¹ delete or add other activities as appropriate