

Code

Course item:

1. INFORMATION ABOUT THE COURSE

A. Basic information

Name of course	Architecture and Programming of Microcontrollers
Study level	First degree
Unit running the study programme	Faculty of Telecommunication, Computer Science and Electrical Engineering
Study programme	
Speciality	
Name of teacher (s) and his academic degree	Marta Gackowska MSc Eng., Gracjan Kątek MSc Eng., Piotr Kiedrowski PhD Eng.
Introductory courses	none
Prerequisites	Basis of programming

B. Semester/week schedule of classes

Semester	Lectures	Classes	Laboratories	Project	Seminars	Field exercises	ECTS
winter or summer	15		15	15			8

2. EFFECTS OF EDUCATION (acc. to National Qualifications Framework)

Knowledge	Student has knowledge about the architecture and construction of a microprocessor system and the operation of various: communication interfaces, memories and means of programming.
Skills	Student can define and describe the concepts related to synchronous and asynchronous, serial and parallel transmission. Student can independently implement a system based on a microcontroller.
Competences	During the implementation of the project, he is aware of the standards of description, linguistic correctness and timely delivery of subsequent stages of work.

3. TEACHING METHODS

multimedia lecture, laboratories and project

4. METHODS OF EXAMINATION

written and/or oral exam

5. SCOPE

Lectures	<ul style="list-style-type: none">• Introduction to MicroPython and Microcontrollers architecture• Basics of programming with MicroPython on microcontrollers (variables, operators, loops, conditions)• Microcontroller's modules enabling• Low energy consumption concepts and their realisation• Real Time Clock implementation and methods its accuracy supporting• General-purpose input/output (GPIO)
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	<ul style="list-style-type: none"> • Analog to digital converter (ADC) • Serial communication (UART, SPI, I2C) with other devices using MicroPython • Using external peripherals (e.g. OLED displays, temperature sensors) with MicroPython
Laboratories	Practical implementation of the tasks discussed in the lecture. Classes are based on Raspberry Pi Pico with MicroPython programming language or STMicroelectronics evaluation kits with C/C++ programming language.
Project	Individual project (80% of students activity depends on self studying/individual work) involving the implementation of a barrier control system using the MicroPython language and Raspberry Pi Pico microcontroller.

6. LITERATURE

Basic literature	Programming with MicroPython. Embedded Programming with Microcontrollers and Python, Nicholas H. Tollervey, O'Reilly Media Inc. 2017. Or Programming with STM32: Getting Started with the Nucleo Board and C/C++, Donald Norris, March 2018, McGraw-Hill Education TAB ISBN: 9781260031324
Supplementary literature	Get started with MicroPython on Raspberry Pi Pico G.Halfacree, B. Everard, Raspberry Pi Trading Ltd. 2021.