COURSE DESCRIPTION CARD - SYLLABUS

Course name
Microprocessor technology [S1Eltech1>TM]

Course

Field of study
Electrical Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr inż. Grzegorz Trzmiel
grzegorz.trzmiel@put.poznan.pl

Lecturers

Prerequisites

Basic knowledge of mathematics, physics, fundamentals of electrical engineering and electronics, including digital. The ability to understand and interpret knowledge transmitted in the classroom. The ability to effectively self-education in a field related to the chosen field of study. The awareness of the need to expand their competence, their willingness to cooperate within the team.

Course objective

Thorough knowledge of theoretical and practical problems associated with the construction elements, components and microprocessor systems and the basis of their programming and design.

Course-related learning outcomes

Knowledge:
1. Has knowledge of the construction and operation principles of the basic components and logical components of the processor,
2. Knows the operation of processor and microprocessor systems.

Skills:

1. Has skills in the application of knowledge in the field of the theory of digital circuits required to determine the important parameters of data transmission and commands,
2. Is able to obtain information from literature and the Internet, work individually,
3. Is able to independently solve tasks in the field of theory of systems analysis and design and microprocessor devices.

Social competences:
1. Is able to think and act in an entrepreneurial manner in the area of analysis microprocessors.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Knowledge acquired as part of the lecture is verified by passing the lecture lasting about 45-60 minutes, consisting of 10-15 questions (test and open), variously scored. Passing threshold: 50% of points. The issues on the basis of which questions are prepared will be sent to students by e-mail using the university"s e-mail system.
Skills acquired as part of the laboratory are verified on the basis of the final test, consisting of the task of implementing the microcontroller software with peripheral systems. Passing threshold: 50% of points..
In addition, the following are taken into account for the final evaluation of the laboratories: rewarding the knowledge necessary to implement the problems posed in a given area of laboratory tasks, rewarding the increase in the ability to use known principles and methods, assessment of knowledge and skills related to the implementation of the exercise task.
In addition, students can get extra points for activity during classes, especially for: proposing to discuss additional aspects of the subject, the effectiveness of applying the acquired knowledge when solving a given problem, the ability to work within a team that practically performs a specific task in the laboratory, comments related to improving teaching materials, diligence aesthetic of the developed tasks within self-study.

Programme content

The module program covers issues related to the basics of construction, principles of operation, applications and programming: microprocessors, microcontrollers, selected communication interfaces, memory and peripheral elements.

Course topics

The lecture program includes the following issues:
All lecture content is based on a modern 32-bit microcontroller. Microprocessors, microcontrollers, components: interfaces, memories (array, programmable), communication systems, peripheral elements. Microprocessor systems: buses, addressing. Systems
interrupts. Signal processing. Design and programming of microprocessor control systems for exemplary applications in the areas of production, operation and measurements in various technological processes. Presenting innovative solutions in the field of microprocessor technology, used in the latest solutions in various industries. Using students' knowledge from other subjects, initiating discussions, asking questions to increase students' activity and independence.
The laboratory program includes the following issues:
Designing and programming microprocessor systems that perform specific tasks in a high-level language. Getting to know the architecture of an example 32-bit microcontroller and programming the microcontroller in C in terms of handling internal and external devices. Basics of the C51 language specification, implementation of programs for selected internal systems, including: timers and interrupt system, serial transmission, AC converter. Implementation of operation of external devices, including LCD display, LED, matrix keyboard, potentiometers, light-emitting diodes, etc. Implementation of an exemplary project of cooperation between a microprocessor system and an external device.

Teaching methods

Lecture: a multimedia presentation with figures, diagrams, photos, supplemented with practical examples on the board, slides and computer programs, facilitating the linking of theory to practice. Lecture supplemented with additional materials provided to students for self study.
Laboratories: Work on physical positions with microcontrollers and specialized software on PCs. Using

tools enabling students to perform tasks at home (microprocessor system emulator, specialized software for programming microcontrollers). Classes at the university supplemented with materials for independent performance of tasks on the provided free software packages.

Bibliography

Basic
1. Paprocki K., Mikrokontrolery STM32 w praktyce, Wyd. BTC, 2014.
2. Kurczyk A., Mikrokontrolery STM32 dla początkujących, Wyd. BTC, 2019.
3. Galewski M., STM32 Aplikacje i ćwiczenia w języku C, Wyd. BTC, 2019.
Additional
1. Krzyżanowski R., Układy mikroprocesorowe, Mikom, Warszawa 2004.
2. Gay W., Beginning STM32: Developing with FreeRTOS, libopencm3 and GCC, Wyd. Apress, 2018.
3. Piasecki A., Trzmiel G., Remote building control using the bluetooth technology, Monograph Computer Applications in Electrical Engineering, Poznan University of Technology 2016, vol. 14, pp. 457-468.
4. Trzmiel G., Kurz. D., Smoczyński W., The use of the EMG signal for the arm model control, ITM Web of Conferences, vol. 28, 2019 (01024), 15.07.2019, DOI: https://doi.org/10.1051/itmconf/20192801024.
5. Internet: specjalistyczna literatura tematu, karty katalogowe, normy.

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00