

# Microcomputer circuits and systems - opis przedmiotu

Informacje ogólne	
Nazwa przedmiotu	Microcomputer circuits and systems
Kod przedmiotu	06.5-WE-INFP-MicCirSys-Er
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	Informatyka
Profil	ogólnoakademicki
Rodzaj studiów	Program Erasmus pierwszego stopnia
Semestr rozpoczęcia	semestr zimowy 2021/2022

Informacje o przedmiocie	
Semestr	5
Liczba punktów ECTS do zdobycia	7
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	• dr inż. Mirosław Koziół

Formy zajęć					
Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	30	2	-	-	Egzamin
Laboratorium	30	2	-	-	Zaliczenie na ocenę
Projekt	15	1	-	-	Zaliczenie na ocenę

## Cel przedmiotu

- To provide knowledge about basic elements of microprocessor system and their mutual cooperation.
- To provide knowledge about the various methods of microprocessor system expansion with additional peripherals and methods of peripherals' handling by the central processor unit.
- To provide knowledge about the architecture of an exemplary microcontroller.
- To develop and shape the skills in the software design for microprocessor systems.
- To shape the skills in the design of microprocessor systems.

## Wymagania wstępne

By entering this course, student should know the following issues:

- basic laws of electrical circuits (e.g. Ohm's law, Kirchoff's laws),
- fundamental knowledge about semiconductors (transistor and diode),
- fundamentals of digital electronics (logic gates, flip-flops, counters, three-state buffer),
- operational amplifier basics (buffer, inverting and noninverting configuration, summing amplifier),
- fundamental knowledge about analog-to-digital and digital-to-analog converters,
- fundamentals of programing in the C language.

## Zakres tematyczny

*Microprocessor system and its basic components.* The role of the tri-state buffers in accessing the data bus. Microprocessor vs. microcontroller.

*Instructions.* Instruction set. Execution of the instruction by the central processor unit of the microprocessor system. Basic addressing modes. Basic groups of instructions in the instruction set.

*Memories in microprocessor systems.* Basic memory types. Basic memory parameters. Exemplary timing charts during read and write operations. Examples of memory chips used in microprocessor systems based on microcontrollers.

*Interfacing peripherals to the system bus.* Isolated and memory mapped input-output devices. Address decoder design on the basis of middle scale digital logic circuits and SPLDs with examples.

*Handling of peripherals.* Polling. Interrupt system.

*Transmission of information between microprocessor systems.* Transmission of information with and without acknowledgement. Synchronous and asynchronous transmission. Parallel and serial transmission. Serial interfaces (RS-232C, RS-485).

*Local serial interfaces.* I2C, SPI.

*MCS-51 family of microcontrollers as an example of single-chip microcomputer.* The most significant features of their architecture. Functional blocks. Interfacing of external program and data memory. Available addressing modes. Instruction set. Embedded peripheral systems, i.e. timer-counters and serial interface. Interrupts. Parallel ports.

## Metody kształcenia

- Lecture: conventional/traditional lecture with elements of discussion.
- Laboratory: laboratory exercises, work in groups with elements of discussion.
- Project: work in groups with elements of discussion.

## Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
Student can design a microprocessor system based on a microcontroller.		<ul style="list-style-type: none"><li>• praca pisemna</li><li>• przygotowanie projektu</li></ul>	<ul style="list-style-type: none"><li>• Projekt</li></ul>
Student can write a program for a microprocessor system based on a microcontroller.		<ul style="list-style-type: none"><li>• bieżąca kontrola na zajęciach</li></ul>	<ul style="list-style-type: none"><li>• Laboratorium</li></ul>
Student knows the exemplary microcontroller architecture.		<ul style="list-style-type: none"><li>• bieżąca kontrola na zajęciach</li></ul>	<ul style="list-style-type: none"><li>• Laboratorium</li></ul>
Student can name basic sub-components of microprocessor system, describe their functional purpose and co-operation.		<ul style="list-style-type: none"><li>• bieżąca kontrola na zajęciach</li><li>• egzamin - ustny, opisowy, testowy i inne</li></ul>	<ul style="list-style-type: none"><li>• Wykład</li><li>• Laboratorium</li></ul>
Student can name and explain methods for servicing of peripherals in microprocessor system.		<ul style="list-style-type: none"><li>• dyskusja</li><li>• egzamin - ustny, opisowy, testowy i inne</li></ul>	<ul style="list-style-type: none"><li>• Wykład</li></ul>
Student can name and explain various methods for extending of microprocessor systems by additional peripherals.		<ul style="list-style-type: none"><li>• bieżąca kontrola na zajęciach</li><li>• dyskusja</li><li>• egzamin - ustny, opisowy, testowy i inne</li><li>• przygotowanie projektu</li></ul>	<ul style="list-style-type: none"><li>• Wykład</li><li>• Laboratorium</li><li>• Projekt</li></ul>

## Warunki zaliczenia

- Lecture: to receive a final passing grade student has to obtain positive grade from the final exam.
- Laboratory: to receive a final passing grade student has to obtain positive grades for all laboratory exercises provided in the laboratory syllabus.
- Project: to receive a final passing grade student has to receive positive grades for all defined projects.

Calculation of the final grade = lecture 30% + laboratory 36% + project 34%

## Literatura podstawowa

1. Godse A.P., Godse D.A.: *Microprocessor, Microcontroller & Applications*, Technical Publications Pune, 2008.
2. Deshmukh A.V.: *Microcontrollers. Theory and Applications*. Tata McGraw-Hill, 2007.
3. Huang H-W.: *Embedded System Design with the C8051*, Cengage Learning, 2009.
4. James M.: *Microcontroller Cookbook. PIC & 8051*, Newnes, 2001.

## Literatura uzupełniająca

### Uwagi

Zmodyfikowane przez dr inż. Mirosław Kozioł (ostatnia modyfikacja: 15-07-2021 17:51)