

DESCRIPTION OF THE COURSES

- Course code: ELR3212
- Course title: **BASICS OF MICROPROCESSOR TECHNIQUE**
- Language of the lecturer: polish

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	<i>1</i>		<i>2</i>		
<i>Number of hours/semester*</i>	<i>15</i>		<i>30</i>		
<i>Form of the course completion</i>	<i>Acquisition</i>		<i>Acquisition</i>		
<i>ECTS credits</i>	<i>1</i>		<i>2</i>		
Total Student's Workload	<i>30</i>		<i>60</i>		

- Level of the course (basic/advanced): basic
- Prerequisites: Basics of electronics, Informatics
- Name, first name and degree of the lecturer/supervisor: dr hab. inż. Czesław T. Kowalski
- Names, first names and degrees of the team's members: dr inż. Krzysztof Dyrz, dr inż. Marcin Pawlak, dr inż. Krzysztof Szabat, mgr inż. Zdzisław Żarczyński
- Year:.....3..... Semester:.....5.....
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course):
- Form of the teaching (traditional/e-learning):

Course description: Basic problems of INTEL8051 type microprocessors: architecture, idea of operation, software elements (assembler), microprocessor environment, memory types and its organization, memory segmentation, input-output systems, parallel port (input, output), serial port, measurement and control interfaces. Instruction formats, basic addressing modes, addressing in microcontroller SAB 80C535/537, interrupts and exception interrupts. Elements of microprocessor arithmetic, number and code notation, fixed and float point notations. Co-operation of microprocessor with external devices (register pooling, interrupts, direct memory access). Analogue-digital 8-bit and 10-bit converter. Counter and timer (T0, T1,T2). Generation of PWM waves. Design of microprocessor systems, developing and systems, examples of microcontroller applications in measurements and drives, in real time systems.

Laboratory exercises are based on SAB 80C535/537 microcontroller.

- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Introduction. Basic definitions and information about microprocessors; architecture, idea of operation, software elements.	<i>2</i>
2. Elements of microprocessor environment, memory types and its organization, memory segmentation, input-output systems, parallel port (input, output), serial port, measurement and control interfaces	<i>2</i>
3. Instruction formats, basic addressing modes, addressing in microcontroller SAB 80C535/537, interrupts and exception interrupts	<i>2</i>
4. Elements of microprocessor arithmetic, number and code notation, fixed and float point notations	<i>2</i>
5. Co-operation of microprocessor with external devices (register pooling, interrupts, direct memory access)	<i>2</i>
6. Analogue-digital 8-bit and 10-bit converter. Counter and timer (T0, T1, T2). Generation of PWM waves.	<i>2</i>
7. Design of microprocessor systems, developing and systems, examples of	<i>2</i>

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:

Introduction to microcontroller SAB80C535/537. Description of educational module.

Using of SYMULATOR and MONITOR software. Basic arithmetic and logic operations, software possibilities, basic instructions.

Arithmetic and logic operations of the microcontroller. Addition of multi-bit arguments, external memory operation.

Programming of input/output ports. Control of diode system.

Measurement of analogue signals using 8-bit A/D converter.

Measurement of analogue signals using 8-bit A/D converter.

Programming of T2 timer in comparator mode. Generation of PWM wave.

Control of DC motor using A/D converter and T2 timer.

Control of DC motor using PWM generation (table type of generation).

Control of step motor.

Programming of basic operation modes of serial port. Programming of SAB80C535 microcontroller with external interrupts.

- Project – the contents:
- Basic literature:

Dyrz K., Kowalski Cz., Żarczyński Z., Podstawy techniki mikroprocesorowej, Oficyna Wyd. P.Wr., 1999

Janiczek J., Stępień A., Mikrokontroler 80(C)515/535, Wyd. Centrum Kształcenia Praktycznego, Wrocław, 1995

Pelka R., Mikrokontrolery – architektura, programowanie, zastosowania, WKŁ, Warszawa, 1999

Daca W., Mikrokontrolery, od układów 8-bitowych do 32-bitowych, Micom, Warszawa, 2000

Starecki T., Mikrokontrolery 8051 w praktyce, Wydawnictwo BTC, Warszawa 2002

- Additional literature:

Niederliński A., Mikroprocesory, mikrokomputery, mikrosystemy, Wyd. Szkolne i Pedagogiczne, Warszawa, 1987

Wójciak A., Mikroprocesory w energoelektronice, WNT Warszawa, 1994

Takashi Kenjo, Power Electronics for the Microprocessor Age, Oxford Univ. Press, 1995

Brighthouse B., Loveday G., Microprocessors in engineering systems, Pitman Publishing, London, 1987

- Conditions of the course acceptance/creditation: Lecture – acquisition, laboratory - acquisition

* - depending on a system of studies