DESCRIPTION OF THE COURSES

- Course code: ARR3212
- Course title: **BASICS OF MICROPROCESSOR TECHNIQUE 2**
- Language of the lecturer: English

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

- Level of the course (basic/advanced): basic
- Prerequisites: Basics of electronics, Informatics
- Name, first name and degree of the lecturer: Czesław T. Kowalski, dr hab. inż.
- Names, first names and degrees of the team's members: dr inż. Krzysztof Dyrcz, dr inż. Marcin Pawlak, dr inż. Krzysztof Szabat, mgr inż. Zdzisław Żarczyński
- Year:.....3..... Semester:.....6.....
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course): *learn of basic problems connected with structure, operation and programming microcontrollers.*
- Form of the teaching (traditional/e-learning): traditional

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 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 537 microcontroller.

- Lecture:

Particular lectures contents	*Number of hours*

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

1. Programming of T2 timer in comparator mode. Generation of PWM wave.
2. Control of DC motor using A/D converter and T2 timer.
3. Control of DC motor using PC keyboard and BASIC programming language.
4. Control of DC motor using table type of PWM generation and programmed PWM.
5. Control of step motor using BASIC language.

6. Control of positioning system.
7. Programming of basic operation modes of serial port.
8. Programming of SAB80C535 microcontroller with external interrupts.
9. Programming of microcontroller with “watchdog” system.
10. 10.Programming of LCD display.
11. Programming of cooperation between microcontroller, display and keyboard – part 1.
12. Programming of cooperation between microcontroller, display and keyboard – part 2.

- Project – the contents:
- Basic literature:

1. *Dyrcz K., Kowalski Cz., Żarczyński Z., Podstawy techniki mikroprocesorowej, Oficyna Wyd. P.Wr., 1999*
2. *Janiczek J., Stępień A., Mikrokontroler 80(C)515/535, Wyd. Centrum Kształcenia Praktycznego, Wrocław, 1995*
3. *Pełka R., Mikrokontrolery – architektura, programowanie, zastosowania, WKŁ, Warszawa, 1999*
4. *Daca W., Mikrokontrolery, od układów 8-bitowych do 32-bitowych, Micom, Warszawa, 2000*
5. *Starecki T., Mikrokontrolery 8051 w praktyce, Wydawnictwo BTC, Warszawa 2002*

- Additional literature:

1. *Niederliński A., Mikroprocesory, mikrokomputery, mikrosystemy, Wyd. Szkolne i Pedagogiczne, 2. Warszawa, 1987*
2. *Wójciak A., Mikroprocesory w energoelektronice, WNT Warszawa, 1994*
3. *Takashi Kenjo, Power Electronics for the Microprocessor Age, Oxford Univ. Press, 1995*
4. *Brighouse B., Loveday G., Microprocessors in engineering systems, Pitman Publishing, London, 1987*

- Conditions of the course acceptance/credition: laboratory - *credit*

***** - depending on a system of studies