DESCRIPTION OF THE COURSES

- Course code: ARR2112
- Course title: MICROPROCESSOR CONTROLLERS IN ENERGETICS
- Language of the lecturer: Polish

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

- Level of the course (basic/advanced): basic
- Prerequisites:
  completed courses: Fundamentals of Electronics
- Name, first name and degree of the lecturer/supervisor:
  Janusz Staszewski, Ph. D.
- Names, first names and degrees of the team's members:
  Marek Michalik, Ph. D.
  Mirosław Łukowicz, Ph. D.
- Year:................ Semester:......................
- Type of the course (obligatory/optional): optional
- Aims of the course (effects of the course):
  The course provides descriptions of basic architecture of microcontrollers, programming and some practical aspect of microcontroller application in engineering practice.
- Form of the teaching (traditional/e-learning): traditional
- Course description:
  The course is aimed at explanation of practical problems encountered in microcontroller programming. On the basis of the 80C537 single-chip microcontroller the following topics are covered: basic aspects of microcontroller application in industry, microcontroller architecture and operation of basic blocks, instruction set, basic programming tools (assembler, linker, debugger), data transfer, addressing modes, arithmetic and logic operations, handling of port lines, A/C and C/A conversion, serial interface, LCD display, timers and counters. Each detailed course topic is an introduction to intensive laboratory exercise.
- Lecture:

Particular lectures contents	Number of hours
1. Overview of one-chip microcontrollers. Architecture of micro-controllers 80C537. ALU, memory structure, addressing modes.	2
2. Fundamentals of microcontrollers programming. Handling of port	2

lines. Arithmetical and logical operations.	*2*
3. Timers and counters.	*2*
4. Interrupts.	
5. Code converting programs. Calculation of mathematical functions	*2*
(square root, sine and cosine).	*2*
6. A/C and DC converters.	*2*
7. "Watchdog", serial interface.	*1*
8. Examples of microcontroller application.	

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
  1. Microcontroller laboratory set - use of programming tools (assembler, linker, debugger)
  2. Data transfer, addressing modes, simple arithmetic and logic operations
  3. Multibyte arithmetic operations
  4. Calculation of mathematical functions (square root, sine, cosine)
  5. Code converting programs
  6. Handling of port lines and keyboard
  7. Handling of programmable LCD alphanumeric display '2x16'
  8. Programming of timers and counters. Handling of interrupts.
  9. Time and frequency measurement
  10. Handling of A/C converter and implementation of C/A converter by use of PWM
  11. Serial interface and "watchdog"
  12. Practical realization of digital filter
- Project – the contents:
- Basic literature:

  [1] "SAB 80C517/80C537 8-bit CMOS Single-Chip Microcontroller - User's Manual", Siemens AG, 1993

  [2] Janiczek J., Stępień A., „Mikrokontrolery", Wydawnictwo Centrum Kształcenia Praktycznego, Wrocław 1997.

  [3] Janiczek J., Stępień A., „Mikrokontroler SAB 80(C)515/535", Wydawnictwo Elektronicznych Zakładów Naukowych, Wrocław 1995

  [4] Janiczek J., Stępień A., „Laboratorium Systemów Mikroprocesorowych cz. I", Wydawnictwo Elektronicznych Zakładów Naukowych, Wrocław 1995

  [5] Janiczek J., Stępień A., „Laboratorium Systemów Mikroprocesorowych cz. II", Wydawnictwo Centrum Kształcenia Praktycznego, Wrocław 1996
- Additional literature:

  [1] Starecki T., „Mikrokontrolery jednoukładowe rodziny 51", Wydawnictwo NOZOMI, Warszawa 1996

  [2] Szafran J., Wiszniewski A., „Algorytmy pomiarowe i decyzyjne cyfrowej automatyki elektroenergetycznej", WNT, Warszawa, 2001
- Conditions of the course acceptance/credition:

* - depending on a system of studies