DESCRIPTION OF THE COURSES

- Course code: ARR2111
- Course title: PROGRAMMABLE CONTROLLERS IN AUTOMATICS
- 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 Control Engineering 1, 2; 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 programmable controllers, programming and some practical aspect of PLC 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 programmable logic controllers (PLC). On the basis of the Siemens family SIMATIC S7-200 the following topics are covered: PLC architecture, two programming languages (graphical - LADDER and mnemonic - STL), application of digital controllers in DDC systems. Each detailed course topic is an introduction to intensive laboratory exercise.
- Lecture:

Particular lectures contents	Number of hours
1. Overview of the Simatic Siemens PLC family. Architecture of the S7-200 controllers. Data types, memory structure, addressing modes. Basic concepts of programming. Entering program in LADDER and STL language. Input/output control.	2
2. Math instructions. Selected bites from Special Function Register (SFR). Logic instructions, shift and rotate instructions. Program	

control. Codes conversion.	*2*
3. Timers and counters. Subroutines: defining, calling. Interrupts: defining, priority.	*2*
4. High speed counters.	*2*
5. High speed outputs (PWM, PTO).	*2*
6. PID regulator.	*2*
7. Selected algorithms of power system protection and control – practical implementation using PLC.	*2*
8. Sequence control relay.	*1*

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
  1. Programmable controller laboratory set – major component of S7-212, use of programming tools (STEP7-Micro/Win).
  2. Input and output instructions.
  3. Math and logic instructions.
  4. Shift and rotate instructions. Indirect addressing.
  5. Timers and counters.
  6. Interrupts.
  7. High speed counters.
  8. Practical using of A/C and C/A converter.
  9. Pass project.
- Project – the contents:
- Basic literature:

  [1] "S7-200 SIMATIC Programmable Controller - system manual", Siemens AG, 1997

  [2] Legierski T., Wyrwał J., Kasprzyk J., Hajda J., „Programowanie sterowników PLC", Pracownia Komputerowa Jacka Skalmierskiego, 1998

  [3] Mikulczynski T., Samsonowicz Z., „Automatyzacja dyskretnych procesów produkcyjnych. Metody modelowania procesów dyskretnych i programowania PLC", WNT, Warszawa 1997

- Additional literature:

  [1] 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