

## DESCRIPTION OF THE COURSES

- Course code: ELR3264
- Course title: PROGRAMMABLE CONTROLLERS PLC IN INDUSTRIAL APPLICATIONS
- 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>written work</i> |                | <i>Completion of lab exercises</i> |                |                |
| <b>ECTS credits</b>                  |                     |                |                                    |                |                |
| <b>Total Student's Workload</b>      |                     |                |                                    |                |                |

- Level of the course (basic/advanced): advanced
- Prerequisites: Fundamentals of control, Programmable controllers
- Name, first name and degree of the lecturer/supervisor: Krzysztof Pieńkowski, D. Sc.
- Names, first names and degrees of the team's members:  
 Krzysztof Dyrz Ph. D.  
 Marcin Pawlak Ph. D.
- Year:.....II..... Semester:.....3.....
- Type of the course (obligatory/): optional
- Aims of the course (effects of the course):  
 Learning of application principles of PLC controllers for control of machines, devices and industrial processes. Learning of advanced methods of PLC programming. Practice in ability of programming and application of PLC in industrial control systems.
- Form of the teaching (traditional/e-learning): traditional
- Course description:  
 Presentation of constructions and software of modern types of programmable controllers.. Application of PLC's as controllers of continuous or pulse operation. Principles of control of complex industrial processes. Control and monitoring of selected technological processes. Hierarchical control and visualization systems of industrial processes.
- Lecture:

| <i>Particular lectures contents</i>   | <i>Number of hours</i> |
|---|------------------------|
| 1. Presentation of modern constructions and specialised modules of modern programmable controllers. | <i>1</i>               |
| 2. Principles of programming of complex control projects  | <i>1</i>               |
| 3. Programming of control projects with application of SFC language                                 | <i>2</i>               |
| 4. Application of PLC as controller with continuous operation (P,PI,PID)                            | <i>2</i>               |
| 5. Application of PLC as controller with pulse operation  | <i>2</i>               |
| 6. Application of PLC as controller with Fuzzy Control operation                                    | <i>2</i>               |
| 7. Principles of hierarchical control and cooperation of PLC's connected                            |                        |

|  |   |
|--|---|
| to network   | 2 |
| 8. Methods of visualization and monitoring of industrial processes               | 1 |
| 9. Presentations of PLC applications in complex control of industrial processes. | 2 |

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
  1. Testing of sequential control with linear sequential steps
  2. Testing of sequential control with parallel sequential steps
  3. Testing of sequential control of selected industrial processes.
  4. Testing of closed control system with PLC as P, PI or PID controller
  5. Testing of closed control system with PLC as hysteresis controller
  6. Testing of hierarchical control and cooperation of PLC's connected to network
  7. Testing of hierarchical control and cooperation of PLC's connected to network

8. Testing of PLC applications in complex control of industrial processes.

- Project – the contents:
- Basic literature:
  1. Kasprzyk J.: Programowanie sterowników przemysłowych, WNT, Warszawa 2006.
  2. Legierski T. i inni : Programowanie sterowników PLC, Wyd. Pracowni Komputerowej J. Skalmierskiego, Gliwice 1998.
- Additional literature:
  1. Borelbach K.H., Kraemer G., Mock W., Nowe E.: Technika sterowników z programowalną pamięcią. Wydawnictwo Szkolne i Pedagogiczne, 1998.
  2. Łukasik Z., Seta Z.: Programowalne sterowniki PLC w systemach sterowania przemysłowego, Polit. Radomska, 2001.
  3. Mikulczyński T., Samsonowicz Z.: Automatyzacja dyskretnych procesów produkcyjnych, WNT, Warszawa 1997.

- Conditions of the course acceptance/creditation:

Positive notes from written work and completion of lab exercises

\* - depending on a system of studies