

## DESCRIPTION OF THE COURSES

- Course code: ELR3269
- Course title: PROGRAMMABLE CONTROLLERS
- 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>1</i>                           |                |                |
| <i>Number of hours/semester*</i>       | <i>10</i>           |                | <i>10</i>                          |                |                |
| <i>Form of the course completion</i>   | <i>written work</i> |                | <i>Completion of lab exercises</i> |                |                |
| <i>ECTS credits</i>                    | <i>1</i>            |                | <i>1</i>                           |                |                |
| <b><i>Total Student's Workload</i></b> | <i>30</i>           |                | <i>30</i>                          |                |                |

- Level of the course (basic/advanced): basic
- Prerequisites: Basics of informatics, Basics of automatics
- Name, first name and degree of the lecturer/supervisor: Krzysztof Pieńkowski, Dr. Sc.
- Names, first names and degrees of the team's members:  
Krzysztof Dyrz, Ph.D.  
Marcin Pawlak, Ph.D.
- Year:.....III..... Semester:.....6.....
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course):  
Learning of programming methods of programmable controllers. Presentation of control of marines, devices and industrial processes with application of PLC. Practical experience in application of PLC in industrial control systems.
- Form of the teaching (traditional/e-learning): traditional
- Course description:  
The principles of work and architecture of programmable logic controllers (PLC's). The principles and methods of programming and elements of programming languages. The programming of logical functions, bistable elements, timers and counters, arithmetic and digital operations. Control programs of drive systems and technological processes.
- Lecture:

| <i>Particular lectures contents</i>  | <i>Number of hours</i> |
|--|------------------------|
| 1. Construction, principle of work and programming of PLC  | <i>1</i>               |
| 2. Text and graphical methods of programming, elements of programming languages, structure of control programmes | <i>2</i>               |
| 3. Control programs with application of logical blocks and logical functions                                     | <i>1</i>               |
| 4. Control programs with application of bistable elements  | <i>1</i>               |
| 5. Control programs with application of timer blocks and functions   | <i>1</i>               |
| 6. Control programs with with application of counter blocks  | <i>1</i>               |
| 7. Control programs with application of SFC language   | <i>1</i>               |

|   |          |
|---|----------|
| 8. Programming of control systems with electrical drives and control of technological processes | <i>I</i> |
| 9. Principles of application of PLC control in industrial control systems                       | <i>I</i> |

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
  - Testing of control systems with application of logical functions and blocks.
  - Testing of control systems with application of bistable elements.
  - Testing of control systems with application of timers.
  - Testing of control systems with application of counters.
  - Testing of control systems with application of SFC language.
  - Testing of selected relay control systems with application of PLC
  - Testing of selected control systems of transportation and technological 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., Nows 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