Załącznik nr 2 do Zarządzenia Nr 915 z 2019 r. Rektora PB

**COURSE DESCRIPTION CARD**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Faculty of Electrical Engineering** | | | | | | | | | | |
| **Field of study** | **Electrical and Electronics Engineering** | | | | | | | **Degree level and programme type** | **bachelor's degree, full time programme** | |
| **Specialization/ diploma path** | **-** | | | | | | | **Study profile** | **-** | |
| **Course name** | **Programmable Logic Controllers** | | | | | | | **Course code** | **IS-FEE-10015W** | |
| **Course type** | **elective** | |
| **Forms and number of hours of tuition** | **L** | **C** | **LC** | **P** | **SW** | **FW** | **S** | **Semester** | **winter** | |
| **15** |  | **30** |  |  |  |  | **No. of ECTS credits** | **5** | |
| **Entry requirements** | **-** | | | | | | | | | |
| **Course objectives** | **This course will provide the basic technical skills and knowledge necessary to work with programmable logic controllers typically found in an industrial environment.** | | | | | | | | | |
| **Course content** | **Industrial control systems. Programmable Logic Controllers (PLC): classification, structure, selection, configuration. PLC programming languages. Input/Output devices (switches, sensors, relays, solenoids etc.). PLC communication with I/O devices. Sequential Control Structure. Industrial networks - Profibus and Profinet. Visualization of industrial processes - Supervisory Control and Data Acquisition (SCADA) Systems. Human–machine interface (HMI). PLC programming software. HMI software.** | | | | | | | | | |
| **Teaching methods** | **presentation and lecture, practical work, reports** | | | | | | | | | |
| **Assessment method** | **lecture – tests; laboratory classes – evaluation of reports** | | | | | | | | | |
| **Symbol of learning outcome** | **Learning outcomes** | | | | | | | | **Reference to the learning outcomes for the field of study** | |
| **LO1** | **explains the purpose of various components of industrial control systems** | | | | | | | |  | |
| **LO2** | **creates the control algorithm based on machine and process description** | | | | | | | |  | |
| **LO3** | **describes the basic structure and operation of the PLC** | | | | | | | |  | |
| **LO4** | **applies appropriate engineering tools for control application, visualization, configuration and parameterization selected PLC** | | | | | | | |  | |
| **LO5** | **writes PLC program and HMI program** | | | | | | | |  | |
| **LO6** | **executes and test the application on a set composed of PLC, HMI and the process model** | | | | | | | |  | |
| **LO7** | **prepares the technical documentation and present the results** | | | | | | | |  | |
| **Symbol of learning outcome** | **Methods of assessing the learning outcomes** | | | | | | | | **Type of tuition during which the outcome is assessed** | |
| **LO1** | **tests** | | | | | | | | **L,LC** | |
| **LO2** | **tests** | | | | | | | | **L,LC** | |
| **LO3** | **tests** | | | | | | | | **L,LC** | |
| **LO4** | **evaluation of reports** | | | | | | | | **LC** | |
| **LO5** | **evaluation of reports** | | | | | | | | **LC** | |
| **LO6** | **evaluation of reports** | | | | | | | | **LC** | |
| **LO7** | **evaluation of reports** | | | | | | | | **LC** | |
| **Student workload (in hours)** | | | | | | | | | **No. of hours** | |
| **Calculation** | **lecture attendance** | | | | | | | | **15** | |
| **individual work on lecture topics** | | | | | | | | **20** | |
| **preparation for and participation in exams/tests** | | | | | | | | **20** | |
| **laboratory class attendance** | | | | | | | | **30** | |
| **preparation for laboratory class** | | | | | | | | **20** | |
| **work on reports** | | | | | | | | **30** | |
| **TOTAL:** | | | | | | | | **130** | |
| **Quantitative indicators** | | | | | | | | | **HOURS** | **No. of ECTS credits** |
| **Student workload – activities that require direct teacher participation** | | | | | | | | | **45** | **1,5** |
| **Student workload – practical activities** | | | | | | | | | **95** | **3,5** |
| **Basic references** | **1. Kręglewska U., Ławryńczuk M., Marusak P.: Control laboratory exercises, Oficyna Wydawnicza PW, Warszawa 2007.**  **2.Erickson K. T.: Programmable Logic Controllers: An Emphasis on Design and Application, 2nd Ed, Dogwood Valley Press 2011.**  **3. Roebuck K.: SCADA: High-impact Strategies - What You Need to Know: Definitions, Adoptions, Impact, Benefits, Mat, 2011.** | | | | | | | | | |
| **Supplementary references** | **1. Clements-Jewery K., Jeffcoat W. : The PLC Workbook: programmable logic controllers made easy. London, Prentice-Hall, 1996.**  **2. Bolton W.: Programmable Logic Controllers (Fourth Edition). London, Elsevier, 2006.** | | | | | | | | | |
| **Organisational unit conducting the course** | **Department of Automatic Control and Electronics** | | | | | | | | **Date of issuing the programme** | |
| **Author of the programme** | **Andrzej Ruszewski,, PhD Eng. DSc.** | | | | | | | | **08.02.2020** | |

**L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,**

**S – seminar**