COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Faculty of Electrical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Electrical and Electronics Engineering</td><td>Degree level and programme type</td><td>bachelor's degree, full time programme</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">-</td><td>Study profile</td><td>-</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Programmable Logic Controllers</td><td>Course code</td><td>IS-FEE-10015W</td></tr>
<tr><td>Course type</td><td>elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>winter</td></tr>
<tr><td>15</td><td></td><td>30</td><td></td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">-</td></tr>
<tr><td>Course objectives</td><td colspan="9">This course will provide the basic technical skills and knowledge necessary to work with programmable logic controllers typically found in an industrial environment.</td></tr>
<tr><td>Course content</td><td colspan="9">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.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">presentation and lecture, practical work, reports</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture – tests; laboratory classes – evaluation of reports</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="8">Learning outcomes</td><td>Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="8">explains the purpose of various components of industrial control systems</td><td></td></tr>
<tr><td>LO2</td><td colspan="8">creates the control algorithm based on machine and process description</td><td></td></tr>
<tr><td>LO3</td><td colspan="8">describes the basic structure and operation of the PLC</td><td></td></tr>
<tr><td>LO4</td><td colspan="8">applies appropriate engineering tools for control application, visualization, configuration and parameterization selected PLC</td><td></td></tr>
<tr><td>LO5</td><td colspan="8">writes PLC program and HMI program</td><td></td></tr>
<tr><td>LO6</td><td colspan="8">executes and test the application on a set composed of PLC,</td><td></td></tr>
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	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