

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Sterowniki programowalne w automatyce przemysłowej**  
 Name in English: **Programmable Logic Controllers In Industrial Automation**  
 Main field of study (if applicable): **Industrial Control Engineering**  
 Specialization (if applicable): **Automation of Machines, Vehicles and Apparatus**  
 Level and form of studies: **2nd level, full-time**  
 Kind of subject: **obligatory**  
 Subject code: **APR013225**  
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):			30		
Number of hours of total student workload (CNPS):			60		
Form of crediting:			crediting with grade		
For group of courses mark (X) final course:					
Number of ECTS points:			2		
including number of ECTS points for practical (P) classes :			2		
including number of ECTS points for direct teacher-student contact (BK) classes:			1.40		

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. It has a basic knowledge of the construction and operation of PLCs.
2. He knows basic PLC programming languages.
3. It can connect the PLC to the control system.
4. He can develop a control algorithm of the selected industrial process.

**SUBJECT OBJECTIVES**

- C1. Acquire skills to configure and program a modern PLC.  
 C2. Strengthening knowledge and skills in the field of programming, commissioning and testing of the control systems and industrial automation  
 C3. Acquiring the ability to configure and program the industrial vision sensors.

**SUBJECT LEARNING OUTCOMES***relating to knowledge:**relating to skills:*

- PEU\_U01 It can configure and run modern PLC.  
 PEU\_U02 He can develop a control algorithm and program PLCs, working in a distributed control system.  
 PEU\_U03 It can configure and program industrial vision sensors.

*relating to social competences:*

- PEU\_K01 It has a sense of responsibility for their own work and a willingness to comply with the principles of teamwork.

PROGRAMME CONTENT		
Form of classes - laboratory		Number of hours:
Lab 1	Introduction to the Rules and Regulations of internal safety lab. Establish rules for passing. General familiarization with laboratory equipment. Discussion of the laboratory exercises.	2
Lab 2	Operation of the Sysmac Studio toolkit. Configuration and programming of OMRON NJ301 controller.	2
Lab 3	Getting to know the function libraries of the Sysmac Studio software. The timer and counter functions.	2
Lab 4	Communication with NX Series distributed I/O modules using EtherCAT network.	2
Lab 5	Configuration and programming of distributed analog input modules. The arithmetic and type-conversion functions.	2
Lab 6	Programming of control systems of selected models of machines and industrial processes.	6
Lab 7	Configuration and programming of the OMRON FQ2 vision sensors.	6
Lab 8	The data exchange between the NJ301 controller and HMI terminal.	2
Lab 9	Integration of a selected industrial process model with a vision sensor - final project.	4
Lab 10	Giving reports, summary and pass the lab.	2
Total hours:		<b>30</b>

TEACHING TOOLS USED
<p>N1. Multimedia presentations.</p> <p>N2. The laboratory is carried out in the traditional manner in student groups. Laboratory is equipped with: PCs, PLCs, vision sensors and the models of machinery, equipment and industrial processes.</p>

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation <i>F - forming (during semester)</i> <i>P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(L)	PEU_U01 PEU_U02 PEU_U03	Assessment of prepare for laboratory exercises.
F2(L)	PEU_U01 PEU_U02 PEU_U03 PEU_K01	Activity in laboratory classes.
F3(L)	PEU_U01 PEU_U02 PEU_U03 PEU_K01	Rating of reports of completed projects.
P(L)	$P = 0,2 \cdot F1 + 0,5 \cdot F2 + 0,3 \cdot F3$	

PRIMARY AND SECONDARY LITERATURE
<p><b>PRIMARY LITERATURE:</b></p> <p>[1] Pawlak M., Sterowniki Programowalne, e-skrypt, Ed. Wrocław University of Science and Technology, Wrocław 2010, available in Lower Silesian Digital Library.</p> <p>[2] Laboratory instructions.</p> <p><b>SECONDARY LITERATURE:</b></p> <p>Data sheets of PLC.</p>

SUBJECT SUPERVISOR
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