

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Zastosowanie PLC w systemach energetyki odnawialnej**
 Name in English: **PLC application in renewable electrical power engineering systems**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable): **Renewable Energy Sources**
 Level and form of studies: **2nd level, full-time**
 Kind of subject: **obligatory**
 Subject code: **ELR053219**
 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. Has a basic knowledge in the field of analog and digital electronic circuits.
2. Has a basic knowledge of the construction of PLCs.
3. He can based on the wiring diagram to connect the control system using PLC.
4. He knows the rules of group work and managing a small team taking responsibility for the results of his work.

SUBJECT OBJECTIVES

- C1. Acquiring the ability to program the PLC in FBD and LD languages for the implementation of typical control systems.
 C2. Acquire the skills connect, run and test the control systems.
 C3. Acquiring the ability to create software algorithms and programming of the PLC in terms of teamwork.

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

PEU_U01 He can connect PLC to an control system.

PEU_U02 He can configure and program the PLC in the chosen language, using a dedicated software tool for the type of PLC.

relating to social competences:

PEU_K01 It has a awareness of the responsibility for their own work and the willingness to comply with the principles of teamwork.

PROGRAMME CONTENT		
Form of classes - laboratory		Number of hours:
Lab 1	Introduction to the safety rules and Regulations of the internal laboratory. Establishing rules for passing. General appreciate the position of the laboratory. Discussion of laboratory exercises.	2
Lab 2	Configuring and programming of the chosen PLC type.	2
Lab 3	Programming basic logic structures (functors AND, OR, NOT, XOR, RS and SR flip-flops, edge detectors).	2
Lab 4	Programming timing and counting functions (timers TON, TOF, TP, counters, comparators).	2
Lab 5	Advanced features of the chosen PLC type. Programming high-speed pulse outputs. Structuring the program's - subroutines and interrupt service.	4
Lab 6	Programming models of electric drives in various systems work.	6
Lab 7	Programming models and industrial devices.	6
Lab 8	Programming models of industrial processes.	4
Lab 9	Summary and pass the lab.	2
Total hours:		30

TEACHING TOOLS USED
<p>N1. Consultation.</p> <p>N2. Individual work and preparation for exercise.</p> <p>N3. Laboratory carried out in the traditional manner in exercises student groups at workplaces equipped with PCs, PLCs and models of machinery, equipment and industrial processes.</p> <p>N4. Crediting with grade.</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_K01	Activity in laboratory classes.
F2(L)	PEU_U01 PEU_U02 PEU_K01	Assessment of reports of completed projects.
P(L)	$P = 0,3 \cdot F1 + 0,7 \cdot F2$	

PRIMARY AND SECONDARY LITERATURE
<p>PRIMARY LITERATURE:</p> <p>[1] Kasprzyk J., Programowanie sterowników przemysłowych, WNT</p> <p>[2] Legierski T., Wyrwał J., Programowanie sterowników PLC, Wyd. Pracowni Komputerowej J. Skalmierskiego, Gliwice 1998</p> <p>[3] Pawlak M., Sterowniki Programowalne, e-skrypt, Wyd. Politechnika Wrocławska, Wrocław 2010, dostępny w Dolnośląskiej Bibliotece Cyfrowej,</p> <p>SECONDARY LITERATURE:</p> <p>[1] Janusz Kwaśniewski, Sterowniki PLC w praktyce inżynierskiej, BTC</p> <p>[2] Zbiór instrukcji laboratoryjnych, materiałów pomocniczych do wykładu oraz dokumentacji technicznych sterowników programowalnych.</p> <p>[3] Flaga S., Programowanie sterowników PLC w języku drabinkowym, BTC, Legionowo 2010</p> <p>[4] Sałat R., Korpysz K., Obstawski P., Wstęp do programowania sterowników PLC, WKŁ, Warszawa 2010</p>

SUBJECT SUPERVISOR
Krzysztof Dyrz, krzysztof.dyrz@pwr.edu.pl