

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **PLC oraz bezprzewodowa telekomunikacja dla potrzeb monitoringu i pomiarów**  
 Name in English: **PLC and Wireless Communication for Monitoring and Metering**  
 Main field of study (if applicable): **Electrical Engineering**  
 Specialization (if applicable): **Electrical Power Engineering**  
 Level and form of studies: **2nd level, full-time**  
 Kind of subject: **optional**  
 Subject code: **ELR052214**  
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30				15
Number of hours of total student workload (CNPS):	60				30
Form of crediting:	examination				crediting with grade
For group of courses mark (X) final course:					
Number of ECTS points:	2				1
including number of ECTS points for practical (P) classes :					1
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40				0.70

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

1. Has a basic knowledge for understanding phenomena present under wired and wireless signal processing and transferring
2. Has basic knowledge about magnetic field theory
3. Knows how to use knowledge on physics for analysis of communication units employed for monitoring and metering
4. Is able to properly use gathered knowledge for quantity and quality analysis engineering tasks

**SUBJECT OBJECTIVES**

- C1. Acquaintance with necessary knowledge for understanding phenomena present under wired and wireless transmission digital and analog signals  
 C2. Acquaintance with possibilities of connecting remote sensor measuring network  
 C3. Gaining knowledge necessary for utilization wireless and PLC methods for remote monitoring and metering in electrical power system  
 C4. Acquaintance knowledge about modern directions in signal transmission in industry applications

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

- PEU\_W01 Has knowledge about physical fundamentals of operation, realization and application PLC technology  
 PEU\_W02 Has knowledge about physical fundamentals of operation, realization and application wire and wireless communication

*relating to skills:*

- PEU\_U01 Has ability to extract data from literature and data bases on selected subject of reliability problems in PLC communication and/or wire and wireless in selected systems for monitoring and metering  
 PEU\_U02 Has ability to elaborate synthetic conclusions and to prepare and deliver presentation

*relating to social competences:*

- PEU\_K01 Has consciousness about responsibility for his own work and is ready for teamwork

## PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	Overview of lecture, requirements and assessing method	2
Lec 2	Tasks of PLC and wireless communication - fundamental definitions	2
Lec 3	Normalization of PLC technology - advantages / disadvantages	2
Lec 4	Architecture of electrical network, modeling of electrical equipment, layered architecture OSI	2
Lec 5	Functionality of transmission channel, synchronization, frame control, priorities of frame management	2
Lec 6	Overview of PLC network protection methods	2
Lec 7	Functionality of transmission modes: master-slave, p2p, centralized	2
Lec 8	Main application field: phones, image transmission, multimedia, equipment, solutions for various transmission types	2
Lec 9	Coupling methods, transformers and meters	2
Lec 10	Selection of transmission medium (cable)	2
Lec 11	Problems with application of selected sensors	2
Lec 12	Monitoring and remote metering of an environmental conditions	2
Lec 13	LAN and WAN wireless architecture, advantages and disadvantages	2
Lec 14	LAN and WAN wired architecture, advantages and disadvantages	2
Lec 15	Summary and discussion of the final examination	2
Total hours:		<b>30</b>

Form of classes - seminar		Number of hours:
Sem 1	Acquaintance with seminar program, requirements and assessing method	1
Sem 2	Individual tasks and projects for presentation, with use of multimedia techniques, considering selected problems of application PLC and telecommunication wireless networks	14
Total hours:		<b>15</b>

## TEACHING TOOLS USED

- N1. Lecture with use of multimedia presentation techniques  
 N2. Seminar with use of multimedia presentation techniques  
 N3. Discussion with remarks on presented materials

## EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation <i>F - forming (during semester) P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEU_W01 PEU_W02 PEU_K01	Exam in oral and/or writing form
P(w)	P=F1	
F1(s)	PEU_U01 PEU_U02 PEU_K01	Individual presentation assessment
F2(s)	PEU_U01 PEU_U02	Activity assessment
P(s)	$P = 0.7F1 + 0.3F2$	

## PRIMARY AND SECONDARY LITERATURE

### PRIMARY LITERATURE:

- [1] Xavier Carcelle, Power Line Communication in Practice, Artec House, Boston London 2006  
 [2] Yang Xiao, Yi Pan, Emerging Wireless LANs, Wireless PANs, Wireless MANs, Willey&Sons, Inc. Pub. 2009

### SECONDARY LITERATURE:

- [1] Selected articles published in renowned journals

## SUBJECT SUPERVISOR

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