

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: **ELR042214**
 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 EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Has knowledge about physical fundamentals of operation, realization and application PLC technology
 PEK_W02 Has knowledge about physical fundamentals of operation, realization and application wire and wireless communication

relating to skills:

- PEK_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
 PEK_U02 Has ability to elaborate synthetic conclusions and to prepare and deliver presentation

relating to social competences:

- PEK_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:		30

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:		15

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 EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation <i>F - forming (during semester) P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEK_W01 PEK_W02 PEK_K01	Exam in oral and/or writing form
P(w)	P=F1	
F1(s)	PEK_U01 PEK_U02 PEK_K01	Individual presentation assessment
F2(s)	PEK_U01 PEK_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, Wiley&Sons, Inc. Pub. 2009

SECONDARY LITERATURE:

- [1] Selected articles published in renowned journals

SUBJECT SUPERVISOR

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ELR042214 - PLC and Wireless Communication for Monitoring and Metering
 AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering**
 AND SPECIALIZATION **Electrical Power Engineering**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_W01	S2EEN_W11	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec15	N.1
PEK_W02	S2EEN_W11	C.2	Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1
PEK_U01	S2EEN_U12	C.3 C.4	Sem2	N.2 N.3
PEK_U02	S2EEN_U12	C.3 C.4	Sem2	N.2 N.3
PEK_K01	K2ETK_K06	C.1 C.2 C.3 C.4	Lec15 Sem1 Sem2	N.1 N.2 N.3