

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **PLC oraz bezprzewodowa komunikacja dla potrzeb monitoringu i pomiarów**
 Name in English: **PLC and Wireless Communications for Monitoring and Metering**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable): **Renewable Energy Systems**
 Level and form of studies: **2nd level, full-time**
 Kind of subject: **optional**
 Subject code: **ELR042234**
 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):	90				30
Form of crediting:	examination				crediting with grade
For group of courses mark (X) final course:					
Number of ECTS points:	3				1
including number of ECTS points for practical (P) classes :					1
including number of ECTS points for direct teacher-student contact (BK) classes:	2.10				0.70

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student has structured and theoretically founded knowledge necessary to understand phenomena related with as wire as well as wireless processing and transmission
2. Has a basic knowledge on electromagnetic field theory
3. Is able to apply properly knowledge of modern physics to analyze the efficiency of operation of communication systems employed in monitoring and metering
4. Is able to exploit properly common rules and laws of physics to the qualitative and quantitative analysis of an engineering issues
5. Able to conduct work in a team and understands the need for continuous education

SUBJECT OBJECTIVES

- C1. Acquaintance with basic knowledge necessary to understand phenomena accompanying both wire and wireless transmission of analog and digital signals
 C2. Acquaintance with opportunities to use PLC technique and wire communication in monitoring and metering
 C3. Creation of skills and ability to use PLC and wireless communication for monitoring and metering in automated electric power systems
 C4. The acquisition of a knowledge related on current trends in signal transmission technology for industrial applications

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Has knowledge on physical basis of operation, implementation and use of PLC technology
 PEK_W02 Has knowledge on physical basis of operation, implementation and use of both wire and wireless telecommunication technology

relating to skills:

- PEK_U01 Able to extract information from literature and database on selected problem in field of reliability of PLC technology and/or wireless telecommunication for selected monitoring and metering systems
 PEK_U02 Has the ability of analyzing the results and formulating conclusions, as well as preparation and delivering presentation

relating to social competences:

- PEK_K01 Has a sense of responsibility for his own work and willingness to comply with the principles of teamwork

PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	Acquaintance with the subject and requirements of completion	2
Lec 2	PLC and wireless telecommunication tasks, basic functions	2
Lec 3	Standardization of PLC technology – advantages and disadvantages	2
Lec 4	Architecture of electric network, modeling of electric devices, layered architecture OSI	2
Lec 5	Transmission channel functionality, synchronization, frame control, management, frame priorities	2
Lec 6	Overview of network security issues	2
Lec 7	Network mode functionality, master-slave, peer-to-peer, centralized	2
Lec 8	Areas of application, voice, video, multimedia, equipment for different modems, PLC modems	2
Lec 9	Coupling problems; transformers and metering devices	2
Lec 10	Choice of transmission cabling	2
Lec 11	Application problems of selected sensors	2
Lec 12	Control of environment conditions and automated meter reading	2
Lec 13	Architecture of LAN and WAN wireless networks, advantages and disadvantages	2
Lec 14	Architecture of LAN and WAN wire networks, advantages and disadvantages	2
Lec 15	Repetition and discussion of exam issues	2
Total hours:		30

Form of classes - seminar		Number of hours:
Sem 1	Acquaintance with program, requirements and way of completion	1
Sem 2	Individual projects and presentations (with use of audiovisual techniques) on application of PLC and telecommunication networks	14
Total hours:		15

TEACHING TOOLS USED

- N1. Lecture with use of audiovisual techniques, multimedia presentation, transparencies
 N2. Seminar with use of audiovisual techniques, multimedia presentation, transparencies
 N3. Discussion on presented material

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	Written exam
P(w)	P=F1	
F1(s)	PEK_U01 PEK_U02 PEK_K01	Individual performance evaluation
F2(s)	PEK_U01 PEK_U02 PEK_K01	Assesment of student activities during seminar
P(s)	P=0,8F1+0,2F2	

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 papers published in recognized international journals and/or presented in internet

SUBJECT SUPERVISOR

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ELR042234 - PLC and Wireless Communications for Monitoring and Metering
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering**
AND SPECIALIZATION **Renewable Energy Systems**

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	S2RES_W17	C.1 C.2	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec15	N.1
PEK_W02	S2RES_W17	C.2	Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1
PEK_U01	S2RES_U19	C.3 C.4	Sem1 Sem2	N.2 N.3
PEK_U02	S2RES_U19	C.3 C.4	Sem1 Sem2	N.2 N.3
PEK_K01	K2ETK_K06	C.1 C.2 C.3 C.4	Lec1 Lec15 Sem1 Sem2	N.1 N.2 N.3