FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Zabezpieczenia sieci ŚN**
Name in English:	**MV Network security**
Main field of study (if applicable):	**Electrical Engineering**
Specialization (if applicable):	**Electrical Power Engineering**
Level and form of studies:	**2nd level, part-time**
Kind of subject:	**obligatory**
Subject code:	**ELR052273**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):			22		
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 properly founded and structured knowledge needed to understand the purposes and targets of modern power system protection units
2. Has knowledge necessary if about working criteria and application techniques for control and regulation in power system elements under malfunction and steady work
3. Is able to correctly connect, coordinate and exploit single input relays and power safety units
4. Is able to correctly install, setup and execute exploitation checking for basic regulation and control units used in power

SUBJECT OBJECTIVES

C1. Acquaintance with modern solutions for power safety units for MV networks

C2. Gaining practical knowledge and skills for setting up tripping values for selected criteria of MV lines protection units depending on network arrangement

C3. Gaining practical skills to apply modern methods, techniques and measuring tools for safety automation investigation

C4. To gain practical knowledge and skills needed for creating protocols from measurements

C5. Competence development in SCADA applications (communication protocols, hubs, dispatch centers)

SUBJECT LEARNING OUTCOMES

relating to knowledge:

relating to skills:

PEU_U01	Is able to connect protection equipment to voltage, current, ground fault and control circuits of MV line model
PEU_U02	s able to select proper setup tripping values for protection relays and research the characteristics of the basic protection criteria of the MV line
PEU_U03	He has skills in establishing digital communication between power protection and compartment controller (concentrator), as part of the Control System

relating to social competences:

PEU_K01	Is conscious about responsibility for his own work and is willing to acknowledge teamwork rules

PROGRAMME CONTENT		
Form of classes - laboratory		**Number of hours:**
Lab 1	Presentation of safety regulations and internal regulations of laboratory. Assessment rules. Overview of laboratory stations and physical models of protection units and criterions for protection of MV lines	2
Lab 2	Overview of work and functionality of digital protection relays tester	2
Lab 3	Overview of construction and work methodology of digital MV line protection	2
Lab 4	Programming of relays	2
Lab 5	Testing of selected MV line protection - determining of characteristics for basic criterions	4
Lab 6	Communication between devices using MODBUS protocol	2
Lab 7	Local Dispatcher position	2
Lab 8	GOOSE communication - IEC61850 standard communication	2
Lab 9	DNP3 protocol communication with Remote Dispatcher	2
Lab 10	Completing arrears, completing the course	2
	Total hours:	**22**

TEACHING TOOLS USED
N1. Laboratory with measurements on physical models of protection devices, traditionally arranged

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(L)	PEU_U01 PEU_U02 PEU_U03 PEU_K01	Examination of preparation for laboratory exercises and activity during laboratory
F2(L)	PEU_U01 PEU_U02 PEU_U03 PEU_K01	Assessment of prepared protocols from measurements
P(L)	P=0,3F1+0,7F2	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Winkler W., Wiszniewski A., Automatyka zabezpieczeniowa w systemach elektroenergetycznych, WNT, Warszawa, 2004.
[2] Synal B., Elektroenergetyczna automatyka zabezpieczeniowa : podstawy, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2003.

SECONDARY LITERATURE:

[1] Wróblewski J., Zespoły elektroenergetycznej automatyki zabezpieczeniowej : zasady budowy, WNT, Warszawa, 1993.

SUBJECT SUPERVISOR

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