

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Zabezpieczanie i sterowanie rozproszonymi źródłami energii 2**  
 Name in English: **Protection and Control of Distributed Energy Sources 2**  
 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: **obligatory**  
 Subject code: **ELR052141**  
 Group of courses: **NO**

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

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

1. Student should have the basic knowledge of fundamentals of circuit theory and basics of differential calculus. 2. Student should know how to analyse steady states and transients in linear circuit 3. Student should have ability to think and act in a creative way. Student should have ability to work in a team.

**SUBJECT OBJECTIVES**

- C1. To provide knowledge of methods related to electric power network protection.  
 C2. Learning how to formulate criteria and schemes for fault detection in power networks.  
 C3. To provide knowledge of modelling and simulation of transient phenomena in electric power lines.  
 C4. Learning how to control of distributed generation system.  
 C5. Self preparation and delivering a poster presentation.

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

- PEU\_U01 Student gets the knowledge on preparation of presentation on protection of distributed generation networks.  
 PEU\_U02 Student is able to deliver a presentation on some selected problems related to protection and automation of distributed power generation.

*relating to social competences:*

- PEU\_K01 Student can act independently and have an attitude of openness of participants towards new problems, controversial issues and demanding professional tasks.

**PROGRAMME CONTENT**

Form of classes - seminar		Number of hours:
Sem 1	Introduction. Establishing conditions for passing and marking the seminar subject.	2
Sem 2	Individual presentation by students of the prepared subjects.	12
Sem 3	Summary, pass.	1
Total hours:		<b>15</b>

**TEACHING TOOLS USED**

N1. Presentation of the prepared theme by using of a computer and projector.

**EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT**

<b>Evaluation</b> <i>F - forming (during semester)</i> <i>P - concluding (at semester end)</i>	<b>Educational effect number</b>	<b>Way of evaluating educational effect achievement</b>
F1(s)	PEU_U01 PEU_U02 PEU_K01	Presentation of the prepared theme
F2(s)	PEU_U01 PEU_U02	Activity in the seminar work
P(s)	$P=0,1 \cdot F2 + 0,9 \cdot F1$	

**PRIMARY AND SECONDARY LITERATURE****PRIMARY LITERATURE:**

- [1] ELMOR W.A., PROTECTIVREE LAYING THEORYAN D APPLICATIONS. MARCELD EKKEIRN,C . D E., 2004
- [2] [http://www.rose.pwr.wroc.pl/index\\_a.htm](http://www.rose.pwr.wroc.pl/index_a.htm) - materiały do kursu
- [3] LUND H., Renewable Energy Systems. Elsevier Inc. 2010.

**SECONDARY LITERATURE:**

- [1] QUASCHNING V., Understanding Renewable Energy Systems. Earthscan 2005.
- [2] JENKINS N. ALLAN R., CROSSLEY P., KIRSCHEN D., STRBACET G., Embedded generation. The Institution of Electrical Engineers, London 2000.
- [3] ACKERMANN T. (editor), Wind power in power systems. John Wiley & Sons, Ltd, Chichester 2005

**SUBJECT SUPERVISOR**

Eugeniusz Rosołowski, eugeniusz.rosolowski@pwr.edu.pl