

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Praca systemów elektroenergetycznych 1**  
 Name in English: **Power Systems Operation and Control 1**  
 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: **ELR052573**  
 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):	90				
Form of crediting:	examination				
For group of courses mark (X) final course:					
Number of ECTS points:	3				
including number of ECTS points for practical (P) classes:					
including number of ECTS points for direct teacher-student contact (BK) classes:	2.10				

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

1. Basic knowledge of electrical systems

**SUBJECT OBJECTIVES**

- C1. Read with the knowledge related to transmission of power and cooperation of modern power systems.  
 C2. Evaluation of the behavior of the power systems in the stability steady and disturbance.  
 C3. Mastering the skills of active and reactive power analysis in closed transmission systems.

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

- PEU\_W01 Knows the rules of the functioning of the electricity system in the making, processing and transmission of power.  
 PEU\_W02 Has knowledge of power system models and methods of determining the load flow of power in modern, large systems.  
 PEU\_W03 Has knowledge of the methods of analysis for the various systems disruption of normal work.

*relating to skills:**relating to social competences:*

- PEU\_K01 Knows how to justify the results obtained in the work of his own

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Introduction, basic concepts, thematic scope, requirements and method of assessment.	1
Lec 2	Mathematical models of elements in the system and mathematical models of generators and the arrivals. Characteristics of set working states.	1
Lec 3	The calculation of load flow of power control systems for the purposes of the power of large. Sure the results obtained	2
Lec 4	Basic system frequency control and power systems. Cooperation rules systems	2
Lec 5	The primary regulation systems-frequency as a parameter the quality of electrical energy. The equation and the characteristics of the primary regulation.	2
Lec 6	Integrated regulation of the secondary system. Response system for big power balance disorders	2
Lec 7	Adjust the power exchange. The equation and the characteristics of secondary regulation	2
Lec 8	Mathematical models of electric power system for analysis stability The stability of the local generator working in the system. Criteria of stability-stability improvement measures.	2
Lec 9	The stability of local-voltage of load. Simplification of the issues, the characteristics of the types of recipients. The criteria stability of the load.	2
Lec 10	Method of "equal fields"-derivation, reasons and examples.	2
Lec 11	Methods of numerical integration. The mathematical Model and analysis.	2
Lec 12	Matrix analysis of power system	2
Total hours:		<b>22</b>

TEACHING TOOLS USED
N1. informative lecture, multimedia presentation, examples of calculated members

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_W03 PEU_K01	in writing-oral exam
P(w)	P - F1	

PRIMARY AND SECONDARY LITERATURE
<b>PRIMARY LITERATURE:</b> [1] Kremens Z., Sobierajski M., Analiza systemów elektroenergetycznych., WNT, Warszawa 1996 [2] Kacejko P., Machowski J., Zwarcia w sieciach elektroenergetycznych, WNT, Warszawa 1993 [3] Kacejko P., Machowski J., Zwarcia w systemach elektroenergetycznych, WNT, Warszawa 2002 [4] your own notes <b>SECONDARY LITERATURE:</b> [1] Information on the Internet

SUBJECT SUPERVISOR
Robert Lis, robert.lis@pwr.edu.pl