FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Systemy elektroenergetyczne 2**
Name in English:	**Electric Power Systems 2**
Main field of study (if applicable):	**Electrical Engineering**
Specialization (if applicable):	
Level and form of studies:	**1st level, part-time**
Kind of subject:	**obligatory**
Subject code:	**ELR042568**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):			20		
Number of hours of total student workload (CNPS):			54		
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. Student has the knowledge of the analysis methods of steady and short-circuits states in electric power systems.
2. Student has the basic knowledge of the control theory in the field of dynamic stability of technical systems.
3. Student has the basic knowledge of programming in Matlab.
4. Student is capable of using differentiation and integration for the analysis of steady and transient states of linear electric circuits.
5. Student is capable of using the knowledge of electric drives for modeling the generator in subtransient , transient and synchronous states.
6. Student is capable of using Matlab for the analysis of electric power system states.
7. Student can work in a team.
8. Student understands the need of various knowledge to integrate.

SUBJECT OBJECTIVES

C1. To assimilate knowledge associated with the voltage and frequency control in electric power systems.
C2. To become skillful at the analysis of steady, short-circuits and transient states of electric power system examples.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

relating to skills:

PEK_U01	Student can work out the equivalent schemes of power system in steady, short-circuits and transient states and calculate the equivalent parameters.
PEK_U02	Student is capable of preparing input data and making computer simulation of power system states.
PEK_U03	Student is capable of concluding results obtained from power system computations.

relating to social competences:

PEK_K01	Student can justify the results obtained in power system computations.

PROGRAMME CONTENT		
Form of classes - laboratory		**Number of hours:**
Lab 1	Introduction - the health and safety requirements, the rules of making laboratory exercises	2
Lab 2	Load flow calculation in radial transmission system.	2
Lab 3	Preparing equivalent schemes and input data for load flow computation in per unit.	2
Lab 4	Iterative computation of load flow in power system.	2
Lab 5	Preparing equivalent schemes and parameters in the symmetrical component system of 012.	2
Lab 6	The computation of the initial symmetrical short-circuit currents supplied by independent sources.	2
Lab 7	The computation of the initial, peak, breaking and thermal equivalent short-circuit currents according to IEC.	2
Lab 8	Preparing the input data file for the analysis of unsymmetrical short-circuits. Computing the impedance matrix in the symmetrical component system of 012.	2
Lab 9	The computation of the initial current in 1-phase and 2-phase short-circuits in the solidly grounded network.	2
Lab 10	Investigating the stability of single generator system by the equal area method.	2
	Total hours:	**20**

TEACHING TOOLS USED
N1. Laboratory group controlled by checking knowledge and exercise performance.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(L)	PEK_U01 PEK_U02 PEK_U03	The mark of preparing, performing and reporting the laboratory exercises.
F2(L)	PEK_U01 PEK_U02 PEK_U03	The mark of the correctness of final reports.
P(L)	P = 0.4F1 + 0.6F2	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] Kremens Z., Sobierajski M.,Electric power system Analysis. Warsaw WNT 1996 . /in polish/ [2] Kacejko P., Machowski J., Short-circuits in electric power systems. Warsaw WNT 2002. /in polish/ [3] Electric power system lecture accessible at http://eps.pwr.wroc.pl/studenci. /in polish/
SECONDARY LITERATURE:
[1] Kacejko P., Dispersed generation in electric power system. Wydawnictwa Politechniki Lubelskiej 2004. /in polish/ [2] Sobierajski M., Łabuzek M., Programming in Matlab. Oficyna Wydawnicza Politechniki Wrocławskiej, 2005. /in polish/ [3] Lecture of Informatics in electrical engineering accessible at http://eps.pwr.wroc.pl/studenci /in polsh/

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ELR042568 - Electric Power Systems 2
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical 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_U01	K1ETK_U22	C.1 C.2	Lab1 Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10	N.1
PEK_U02	K1ETK_U22	C.1 C.2	Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10	N.1
PEK_U03	K1ETK_U22	C.1 C.2	Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10	N.1
PEK_K01	K1ETK_K05	C.1 C.2	Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10	N.1