DESCRIPTION OF THE COURSES

- Course code: ELR2518
- Course title: ELECTRIC POWER SYSTEM OPERATION AND CONTROL
- Language of the lecturer: english

Course form	***Lecture***	***Classes***	***Laboratory***	***Project***	***Seminar***
*Number of hours/week**	*2*				*1*
*Number of hours/semester**	*30*				*15*
Form of the course completion	*Final test*				*Presentation of the analysis results of power system states*
ECTS credits	*4*				
Total Student's Workload					

- Level of the course (basic/advanced): advanced
- Prerequisites: Programming in Matlab, Electric Power Systems
- Name, first name and degree of the lecturer/supervisor: Prof. Marian Sobierajski, Ph.D., D.Sc. Associate Professor
- Names, first names and degrees of the team's members: Robert Lis, Ph.D, Robert Łukomski, PhD
- Year:.....1..... Semester:.....2.....
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course): Knowledge of control and regulation of voltage and frequency in transient states
- Form of the teaching (traditional/e-learning): traditional
- Course description: Steady-state and short-circuit analysis. Voltage regulation and voltage stability. Exciters and voltage regulators. Speed regulators. Dynamic and transient stability.
- Lecture:

Particular lectures contents	*Number of hours*
1. Models of basic elements of electrical power systems.	*2*
2. Mathematical background of load flow analysis.	
3. Iterative solution of active and reactive power flows using Matlab.	*2*
4. Example of hand and computer calculations of load flow.	*2*
5. Voltage and reactive power regulation.	
6. Voltage stability of power system using Matlab.	*2*
7. Symmetrical short-circuit in electrical power systems.	*2*
8. Analysis of unbalanced faults using the symmetrical component transformation..	*2*
9. IEC method of short-circuit analysis. Example of short-circuit analysis.	*2*

10. Short-circuit analysis using Matlab. 11. Small disturbance stability using eigenvalue analysis of the state matrix. 12. Synchronous generator models in stability analysis. 13. Transient stability of a synchronous generator connected to a large power system. Differential equations of generator and voltage and speed regulators. 14. The analysis of small disturbance stability of a synchronous generator connected to a large electric power system. 15. Modeling and simulation of transient states of a small water power station using Matlab.	*2* *2* *2* *2* *2* *2* *2* *2*

- Classes – the contents:
- Seminars – the contents: Individual home analysis of steady state, voltage stability, dynamic stability and transient stability of a power system using Matlab. Presenation and discussion of the results of the computer analysis.
- Project – the contents:
- Basic literature:

  1. Machowski J., Bialek J. W., Bumby J. R., Power System Dynamics and Stability. John Wiley and Sons 1997.
  2. Sobierajski M., Łabuzek M., Lis R., Electric Power System Analysis in Matlab, Wroclaw University of Technology, 2007.
- Additional literature:

  3. Kremens Z., Sobierajski M., Electric Power Analysis. WNT 1996 /in polish/
- Conditions of the course acceptance/credition: Positive note of seminars and final test.

***** - depending on a system of studies