## DESCRIPTION OF THE COURSES

- Course code: ARR2503
- Course title: ELECTRIC POWER SYSTEMS
- Language of the lecturer: english, polish

| *Course form* | ***Lecture*** | ***Classes*** | ***Laboratory*** | ***Project*** | ***Seminar*** |
|---|---|---|---|---|---|
| *Number of hours/week** | *2* | | | | |
| *Number of hours/semester** | *30* | | | | |
| *Form of the course completion* | *2 individual home works.* | | | | |
| ***ECTS credits*** | *2* | | | | |
| ***Total Student's Workload*** | *60* | | | | |

- Level of the course (basic/advanced): basic
- Prerequisites: Mathematics, Physics, Electric Circuit Theory, Informatics in Electrical Engineering
- 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: Prof. Artur Wilczynski, Ph.D., D.Sc., Associate Professor, Robert Lis, Ph.D, Robert Łukomski, PhD
- Year:.....3..... Semester:.....4.....
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course): Skill of calculations of load flows and shorth circuits in modern power systems. Knowledge of basic problems of voltage and frequency regulation in modern power systems.
- Form of the teaching (traditional/e-learning): traditional
- Course description: General classification of transmission systems - brief historical overview, modern generation and transmission. Load flows in radial and meshed networks. Symmetrical short-circuit analysis. Symmetrical components. Unsymmetrical short-ciruit analysis. Short-circuit in medium voltage network. Dynamic and transient stability. Voltage and frequency regulation
- Lecture:

| *Particular lectures contents* | *Number of hours* |
|---|---|
| 1. Modern problems in electrical energy transmission and distribution. | |
| 2. Line and cables parameters. Power transformer parameters. | *2* |
| 3. Modelling radial power systems. Calculation of voltages and currents in radial networks. | *2* |
| 4. Mathematical background of power flows in transmission networks. | *2* |
| Computer methods of load flow calculations. | *2* |
| 5. Symmetrical faults - Thevenin's theorem, short circuit current calculation. | *2* |
| 6. IEC method of short circuit analysis. | |

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|---|---|
| 7. Unsymmetrical short circuit analysis - equivalent circuits and parameters using symmetrical components.<br>8. Currents and voltages in unbalanced short-circuits.<br>9. Short-circuit in medium voltage networks. Limiting short-circuit currents in power system.<br>10. Introduction to angle stability. Local stability.<br>11. Transient stability - equal area criterion.<br>12. Voltage regulation in transmission and distribution networks.<br>13. Voltage collapse - measure against voltage collapse.<br>14. Primary and secondary frequency regulation.. | *2*<br>*2*<br>*2*<br>*2*<br>*2*<br>*2*<br>*2*<br>*2*<br>*2* |

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
- 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.
  3. Kremens Z., Sobierajski M., Electric Power Analysis. WNT 1996 /in polish/
- Additional literature: An academic book on Electrical Power System Analysis.
- Conditions of the course acceptance/credition: Positive note of 2 individual works on load flow calculation and short-circuit analysis.

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