DESCRIPTION OF THE COURSES

- Course code: **ARF2207**
- Course title: **Automation in electrical energy systems**
- Language of the lecturer: **polish**

Course form	Lecture	Classes	Laboratory	Project	Seminar
Number of hours/week*	2		1		
Number of hours/semester*	30		15		
Form of the course completion	quiz		completion		
ECTS credits					
Total Student's Workload					

- Level of the course (basic/advanced): **basic**
- Prerequisites: **Power systems, Relay protection**
- Name, first name and degree of the lecturer/supervisor: **Witold Dzierżanowski, Ph.D.**
- Names, first names and degrees of the team's members:
  Wilhelm Rojewski, Ph.D.
- Year:.........**II stage**....... Semester:......................
- Type of the course (obligatory/optional): **optional**
- Aims of the course (effects of the course): **understanding of structures, functions and realization principles of automation in power system**
- Form of the teaching (traditional/e-learning): **traditional**
- Course description: **Character of power systems faults. Reliability of power delivery. Role and functions of power systems automation sets. Description of different systems automation. Simulation of events in power system. Integrated sets of power system automation.**
- Lecture:

Particular lectures contents	Number of hours
1. **Contents of course. Literature. Requirements.**	1
2. **Classification and role of power system automation.**	1
3. **Description of power system faults**	2
4. **Perturbation after deficiency of active power in power system.**	3
5. **Criterions of operation, setting of load shedding automation.**	2
6. **Electromechanical transients during operation of ATO.**	3
7. **Description of ATO sets.**	2
8. **Temporary faults, automatic reclosing, time delay, stability of power systems.**	2
9. **Description of automatic reclosing sets.**	2
10. **Methods of testing of system automation**	2
11. **Integrated sets of power system automation.**	2
12. **Recording of power system events**	2
13. **Checking – measuring systems of different elements of power**	2

systems	
14. **Microprocessor based control systems. Signal processing.**	**2**
15. **Quiz**	**2**

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
  1. **Testing of power system protection.**
  2. **Testing of ATO sets.**
  3. **Testing of automatic reclosing sets.**
  4. **Testing of load shedding sets.**
  5. **The use of CMC156 test device to testing of protections.**
- Project – the contents:
- Basic literature:
  1. **Synal B., Elektroenergetyczna automatyka zabezpieczeniowa – podstawy, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2000.**
  2. **Synal B., Rojewski W., Dzierżanowski W., j. w. – wydanie II poprawione i uzupełnione, Wrocław 2003.**
  3. **Winkler W., Wiszniewski A., Automatyka zabezpieczeniowa w systemach elektroenergetycznych, WNT, Warszawa, 1999, oraz wydanie II 2004.**
  4. **Praca zbiorowa pod red. B. Synala, Automatyka elektroenergetyczna, ćwiczenia laboratoryjne, część I: Przetworniki sygnałów pomiarowych i przekaźniki automatyki zabezpieczeniowej, część II: Układy automatyki zabezpieczeniowej i regulacyjnej skrypt Politechniki Wrocławskiej, Wrocław 1991.**
- Additional literature:
  1. **Wiszniewski A., Algorytmy pomiarów cyfrowych w automatyce elektroenergetycznej, WNT, W-wa, 1990.**
  2. **Horowitz S. H., Phadke A.G., Power system relaying, RSP England 1992.**
  3. **Wróblewski J., Zespoły elektroenergetycznej automatyki zabezpieczeniowej, WNT, W-wa, 1993.**
  4. **Ungrad H., Winkler W., Wiszniewski A., Protection techniques in electrical energy systems, Marcel Dekker Inc., New York 1995.**
- Conditions of the course acceptance/credition: **Quiz, completion of laboratory**

* - depending on a system of studies