

DESCRIPTION OF THE COURSES

- Course code: **ELR2266**
- Course title: **Power system protections**
- Language of the lecturer: **polish**

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	1		2		
<i>Number of hours/semester*</i>	11		22		
<i>Form of the course completion</i>	Exam		Completion		
<i>ECTS credits</i>	3		2		
<i>Total Student's Workload</i>	90		60		

- Level of the course (basic/advanced): **basic**
- Prerequisites: **Electrical power systems, Power system protection**
- Name, first name and degree of the lecturer/supervisor: **Witold Dzierzanowski, Ph.D.**
- Names, first names and degrees of the team's members:
Henryk Belka, Ph.D.
Wilhelm Rojewski, Ph.D.
Grzegorz Wiśniewski, Ph.D.
- Year:..... **I / II stage**..... Semester:.....**1**.....
- Type of the course (obligatory/optional): **obligatory**
- Aims of the course (effects of the course): **understanding of phenomena and dangers of faults leading to power system blackout and knowledge of basic principles of preventive and restitutive power system protection solutions.**
- Form of the teaching (traditional/e-learning): **traditional**
- Course description:

Characteristics of phenomena in power systems during faults caused by deficiency of active power, switch over and reclosure of large electrical sources, large receivers and parts of power systems; the analysis of dangers. The role, functions and principles of preventive and restitutive power system protection solutions. Integrated protection systems of some electrical objects. Modern testing methods and means for testing of protection systems.

- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Characteristics of course, literature, requirements	1
2. General characteristics, classification and role of preventive and restitutive power system automation.	1
3. Phenomena in power systems due to deficiency of active power, dangers	1

4. Operation criterions, solutions and setting principles of load-shedding automatic	1.5
5. Electromechanical transient processes in consumer nets during switch over of electrical sources	1
6. Operation criteria, solutions and setting principles of automatic throw-over (ATO)	1.5
7. Characteristics of temporary faults, time delays, stability of power systems	1
8. Operation criterions, solutions and setting principles of automatic reclosing sets	1
9. Integrated sets of power system automatic	1
10. Modern testing methods and means for testing of protection system, protections testers	1

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
 1. Introduction, information about pass of grade form
 2. Reception tests of generator protections
 3. Reception tests of directional protections
 4. Testing of line differential protections
 5. Testing of automatic reclosing sets
 6. Testing of ATO sets
 7. Testing of load shedding sets
 8. Microprocessor based protection testing device
 9. Testing of digital distance relay
- Project – the contents:
- Basic literature:
 1. Synal B., Elektroenergetyczna automatyka zabezpieczeniowa – podstawy, Oficyna Wydawnicza Politechniki Wroclawskiej, Wroclaw 2000.
 2. Synal B., Rojewski W., Dzierzanowski W., as above – Wydanie II poprawione i uzupełnione, Wroclaw 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 Wrocl., Wroclaw 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.
 5. Winkler W., Wiszniewski A., Automatyka zabezpieczeniowa w systemach elektroenergetycznych, WNT, Warszawa, 1999, oraz Wydanie II, 2004.

- Conditions of the course acceptance/creditation: **Exam, completion of Lab**
- * - depending on a system of studies