DESCRIPTION OF THE COURSES

- Course code: ELR1104
- Course title: **Diagnostics of electrical devic**es
- Language of the lecturer: polish

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

- Level of the course (basic/advanced): advanced
- Prerequisites: Credited Theoretical electrical engineering and High Voltage Engineering
- Name, first name and degree of the lecturer/supervisor: Janusz Fleszyński, professor PhD, DSc. Zbigniew Wróblewski, professor PhD, DSc,
- Names, first names and degrees of the team's members:
  Grażyna Dąbrowska-Kauf, PhD.
  Janusz Konieczny, PhD.
  Marek Jaworski, PhD.
  Adam Tymań, PhD.
  Maciej Jaroszewski, PhD.
  Krzysztof Wieczorek, , PhD
- Year: 4 Semester: 7
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course): Acquiring of basic diagnostic methods used for testing of high and low voltage devices. Practical skills in measurement of selected diagnostic parameters and on this basis ability to carry out estimation of technical state of electric devices.
- Form of the teaching (traditional/e-learning): traditional
- Course description:

Aims, tasks and fundamentals of devices and low voltage installations. Diagnostics, forecast and generation of devices and installations state. Diagnostic signals and symptoms. Parameters and characteristics of the technical diagnostics. Models of diagnostics objects (structural, functional, testing, physical). Resources and methods of technical diagnostics. Practical diagnostic procedures for low voltage devices.

Aims and methods of electrical power devices diagnostic tests. Tests of electrical high voltage insulation. Parameters and characteristics of high voltage insulation. Partial discharges testing. Physicochemical investigation of transformer oil insulation.

- Lecture:

Particular lectures contents	*Number of hours*
1. Basic notions and parameters of the technical diagnostics.	*2*
2. Diagnostic models of low voltage objects (structural, functional,	*2*

testing, physical).	
3. Resources and methods of the technical diagnostics for low voltage electrical objects: ultrasonic, radiologistics, magneto-powdered, potential decreasing, eddy currents, penetration, thermal, acoustic, optic, vibroacoustic	*2*
4. Practical diagnostic procedures for low voltage electrical nets diagnostics, low voltage transformers, welders, condensers batteries, devices for electrolysis, rectifiers, accumulators, safety resources and complex industrial objects.	*2*
5. Aims and methods of electrical power devices diagnostic tests.	*2*
6. High voltage insulation tests. Test systems.	*2*
7. Test methods for resistance parameters of electrical insulation and dissipation factor characteristics.	*2*
8. Electric and acoustic partial discharges measurements and physicochemical investigation of transformer oil	*2*

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:

Insulations estimation of electrical devices and low voltage insulation installations. Thermo vision usage in researches and in electrical devices diagnostics. Electromagnetic fields level estimation emitted by inductive and micro waving electro thermal devices. High voltage power insulator testing: AC and impulse voltage tests, leakage current measurements. Partial discharges measurements on high voltage insulation. Diagnostic tests on high voltage arresters.

- Project – the contents:
- Basic literature:

[1] Cempel C.: Podstawy wibroakustycznej diagnostyki maszyn. WNT, Warszawa 1982.
[2] Żółtowski B., Józefik W.: Diagnostyka techniczna elektrycznych urządzeń przemysłowych. WU ATR, Bydgoszcz 1996.
[3] Wodziński J.: Wysokonapięciowa technika prób i pomiarów, Wydawnictwo Naukowe PWN, Warszawa 1997.
[4] Praca zbiorowa pod red. J. Fleszyńskiego: Laboratorium wysokonapięciowe w dydaktyce i elektroenergetyce, Oficyna Wydawnicza PWr. Wrocław 1999

- Additional literature:

[1] Cempel C., Tomaszewski F.: Diagnostyka maszyn. Zasady ogólne. Przykłady zastosowań. MCNEMT, Radom 1992.
[2] Krefft A.: Funkcje diagnostyczne zjawisk nieobserwowalnych. OW PWr, Wrocław 1999.
[3] Praca zbiorowa pod red. H. Mościckiej-Grzesiak: Inżynieria wysokich napięć w elektroenergetyce, Wydawnictwo Politechniki Poznańskiej, t.1 – 1996, t.2 – 1999

- Conditions of the course acceptance/credition:

Completion of the course is confirmed on the basis of class test covering the whole material

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