COURSE DESCRIPTION CARD - SYLLABUS

Course name
ADVANCED ON-LINE DIAGNOSTICS OF THE POWER TRANSFORMER

Course

Proposed by Discipline
Environmental engineering, mining and energy

Year/Semester
II/3, III/5

Type of studies
Doctoral School

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
4

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

Knowledge: PhD student should have basic knowledge in the field of electricity generation and transmission as well as high voltage technology.

Skills: PhD student can individually identify, formulate and solve engineering problems using innovative tools.

Social competencies: PhD student recognizes the importance of continuous learning and individual work, is open to exploring new areas of knowledge.

Course objective

Acquaintance with modern on-line diagnostics techniques and assessment of the state of insulation of high-voltage devices on the example of power transformer. Acquisition of processing skills and proper interpretation of measurement data to assess the condition of high voltage equipment.

Course-related learning outcomes

Knowledge

A PhD student who graduated from doctoral school knows and understands:
1) the key trends for the development of electrical power equipment diagnostics, [P8S_WG/SzD_W02]
2) the relationships that exist between the economic sphere and the commercialization of scientific research results. [P8S_WK/SzD_W07]

Skills

A PhD student who graduated from doctoral school can:
1) use knowledge from various fields of science to create expert systems that allow comprehensive assessment of the state of technical devices, [P8S_UW/SzD_U01]
2) critically analyze and evaluate the results of measurements and analyzes in order to make rational decisions regarding the operation of electrical power equipment. [P8S_UW/SzD_U02]

Social competences

A PhD student who graduated from doctoral school is ready to:
1) critically assess the achievements in the field of modern methods of assessing the state of power engineering devices, [P8S_KK/SzD_K01]
2) initiate actions aimed at making the public aware of the importance of modern methods of online diagnostics for energy security. [P8S_KO/SzD_K05]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

PQF code	Methods for verification of learning outcomes	Assessment criteria
W02, W07	Knowledge assessment based on a written test	Depending on the number of correct answers expressed as a percentage, the student will receive the following grade: 50-59% - 3.0 (E) 60-69% - 3.5 (D) 70-79% - 4.0 (C) 80-89% - 4.5 (B) 90-100% - 5.0 (A)
U01, U02	as above	as above
K01, K05	as above	as above

Programme content

1. Dissolved Gas in Oil Analysis (The fundamental description of the DGA method, Procedures of method use, Methods of results interpretation, On-line application using DGA method).
2. Partial discharges measurement (Partial discharges measurement rules, On-line, on-site methods used for PD measurement, Interpretation of the PD measurement results, On-line application using different methods of PD measurement).

Teaching methods

Lecture: multimedia presentation including illustrations and examples.

Bibliography

Basic

1. E. Kuffel , W.S. Zaengl, J. Kuffel , High Voltage Engineering. Fundamentals, Second edition, Butterworth-Heinemann, 2000.

2. James H. Harlow , Electric Power Transformer Engineering, 3rd Edition, CRC Press, 2012.

3. Issouf Fofana (Ed.), Power Transformer Diagnostics, Monitoring and Design Features, MDPI, December 2018.

4. Ahmed Abu-Siada Ed), Power Transformer Condition Monitoring and Diagnosis, IET, 2018.

Additional

1. W. Sikorski (Ed), Acoustic emission. Research and applications, INTECH, 2013.

2. W. H. Tang , By (author) Q. H. Wu, Condition Monitoring and Assessment of Power Transformers Using Computational Intelligence, Springer London Ltd , 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	10	1.0
Classes requiring direct contact with the teacher	8	0.5
Student's own work (literature studies, preparation for tutorials, project preparation) [1]	2	0.5

[1] delete or add other activities as appropriate