COURSE DESCRIPTION CARD - SYLLABUS

Course name
POWER NETWORK ASSET MANAGEMENT STRATEGIES FOR ENSURING POWER RELIABILITY ON THE EXAMPLE OF A POWER TRANSFORMER [S5ISGIE>SZASE]

Course

Proposed by Discipline
–

Year/Semester
3/6

Level of study
Doctoral School

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
4

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

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Lecturers

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Prerequisites

PhD student should have basic knowledge in the field of electricity generation and transmission as well as high voltage technology. He/she can individually identify, formulate and solve engineering problems using innovative tools. PhD student recognizes the importance of continuous learning and individual work, is open to exploring new areas of knowledge.

Course objective

An overview of current strategies for managing power grid assets, using power transformers as an example. A general discussion of issues related to testing, diagnostics, risk assessment, and monitoring methods for this type of equipment.

Course-related learning outcomes

A PhD student who graduated from doctoral school knows and understands:
1) current trends in network asset management in the electric power sector [P8S_WG/SzD_W02]
2) methods and tools enabling the management of electrical power equipment, taking into account technical, organizational, and economic aspects [P8S_WK/SzD_W07]
A PhD student who graduated from doctoral school can:
1) is able to apply an optimal management strategy for a given electric power device, depending on the

adopted criteria [P8S_UW/SzD_U01]
2) is able to use the appropriate tool to ensure the proper, trouble-free operation of the electric power equipment [P8S_UW/SzD_U02]
A PhD student who graduated from doctoral school is ready to:
1) critically assess the achievements in the field of power network asset management strategies for ensuring power reliability [P8S_KK/SzD_K01]
2) is able to act prudently regarding the adopted network infrastructure management strategy, taking social aspects into account [P8S_KO/SzD_K04]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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)

Programme content

The course content addresses strategies for managing network assets in the electric power industry. Using the power transformer as a case study, the curriculum covers the assessment of failure risk, statistics regarding failure rates and unit service life, and methods for preventing critical system-wide failures.

Course topics

The lectures cover the following topics: transformer service life; unit management strategies based on periodic inspections or continuous condition monitoring; and the causes of unit failures, including relevant statistics. Real-world examples will be used to illustrate potential risks and failure progression scenarios. Finally, current methods for monitoring power transformers to prevent major system failures will be presented.

Teaching methods

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. AncellL, G. (ed.) 2022. Power system assets: Investment, management, methods and practices. Cham: Springer / CIGRE.
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	25	1,00
Classes requiring direct contact with the teacher	4	0,00
Doctoral student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)	21	1,00