



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Exploitation and diagnostics in power engineering [S1Energ2>EwEiD]

Course

Field of study

Power Engineering

Year/Semester

3/6

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

60

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

Student has fundamental information in frame of technology and power machines used in commercial power engineering, liquid mechanics, and metrology. Student has knowledge in frame of material science, fundamental of electric engineering, and structure of high voltage insulating systems. He/she understands principles of work of machine parts and knows structure of basic electric power devices - steam boiler, steam and gas turbine, heat regenerator, compresor, fan. Student is able to choose proper materials to high voltage insulating systems. Student has consciousness of necessary of extension their competencies, and to be ready to cooperate in frame of team.

Course objective

Achievement of knowledge of application of correct principles of loading of power devices and machines. Recognition of tasks concerning to detailed structure, loading and diagnostics of high voltage insulating systems of power devices.

Course-related learning outcomes

Knowledge:

1. Student has fundamental knowledge in frame of utility power devices in various state of loading.

2. Student has general knowledge about methods of optimisation of work of power sources in electric power system.

3. Student has knowledge in frame of detailed structure, loading and diagnostics insulating systems of power devices.

Skills:

1. Student is able to formula correct principles of loading of basic power devices.

2. Student is able to utility principles of correct work of power sources in electric power system. -

3. Student recognise state of loading of power instalation.

Social competences:

1. Student has consciousness of influence of power machine technology on natural environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

Evaluation of knowledge and skills indicated on exams with problem character, 50% of the maximum points required

Laboratory classes

Tests verifying needed knowledge to realisation indicated problems in some field of laboratory tasks,

Evaluation of knowledge and skills related to realisation of laboratory tasks, grade of report

Programme content

Principles of operation of a steam power plant block.

Simulating the operating states of a steam block

Diagnostics methods for high-voltage power equipment

Diagnostics and operational testing of high voltage power equipment.

Course topics

Lecture

Fundamental exploitation oriented definitions. Exploitation principles of power devices. Utilization of power block in power station in various working states. Work of producing devices in transition states, caused by failure or planned transition states. Changes of load. Dyspozytory of power plants. Problems of reliability. Repairs. Collection and analysis of load data. Selected issues of operation of a nuclear power plant. Diagnostics of basic kinds of failures. Recognition of possibilities, limitations of diagnostics methods used in high voltage insulating systems of power devices. High voltage diagnostic laboratory equipment. Construction of transformers, insulators, cables, capacitors and high voltage GIS and GIL systems. Diagnostics and operational testing of high voltage power equipment. The subject of the laboratories is in accordance with the topic of the lecture and includes the use of energy devices in various states of work

Laboratory classes

Determination of technical and economic indicators and energy characteristics of the 200 MW unit.

The impact of regenerative heating of feed water on energy efficiency

Controlling the operation of mill units

Regulation of active power and reactive power generated by the power unit

Using the block during disturbances and failures.

Diagnostics of winding short circuits in a transformer based on measurements of magnetizing currents

Testing of the power transformer's gear ratio

Testing the resistance of the windings of a transformer equipped with PPZ

Testing of the on-load tap changer power switch using the oscillographic method

Examination of the degree of polymerization of cellulose using the microscopic method

Testing of surge arresters

Teaching methods

Lecture

Lecture with multimedia presentation supplemented with examples given on the board.

Laboratory classes

200 MW power block simulator

Measurements of device working parameters at the teaching stands

Bibliography

Basic:

1. R.Janiczek: Eksploatacja elektrowni parowych, WNT W-wa 1990
2. Florkowska B., Diagnostyka wysokonapięciowych układów izolacyjnych urządzeń elektroenergetycznych, Wydawnictwa AGH, Kraków, 2009
3. Glinka T., Maszyny elektryczne i transformatory. Podstawy teoretyczne, eksploatacja i diagnostyka, Komel 2015

Additional:

1. Gładys H., Matla R.: Praca elektrowni w systemie elektroenergetycznym. WNT. W-wa 1995
2. Pawlik M., Strzelczyk F.: Elektrownie, WNT W-wa 2012, 2017
3. Gacek Z., Kształtowanie wysokonapięciowych układów izolacyjnych stosowanych w elektroenergetyce, Wydawnictwo Politechniki Śląskiej, Gliwice, 2002
4. Florkowska B. i inni, Mechanizmy, pomiary i analiza wyładowań niepełnych w diagnostyce układów izolacyjnych wysokiego napięcia, Uczelniane Wydawnictwo Naukowe i Dydaktyczne AGH, Kraków, 2001

Breakdown of average student's workload

	Hours	ECTS
Total workload	162	6,00
Classes requiring direct contact with the teacher	92	3,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	70	2,50