# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Exploitation and diagnostics in power engineering [N1Energ1>EwEiD]

## Course

Field of study
Power Engineering

Year/Semester
4/8

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
compulsory

## Number of hours

Lecture
40

Laboratory classes
20

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

## Number of credit points

4,00

## Coordinators

dr hab. inż. Bartosz Ceran prof. PP
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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 diagnosctics 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 optimalisation 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 utilty 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:

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Lecture:
Evaluation of knowledge and skills indicated on exams with problem character,
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

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. Work of power plant in electric power system - economic distribution of load. Dyspozytory of power plants. Problems of reliability. Repairs. Collection and analysis of load data. Diagnostics of basic kinds of failures. Recognotion 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:
Simulating the operating states of a 200 MW steam block.
Diagnostics and operational testing of high voltage power equipment.

## 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. Gładyś 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 niezupełnych w diagnostyce układów izolacyjnych wysokiego napięcia, Uczelniane Wydawnictwo Naukowo ? Dydaktyczne AGH, Kraków, 2001

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 100 | 4,00 |
| Classes requiring direct contact with the teacher | 80 | 3,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 20 | 1,00 |