COURSE DESCRIPTION CARD - SYLLABUS

Course name

Computer aided calculations and decision making in power engineering

Course

Field of study

Electric Power Engineering

Area of study (specialization)

common courses

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

45

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

dr inż. Andrzej Kwapisz

Faculty of Environmental Engineering and Energy

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phone 616652282

Responsible for the course/lecturer:

Prerequisites

Has basic knowledge in the field of electrical engineering, energy and computer operation.

The ability to effectively self-study in a field related to the chosen field of study. Is able to operate a computer at a basic level.

Is aware of the need to expand their competences. Understands the need to use computer programs at work.

Course objective

Understanding the application of computer methods in the calculation of power systems and networks as well as power plants and power system. The use of computer technology in controlling energy processes. Getting to know practical methods of determining short-circuit quantities and determining short-circuit hazards for elements of the power system. Understanding the basics of optimization theory and decision-making processes in the energy sector. Solving simple optimization problems.

Course-related learning outcomes

Knowledge

1. Has knowledge in the field of methodology and principles of calculating systems, power networks as well as power plants and the power system.

2. Has knowledge in the field of decision support and optimization of power plant, network and power system operation.

3 Has knowledge of modeling of devices and elements of the power system and occurring phenomena.

4. Has in-depth knowledge of electricity quality parameters.

Skills

1. Is able to clearly understand the course of the task being carried out and the results obtained.

2. Is able to model the power structure of the power facility, working system in normal and emergency conditions using.

3. Is able to apply the calculation tools necessary to determine the conditions of safe operation of the power system.

4. Is able to solve simple optimization problems in the energy sector.

5. Can carry out basic calculations and costs analysis in the power sector

Social competences

1. Is aware of the need to use modern decision support methods and design to achieve a high quality technical solution.

2. Understands the need to obtain economic and social acceptability for the chosen technical solution.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:
Lecture: assessment of activity in class, assessment of homework, final test in writing at the end of the semester, colloquium includes test questions or problem tasks, written exam covering the subject of the subject assessed on a scale of 0 to 100%, the final grade lectures given by more than one lecturer based on weighted average, final grade for more than one component grade based on weighted average

Laboratory: verification of individual preparation for classes, including material from a single exercise or block of exercises, assessment of individual exercise reports made by the student, colloquium at the end of the semester, colloquium includes test questions or problem tasks, all grades on a scale of 0 to 100%, final grade based on the weighted average of all component ratings

Programme content

Lecture

Computer network calculation and decision support systems. Methods for computer calculation of power flows. Optimization of power grid systems. Calculation of short circuits in the network. Network design methodology. Determination of settings in power lines and stations. Selection of earth fault protection for MV switchboards. Ways of the MV neutral point operation. Conducting earth fault compensation for the MV network.

Laboratory

Modeling of transmission and distribution networks, interference in power networks. Calculation of network parameters, transmission systems and power equipment, calculation of protection systems settings. Algorithms for estimation of power system states

Teaching methods

Lecture: multimedia and interactive presentation presenting important issues related to the subject, didactic discussion based on the literature on the subject, informative lecture, problem lecture, case study, work on source materials

Laboratory: implementation of exercises, use of publicly available information and software tools to support the didactic process, encouraging students to independently search for optimal solutions and problem solving

Bibliography

Basic
1. Kacejko P.: Generacja rozproszona w systemie elektroenergetycznym. Wydawnictwo Politechniki Lubelskiej, Lublin, 2004

2. Kujszczyk Sz.: Nowoczesne metody obliczeń elektroenergetycznych sieci rozdzielczych. WNT, Warszawa, 1984

3. Pawlik M. Układy i urządzenia potrzeb własnych elektrowni. WNT. 1986

4. Lorenc J. Admitancyjne zabezpieczenia ziemnozwarciowe. Wyd. PP. 2007

5. Zajczyk R.: Zwarcia w układach elektroenergetycznych, Gdańsk, 2005

6. Lubośny Z.: Farmy wiatrowe w systemie elektroenergetycznym, WNT, Warszawa, 2009

Additional

1. Planning of Power Distribution - the manual for Totally Integrated Power, Siemens AG, Erlangen, 2001

2. Beynon-Davis Paul: Systemy baz danych. WNT, Warszawa, 2004

3. Marszałkiewicz K., Grządzielski I., Trzeciak A.: Impact of Voltage Conditions on Distributed Generation Connctiivity in Medium Voltage Grids. Acta Energetica, 4/25 2015 ISSN 2300-3022

4. S. Khokhar ; A. A. Mohd Zin ; A. S. Mokhtar ; Nam Ismail: MATLAB/Simulink based modeling and simulation of power quality disturbances --- Energy Conversion (CENCON), 2014 IEEE Conference on, 01 December 2014

Breakdown of average student's workload

	Hours	ECTS
Total workload	107	4
Classes requiring direct contact with the teacher	68	3
Student's own work (literature studies, preparation for laboratory classes, preparation for tests, preparation of lab reports)[1]	39	1

1 delete or add other activities as appropriate