COURSE DESCRIPTION CARD - SYLLABUS

Course name

Safety control engineering in electrical grid and in power plants

Course

Field of study

Power Engineering

Year/Semester

3/6

Area of study (specialization)

-

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

20

Laboratory classes

20

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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Prerequisites

Basic knowledge within the scope of electrical engineering, electrical power engineering and electrical power systems and networks. Ability to effective self-studying in the domain connected with chosen course of studying, abilityto use computer simulation to evaluate performance of elements of power system. Has a consciousness of necessity to widen competences and willingness to work in a team.

Course objective

The objective is to acquaint with basic tasks and technical solutions of electric power system protection (EAZ) in electric power systems.

Course-related learning outcomes

Knowledge

1. Has systematic knowledge and understands the importance of energy security issues, in particular existing threats and ways to raise the level of energy security.

2. Has structured, theoretically founded knowledge of programming techniques and knows methods of simulating phenomena in energy systems.

3. Has systematic knowledge of the basics of control and automation of technological processes in the energy sector; understands the problems of stability in dynamic systems and knows the methods of their description.

4. Has structured knowledge in the field of power equipment diagnostics, security techniques; knows and understands the methods of measuring basic quantities characterizing electrical and mechanical devices and systems of various types; knows the calculation methods and IT tools necessary to analyze the results of experiments.

Skills

1. Is able to obtain information from literature, databases and other sources; is able to integrate the information obtained, interpret it, as well as to infer and formulate and justify opinions.

2. Can work individually and in a team; knows how to estimate the time needed to complete the task; can develop and implement a work schedule to ensure that deadlines are met.

3. Is able to plan and carry out experiments, including computer measurements and simulations, as well as construct an algorithm and use properly selected programming environments, simulators and tools of computer-aided design for simulation, design and verification of energy elements and systems as well as simple electronic systems and automation.

4. Is able to use properly selected methods and devices enabling measurement of basic quantities characterizing energy elements and systems.

Social competences

1. Is aware of the importance and understands the non-technical aspects and effects of the power engineering engineer, including its impact on the environment and the associated responsibility for decisions; is ready to fulfill social obligations, co-organize activities for the social environment and initiate activities for the public interest.

2. Is aware of the responsibility for own work and readiness to comply with the principles of team work and to bear the responsibility of the professional role in jointly implemented tasks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- evaluation of the knowledge and competitions on written exam (problem character),

- permanent evaluation on every class rewarding for activity and quality of perception.

Laboratory:

- pre-classes verifying tests,

- rewarding the knowledge necessary for realization of problems connected with laboratory tasks,

- evaluation of the exercise report,

- permanent evaluation on every class rewarding increase of competence to use learned investigation methods.

Programme content

Lectures:

Tasks and functions of elements of electric power system protection (EAZ), VT's, CT's, digital technology, protection systems for generators, transformers and lines. Power system automation: SPZ, SCO, SZR. Modern solutions of EAZ systems used in power system and basics of selection of settings.

Laboratory:

Laboratory classes related to investigation of basic protections (relays) using basic measurement devices and of it's autonomic sets and of models of the elements of electric power systems.

Teaching methods

Lectures:

- lecture with multimedia presentation (drawings, photos, videos) supplemented by records on the board,

- interactive lecture with questions to students,

- theory presented in close connection with practice.

Laboratory:

- group work,

- demonstrations,

- detailed review of the reports (by teacher) and discussion of the comments.

Bibliography

Basic

1. Hoppel W.: Sieci średnich napięć. Automatyka zabezpieczeniowa i ochrona od porażeń. PWN, Warszawa 2017

2. Winkler W., Wiszniewski A.: Automatyka zabezpieczeniowa w systemach elektroenergetycznych, Wyd. II. WNT, Warszawa 2004

3. Szafran J., Wiszniewski A.: Algorytmy pomiarowe i decyzyjne cyfrowej automatyki elektroenergetycznej. WNT, Warszawa 2001

4. Borkiewicz K.: EAZ w sieciach elektroenergetycznych ŚN i WN. ZiAD, Bielsko Biała 2016

Additional

1. Musierowicz K., Staszak B.: Technologie informatyczne w elektroenergetyce. Wyd. PP, Poznań 2010

2. Lorenc J.: Admitancyjne zabezpieczenie ziemnozwarciowe. Wyd. PP, Poznań 2007

3. Hoppel W., Olejnik B.: Elektroenergetyczna automatyka zabezpieczeniowa dla sieci średniego napięcia z elektrowniami lokalnymi. INPE - miesięcznik Stowarzyszenia Elektryków Polskich, nr 177/2014

4. Christopoulos C., Wright A.: Electrical Power System Protection. Springer US, 1999

Breakdown of average student's workload

	Hours	ECTS
Total workload	105	4,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	60	2,0

[1] delete or add other activities as appropriate