COURSE DESCRIPTION CARD - SYLLABUS

Course name

Safety control engineering in electrical grid and in power plants

Course

Field of study

Electrical Engineering

Year/Semester

5/9

Area of study (specialization)

Electrical power systems and power system protection

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

part-time

Requirements

elective

Number of hours

Lecture

10

Laboratory classes

20

Other (e.g. online)

0

Tutorials

0

Projects/seminars

10

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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Prerequisites

Has knowledge of the basics of electrical engineering, electric power industry and automatic protection. Is able to independently carry out calculations for power grids and perform basic measurements for electrical circuits using modern control and measurement equipment. Is aware of the need to supplement specialist knowledge and to start cooperation in the group.

Course objective

The grove of specific knowledge for the work of power electric grid and the activities of the automatic protection. The gain of the skill of laboratory verification of correctness working of automatic protection arrangements.

Course-related learning outcomes

Knowledge

1. Has basic knowledge of the basics of automation and automatic control, knows the operating criteria and principles for the selection of power protection automation devices.

2. Has theoretically founded knowledge of the power system, including the structure and operating states of the manufacturing, transmission and distribution sectors; knows and understands the basic principles of operation of elements of the power system.

Skills

1. Is able to plan and carry out simulation and measurements of basic quantities characteristic of electrical systems; can present the results obtained in numerical and graphic form, interpret them and draw the right conclusions.

2. Is able to plan and organize individual and team work, knows how to estimate the time needed to carry out a task; can develop and implement a work schedule to ensure that the deadline is met.

Social competences

1. Understands the importance of knowledge in solving problems and raising professional, personal and social competences; is aware that in technology knowledge and skills quickly become outdated.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of knowledge and skills demonstrated during the written exam,

- current assessment in class (rewarding activity and quality of perception)

Laboratory exercises:

- test and rewarding of knowledge necessary to implement the problems posed in the area of laboratory tasks,

- continuous assessment in every class,

- rewarding the increase in the ability to use known principles and methods,

- assessment of knowledge and skills related to the implementation of the exercise task,

- assessment of the report of the exercise performed,

- taking into account the laboratory task in team performance assessment.

Project classes:

- assessment of project tasks carried out, assessment of creativity in solving project tasks

- continuous evaluation in each class (preparation for classes, rewarding activities).

Programme content

The program contents of the module relate to:

lecture: knowledge in the field of electrical power system protection (EAZ). Algorithms for the operation of protection systems for generators, lines, transformers and asynchronous motors. Input measuring systems in modern security systems. Functions and implementation method of automatic control systems SPZ, SZR, SCO and APKO. Directions of development of EAZ systems, field controllers of MV network, automation in depth of network.

Laboratories: testing and checking the operating conditions of EAZ systems at specialized laboratory stands. Simulation research and computer analysis for the needs of EAZ.

Designing: principles for designing protection systems, independent preparation of a protection design for a selected line element, transformer or generator (calculations and selection of EAZ devices), discussion and comment of the developed project

Teaching methods

Lecture:

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

- lecture conducted in an interactive way with the formulation of questions to a group of students or to specific students indicated,

- theory presented in close connection with practice.

Laboratory exercises:

- work in teams,

- demonstrations,

- detailed review of reports by the laboratory leader and discussions on comments.

Project classes:

- demonstrations,

- classes conducted in an interactive way, with significant participation of students,

- theory presented in close connection with practice.

Bibliography

Basic

1. Żydanowicz J. Elektroenergetyczna automatyka zabezpieczeniowa. WNT - Warszawa, tom I (1979), tom II (1985), tom III (1989)

2. Winkler W., Wiszniewski A. Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT - Warszawa 1999

Additional

1. Lorenc J.: Admitancyjne zabezpieczenia ziemnozwarciowe. Wydawnictwo Politechniki Poznańskiej 2007.

2. Wiszniewski A.: Algorytmy pomiarów cyfrowych w automatyce elektroenergtycznej., Warszawa, WNT 1990.

3. Zilouchian A., Jamshidi M.: Intelligent Control Systems Using Soft Computing Metho-dologies. CRC Press, 2001

4. Datasheet devices EAZ

5. Articles magazines"Automatyka Elektroenergetyczna", "Wiadomości Elektrotechniczne"

Breakdown of average student's workload

	Hours	ECTS
Total workload	140	5,0
Classes requiring direct contact with the teacher	65	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for exam, project preparation) [1]	75	3,0

[1] delete or add other activities as appropriate