COURSE DESCRIPTION CARD - SYLLABUS

Course name
Safety control engineering in electrical grid and in power plants [S1Eltech1>D-AZwSiE]

Course

Field of study
Electrical Engineering

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

6,00

Coordinators

dr inż. Bartosz Olejnik
bartosz.olejnik@put.poznan.pl

dr inż. Bogdan Staszak
bogdan.staszak@put.poznan.pl

Lecturers

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raising professional, personal and social competences; is aware that in technology knowledge and skills quickly become outdated.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:

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 content of the module deals with the knowledge of electric power protection automation (EAZ). EAZ of generators, lines, transformers and asynchronous motors. Signal processing for EAZ. Basic systems of substation automation. Development directions of protection automation.

Course topics

The topics covered in the module are:

1) Lecture: knowledge of electric power protection automation (EAZ). Algorithms
operation of protection systems for generators, lines, transformers and asynchronous motors. Input measurement systems in modern protection systems. Functions and implementation of automatic control. Development directions of EAZ systems, bay controllers of MV networks.

2) Laboratory: testing and checking the operating conditions of EAZ systems on specialized laboratory workstations.

3) Project: principles of design of protection systems, independent preparation of protection design of a selected element of the line, transformer or generator (calculations and selection of EAZ devices), discussion and commentary 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	150	6,00
Classes requiring direct contact with the teacher	90	4,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00