COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electric power protection automatics [S2Eltech2-SiAE>EAZ]

Course

Field of study
Electrical Engineering

Year/Semester
1/2

Area of study (specialization)
Power Networks and Electric Power Systems Protection

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Has knowledge within the scope of fundamentals of electrical engineering, electrical power engineering, electrical metrology and informatics. Is able to carry out calculations of power network alone and to carry out basic measurements of electrical circuits using modern control-measuring apparatus. Has a consciousness of necessity to complete specialist knowledge and to carry out cooperation in group.

Course objective

To acquire specialist knowledge in the range of the work of electric power protection. To acquaint with basic decision measurement algorithms of modern devices EAZ. To acquaint with general principles of EAZ devices designing.

Course-related learning outcomes

Knowledge:

1. Has extended knowledge in the field of measurements of electrical quantities and selected non-electrical quantities; has in-depth knowledge of the preparation of the results of the experiment
2. Has in-depth knowledge of the construction and operation of the power system, renewable energy sources and economic and legal issues related to the generation, distribution and processing of electricity
3. Has extended knowledge of creating optimization and decision algorithms used in the power industry

Skills:
1. Can use the known methods and mathematical models - if necessary modifying them appropriately - to analyze and design processes, devices and electrical systems
2. Can use the known methods and mathematical models - if necessary modifying them appropriately - to analyze and design processes, devices and electrical systems

Social competences:
Is aware of the need to develop professional achievements and observe the rules of professional ethics, fulfill social obligations, inspire and organize activities for the social environment

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 test problem-related (students can use any teaching materials),
- ongoing assessment of each class (rewarding activity and quality of perception).
Laboratory exercises:
- test and rewarding of knowledge necessary to implement the problems posed in a given area of laboratory tasks,
- continuous assessment, during each 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, evaluation of the report of the exercise,
- taking into account the laboratory task in team performance assessment

Programme content

The program content concerns expanding knowledge in the scope of selected issues of power protection automation (PPE). The operating conditions of PPE devices during complex short-circuit disturbances and unstable states of the system are discussed.

Course topics

Lectures:

Influence of power swings and couplings in multi-circuit lines on the operation of EAZ devices. EAZ systems of lines cooperating with local sources (wind energy). Locating the location of damage to the HV power line. Smart grid and smart metering issues, adaptive protection, communication links in EAZ systems.

Laboratories:
testing and checking the operating conditions of EAZ systems using laboratory testers and on physical models of lines, transformers and generators, testing selected functions of substation automation.

Teaching methods

Lecture: Multimedia presentation illustrated with examples on the board.
Laboratory: - work in teams, - demonstrations, - detailed review of reports by the laboratory leader and discussions on comments.

Bibliography

Basic:

1. Żydanowicz J. Elektroenergetyczna automatyka zabezpieczeniowa. WNT -Warszawa, I (1979), tom II (1985), tom III (1989)
2. Winkler W., Wiszniewski A. Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT Warszawa 1999
3. Lorenc J.: Admitancyjne zabezpieczenia ziemnozwarciowe. Wydawnictwo Politechniki Poznańskiej 2007.
4. Zilouchian A., Jamshidi M.: Intelligent Control Systems Using Soft Computing Methodologies. CRC Press, 2001
5. Musierowicz K., Staszak B.: Technologie informatyczne w elektroenergetyce. Wydawnictwo Politechniki Poznańskiej 2010 .

Additional:
1. P. Kacejko, J. Machowski : Zwarcia w sieciach elektroenergetycznych, WNT, Warszawa, 2002r
2. P. Kundur : Power System Stability and Control , McGraw-Hill. Inc., 1993 .
3. Rosołowski E.: Cyfrowe przetwarzanie sygnałów w automatyce elektroenergetycznej. Akademicka Oficyna Wydawnicza EXIT, 2002
4. Witold Hoppel: Sieci Średnich napięć, zabezpieczenia elektroenergetyczne i ochrona od porażeń.
5. Articles from magazines "Automatyka Elektroenergetyczna" , "Wiadomości Elektrotechniczne"

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00