POZNAN UNIVERSITY OF TECHNOLOGY
EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)
pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electric power devices and distribution stations

Course

Field of study
Power Engineering

Area of study (specialization)
-

Level of study
First-cycle studies

Form of study
part-time

Year/Semester
4/7

Profile of study
general academic

Course offered in
polish

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
20	20	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

Grzegorz Dombek, Ph. D., Eng.

Faculty of Environmental Engineering and Energy

Institute of Electric Power Engineering

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tel. 61 665 2192

Responsible for the course/lecturer:

Prerequisites

Basic knowledge on electrical engineering, mathematics, physics and electrical metrology. Able to perform mathematical and physical analysis of phenomena occurring in the electric power devices and systems and read electrical wiring schemes. A sense of the need to broaden the competence and willingness to work together in a team.

Course objective

Knowledge of phenomena occurring in electrical devices and systems as well as their mathematical and physical descriptions. Purchase of skills in the application of phenomena description to design of power supply and hazard assessment that can occurs in these systems. Knowledge of devices functioning and role of power distribution stations in system, analyze methods of station operation reliability. Able to design supply system, transformer and distribution stations and select devices. Experiment planning, selection of measurement instrument, realization of test set-up, researches performing and results analyzing.

Course-related learning outcomes

Knowledge

Know how describe phenomena occurring in electrical devices and power supply and how they operate. Know how formulate mathematical and physical description of phenomena, know principle configurations of power distribution stations, way of its functioning and analyse methods of station operation reliability.

Skills

Able to analyze the mathematical and physical descriptions of phenomena for the different operating states and conditions as well as design supply system and transformer distribution stations. Able to perform the calculation and estimation of hazard assessment occurring in electrical devices and power supply systems as well as perform calculations and analyses necessary for the selection of equipment in distribution stations. Able to plan experiment, measurement instrument select, test set-up realize, perform researches and analyse of results.

Social competences

A sense of influence of proper devices selection and analysis of phenomena on ensuring supply continuity to different electricity consumers. A sense of influence of phenomena, devices and distribution stations on the environment and the people working with electrical equipment and using them, and the consequent need for extensive cooperation both at the design stage and eksploatation.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- knowledge acquired as part of the lecture is verified by a written final exam consisting of open or test questions with different points. Passing threshold: 50% of points,

- current grading in each lecture (rewarding activities).

Laboratory classes:

- current check and rewarding knowledge necessary for the accomplishment of the problems in the area of laboratory tasks,

- evaluation of reports performed on laboratory classes,

- rewarding activities related to the implementation of laboratoy classes.

Programme content

Lecture:

Thermal effects of operating and short-circuit currents: heat sources in devices, heating of wires and conductors under the influence of operating currents, warm operation of short-circuit currents, determination of the heating and cooling functions. Dynamic effects of short-circuit currents: analysis of some characteristic conductor systems, resistance of electrical devices and busbars to mechanical exposure. Electric switching arc: electric arc and its quenching, arc model, DC and AC arc characteristics, arc quenching conditions, arc quenching techniques. High voltage switches: classification, circuit-breakers, disconnectors, switches, fuses, short-circuit current limiters. Current, voltage and combined transformers. Equipment and main circuits of distribution stations: station connection systems, transformers, autotransformers, station construction solutions. Auxiliary devices and devices managing station operation: station's own needs, limiting short-circuit currents, lightning and surge protection.

Laboratory classes:

Classes discussing the regulations of the laboratory, topics of laboratory classes and OHS training related to the operation of laboratory positions. To perform 9 two-hour laboratory classes in the field of lecture.

Teaching methods

Lecture:

- multimedia or object-oriented presentations supported by illustrated examples presented on the board,

- interactive lecture with questions and initiating discussions.

Laboratory classes:

- object-orientedpresentations supported by illustrated examples presented on the board,

- presentations of selected experiments,

- initiating teamwork.

Bibliography

Basic

1. Markiewicz, H. Urządzenia elektroenergetyczne, WNT, Warszawa, 2006.

2. Markiewicz, H. Bezpieczeństwo w elektroenergetyce, WNT, Warszawa, 2017.

3. Kamińska, A. Urządzenia i stacje elektroenergetyczne, Wydawnictwo Politechniki Poznańskiej, 2000.

4. Maksymiuk, J., Nowicki, J. Aparaty elektryczne i rozdzielnice wysokich i średnich napięć, Wydawnictwo Politechniki Warszawskiej, Warszawa, 2014.

5. Żmuda, K. Elektroenergetyczne układy przesyłowe i rozdzielcze. Wybrane zagadnienia z przykładami, Wydawnictwo Politechniki Śląskiej, 2014.

Additional

1. Glover, J. D., Sarma, M.S., Overbye, T.J. Power System Analysis and Design, cengage Learning, Inc, Florence, KY, US, 2011

2. Wasiak, I. Elektroenergetyka w zakresie Przesył i rozdział energii elektrycznej, Politechnika Łódzka, 2010.

3. Królikowski, C.,Boruta, Z., Kamińska, A. Technika łączenia obwodów elektroenergetycznych. Przykłady obliczeń, PWN, Warszawa, 1992.

4. Maksymiuk, J. Aparaty elektryczne. Podstawy doboru i eksploatacji. WNT, Warszawa, 1977.

5. Au, A., Maksymiuk, J., Pochanke, Z. Podstawy obliczeń aparatów elektroenergetycznych. WNT, Warszawa, 1982.

Breakdown of average student's workload

	Hours	ECTS
Total workload	135	5,0
Classes requiring direct contact with the teacher	56	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation of reports, preparation for exam, project preparation) [1]	79	3,0

[1] delete or add other activities as appropriate