COURSE DESCRIPTION CARD - SYLLABUS

Course name

Heat exchange in electric devices

Course

Field of study

Electrical Engineering

Year/Semester

1/1

Area of study (specialization)

Distribution Devices and Electrical Installations

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Prof. Jarosław Bartoszewicz, Ph. D., Hab. Eng.

Faculty of Environmental Engineering and Energy

Institute of Electric Power Engineering

e-mail:
jaroslaw.bartoszewicz.janiszewski@put.poznan.pl

tel. 61 665 2215

Responsible for the course/lecturer:

Prerequisites

Basic knowledge on the construction and operation of electrical devices and installations as well as measuring apparatus and its use. Ability to obtain information from subject literature and other sources as well as critically analyze them. Ability to use analytical, simulation and experimental tools. Understanding the need for creative action.

Course objective

Understanding the principles of designing structural elements of distribution devices and methods for diagnosing the parameters of devices operating in normal and fault states.

Course-related learning outcomes

Knowledge

Student has ordered knowledge in the field of design and diagnostics of typical structural elements of switchgear.

Skills

Student is able to use mathematical models to design and analyze the operating status of electrical equipment components. Student is able to carry out diagnostic measurements and verify the quality of the tested object.

Social competences

Student can think and act in a professional manner. Student understands the need for education in various fields and understands the need for innovative testing of the condition of devices to ensure their operational safety.

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 test consisting of open or test questions with different points. Passing threshold: 50% of points,

- current grading in each lecture (rewarding activities).

Tutorials:

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

- evaluation of reports performed on tutorials,

- rewarding activities related to the implementation of tutorials.

Programme content

Lecture:

Types of heat transfer. Analytical methods of determining thermal states of simple systems of electrical devices under steady conditions. Application of the theory of similarity in thermal calculations of electrical devices. Working conditions of electric power devices, determination of thermal load capacity of devices in working and disturbance conditions. Axial heat flow in current paths. Thermal calculation of current paths of switches and power switchboards.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 6 two-hour laboratory classes in the field of lecture.

Tutorials:

Classes discussing the subject of the exercises. Modeling of heat flow in stationary and dynamic conditions with the use of supporting software. Elements of designing heat flow in current paths.

Teaching methods

Lecture:

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

- interactive lecture with questions and initiating discussions.

Tutorials:

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

- initiating teamwork,

- using dedicated or developed computer applications, graphic programs and catalogs of installation equipment manufacturers.

Bibliography

Basic

1. Maksymiuk J: Niezawodność maszyn i urządzeń elektrycznych, Oficyna Wydawnicza PW, 2003.

2. Kupras K.: Pomiary w elektroenergetyce ?wytyczne, wyd. SEP, 2007

3. Maksymiuk J., Pochanke Z.: Obliczenia i badania diagnostyczne aparatury rozdzielczej, wyd.1, WNT, 2001.

4. Au A., Maksymiuk J., Pochanke Z.: Podstawy obliczeń aparatów elektroenergetycznych, WNT, 1995.

5. Maksymiuk J.: Aparaty elektryczne, PWN, Warszawa, 1995.

6. Chmielak W., Daszyński T., Pochanke Z.: Laboratorium Aparatów elektrycznych, Oficyna wydawnicza PW, 2017.

7. Konopacki Z., Gryżewski Zd.: Prace kontrolno-pomiarowe przy urządzeniach elektroenergetycznych o napięciu znamionowym do 1 kV, COSTW SEP, Warszawa,1999.

Additional

1. Wiśniewski S., Wiśniewski T.S.: Wymiana ciepła. WNT, Warszawa, 1997

2. Periodyki: Elektroinstalator, Elektroinfo

3. Poradnik inżyniera elektryka, WNT, 2009

4. Internet publications.

5. Standards.

6. Przepisy Budowy Urządzeń Elektroenergetycznych, Wydawnictwa Przemysłowe WEMA, Warszawa, 1997.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) [1]	25	1,0

[1] delete or add other activities as appropriate