COURSE DESCRIPTION CARD - SYLLABUS

Course name
Construction of electrical power devices [N1Eltech2>PO7-BUE]

Course

Field of study
Electrical Engineering

Year/Semester
4/8

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
20

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
20

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge of electrical materials science and the basic laws of electrical circuit theory. Basic knowledge of high-voltage technology, materials, and insulating environments. Basic knowledge of electrical devices, measuring equipment, and their applications. Ability to construct a simple electrical circuit. Ability to measure physical quantities characteristic of insulating systems and electrical devices. Ability to work and collaborate in a team. Awareness of the impact of high-voltage insulating systems on the natural environment.

Course objective

Understanding the basic concepts of electrical power equipment construction, such as insulators, high-voltage transformers, capacitors, cables, and GIS/GIL stations. Understanding the concepts of high-voltage power cable line design. Understanding the structure and operating principles of devices designed to drive electrical generators.

Course-related learning outcomes

Knowledge:
He / she has advanced knowledge of the construction and design of electrical power equipment.
He / she knows and understands at an advanced level the phenomena occurring in electrical power devices; has knowledge of the properties and applications of materials used in electrical power devices.
He / she knows and understands at an advanced level the principles of selection and safe and ergonomic use of electrical power equipment.

Skills:
He / she is able to use known analytical, simulation and experimental methods to design, analyse and evaluate the functioning of electrical power equipment.

Social competences:
He / she is ready to improve professional, personal and social competences; is aware that knowledge and skills in the field of electrical power equipment are evolving rapidly

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Knowledge acquired during the lecture is assessed by a written final assessment, consisting of open-ended or multi-choice questions, with various scoring criteria. Passing threshold: 50% of points, with ongoing assessment during each class (with activity rewards).
Project: ongoing assessment of progress conducted during project classes, final assessment of the prepared project.

Programme content

Lectures: Issues related to the design, selection of materials, construction of electrical power devices.
Project: Principles, applicable regulations, standards and good practices in the design of power lines, in terms of their electrical, thermal and mechanical strength parameters.

Course topics

Lectures: Issues related to the design, material selection, and construction of electrical power equipment such as insulators, power transformers, high-voltage cables, capacitors, GIS stations, and GIL lines. The design and operation of steam turbine sets, gas turbine sets, and hydroelectric units installed in district power plants. Lectures present general information on the role of individual devices, as well as issues related to the construction of individual active and passive components of the aforementioned electrical power equipment.
Project: Design of a high-voltage power cable, cable line, and distribution station equipment supplying power to the customer. The maximum permissible load capacity of the power line should be calculated taking into account the cable construction, its installation method, and the method of reducing transmission losses. Proper selection of conductive and insulating materials is required depending on the rated voltage, power, and terrain conditions of the cable installation.

Teaching methods

Lecture: multimedia or object-oriented presentations supported by illustrated examples presented on the board, - lecture conducted in an interactive manner with asking questions and initiating discussions.
Project: Multimedia presentation with calculation examples.

Bibliography

Basic:
1. Glinka T., Electrical Machines and Transformers. Theoretical Foundations, Operation, and Diagnostics, KOMEL Institute of Electrical Drives and Machines, 2015.
2. Rakowska A., Direct Current Cable Lines: Selected Issues, Poznań University of Technology Publishing House, Poznań, 2011.
3. Knothe S., Insulated High-Voltage Switchgears, Scientific and Technical Publishing House, Warsaw, 1976.
4. E. Jezierski et al., Transformers: Construction and Design, Scientific and Technical Publishing House, Warsaw, 1963.

5. Bąk J. et al., Electrical Engineer's Handbook, Vol. 3, WNT Scientific and Technical Publishing House, 2005.
6. Markiewicz H.: Electrical Power Equipment, WNT, Warsaw, 2001.
7. Maksymiuk J.: Electrical Apparatus, PWN, Warsaw, 1995.
8. Flisowski Z.: High Voltage Technology, WNT, Warsaw, 1999.
9. M. Pawlik, F. Strzelczyk: Power Plants, WNT Warsaw 2012, 2017

Additional:
1. Gielniak J., Morańda H., Moisture Dynamics of Power Transformer Insulation Depending on the Design, Electrical Review, Vol. 90, W. 10/2014.
2. Periodicals: Elektroinstalator, Elektroinfo.
3. Subject-specific standards.
4. Company catalogs.
5. Online publications.

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,00
Classes requiring direct contact with the teacher	40	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	70	2,50