COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electromagnetic energy conversion

Course

Field of study

Power Engineering

Year/Semester

1 / 2

Area of study (specialization)

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	15	
Tutorials	Projects/seminars	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Wydział Elektryczny

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Responsible for the course/lecturer:

Prerequisites

Knowledge of methods of analysis of chosen phenomena occurring in electromagnetic converters used in power engineering; knowledge of methods of generation of rotation and transformation electromotive force, various variants of transformer equivalent circuits; basic knowledge relating to the method of the symmetrical components; knowledge of construction of electromagnets, DC motors, induction and synchronous machines. Skill of analysis of simple electric and magnetic circuits, determination of parameters of equivalent circuits of the transformer, the induction machine, the synchronous generator and skill of connection of electric circuits and realization of measurements of electrical and mechanical quantities. Awareness of necessity of knowledge and skills extension. Ability to submission to rules standing during lectures and laboratory classes. Skill of communication with the cooperating students and realization of common tasks.

Course objective

Learning of methods of analysis of chosen phenomena in electromagnetic converters used in power engineering and principles of operation, characteristics, exploitation properties of transformers, synchronous machines and chosen electromagnetic actuators.

Course-related learning outcomes

Knowledge

1. have knowledge of power electronics systems for quality improvement and efficient electric energy transmission; have basic knowledge of means of heat transfer, electrothermal changes occurring in electrical engineering and electric heating engineering; skill of methods of temperature measurement

Skills

1. choose the calculation method, use and realize the programming proper to solving the well-defined problem taking into account the new achievements of techniques and technologies;

2. have preparation necessary to work in industrial environment and know rules of work safety;

3. determine directions of the subsequent learning and realize self-education process.

Social competences

1. have competences: correctly identify and decide within problems connected with state power engineering safety

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:

- evaluation of knowledge and skills presented in the written test.

Laboratory classes:

- test and awarding knowledge during realization of laboratory classes on electrical machines,

- evaluation of student activity and appraisal both of increase of his knowledge, skills and social competences connected with activities in teamwork,

- evaluation of knowledge and skills related to the individual laboratory class, appraisal of the report.

Obtainment of the additional points in connection with activity, in particular:

- preparation of answers on questions and problems given by the lecturer,

- skill of co-operation in the teamwork in laboratory,

- annotations connected with improvement of didactic materials,

- care and aesthetics of reports and problems elaborations within own learning.

Programme content

Models of electromagnetic converters. Laws of electromagnetic energy conversion. Transformations of circuit models of electromagnetic converters: phasic, commutator and Fortescue. Generator operation of induction machine. Modern synchronous generators of different type: construction and principle of operation, vector diagram, equivalent circuit, problems od analysis of short-circuit states of synchronous generator, operation of synchronous generator in power network. Transformer operation at asymmetrical supply or asymmetrical load. Electromagnetic actuators, electromagnets. Energy conversions in transient states of induction and synchronous machines.

Teaching methods

Lectures:

- lecture with multimedia presentation supplemented with examples given on the board,

- interactive lecture with questions to students,

- student activity is taken into account during the course of the assessment process.

Laboratory:

- detailed review of the reports by the teacher, discussion,

- demonstrations and presentations,

- teamwork.

Bibliography

Basic

1. Maszyny Elektryczne w Energetyce, J. Anuszczyk, WNT, Warszawa 2005.

2. Maszyny Elektryczne w Elektroenergetyce, W. Matulewicz, PWN, Warszawa 2005..

3. M. S. Sarma, Electric Machines, Steady-State Theory and Dynamic Performance, West Publishing Company, wyd. 2, 1996.

4. P. Staszewski, W. Urbański, Zagadnienia obliczeniowe w eksploatacji maszyn elektrycznych. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2009.

5. W. Przyborowski, G. Kamiński, Maszyny Elektryczne, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2014

6. G. Kamiński, W. Przyborowski, A. Biernat, J. Szczypior, Badania laboratoryjne maszyn elektrycznych, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2018.

Additional

1. W. Latek, Teoria Maszyn Elektrycznych, wyd. II, WNT Warszawa, 1987.

2. Praca zbiorowa, Poradnik Inżyniera Elektryka, Tom 1 i 2, WNT Warszawa 2013.

Breakdown of average student's workload

	Hours	ECTS
Total workload	59	2,0
Classes requiring direct contact with the teacher	38	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for test) [1]	21	1,0

[1] delete or add other activities as appropriate