



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electrical machines [S1Eltech1>ME1]

Course

Field of study

Electrical Engineering

Year/Semester

2/3

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

dr hab. inż. Rafał Wojciechowski prof. PP
rafal.wojciechowski@put.poznan.pl

prof. dr hab. inż. Andrzej Demenko
andrzej.demenko@put.poznan.pl

Lecturers

Prerequisites

Basic knowledge of electromagnetism and electrical circuits analysis. Skill of analysis of simple electrical circuits of two degrees of freedom and solving systems of differential linear equations. Awareness of necessity of knowledge and skills extension. Ability to submission to rules standing during lectures in big group. Skill of communication with the cooperating students and lecturers.

Course objective

Learning of construction, principles of operation, characteristics, exploitation properties and basic methods of analysis of typical operation states of transformers and induction machines. Learning of basic methods of calculation of magnetic circuits in electromagnetic converters.

Course-related learning outcomes

Knowledge:

1. have well-ordered knowledge related to electromagnetism and essentials of the theory of the

electromagnetic

2. have well-ordered and completed by theory knowledge of construction and principles of operation of transformers and electrical machines; have knowledge of exploitation of technical systems

Skills:

1. design a simple electric and magnetic systems within various applications using proper methods and techniques
2. use the known methods, mathematical models and computer simulations for analysis and estimation of elements and electric systems operation

Social competences:

1. have awareness of importance and understanding of different aspects and results of electrical engineer activities, taking into consideration influence on environment; awareness of responsibility for decisions think and work by creative way within the electrical engineering
2. think and work by creative way within the electrical engineering

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture accepted on the ground of written tests checking knowledge and studentclassroom activity (test is scored)

Programme content

1. Electric and magnetic circuits
2. Transformers
3. Electromagnetic energy conversion - electrical machines,
4. Induction Machines.

Course topics

1. Electric and magnetic circuits:
 - basic laws of electromagnetism
 - peripheral models, equivalent,
2. Transformers:
 - single-phase transformer, unloaded transformer, equivalent diagram, operation of a loaded transformer, three-phase transformers, parallel operation, selected transient states.
3. Basics of electromagnetic energy conversion - electric machines:
 - basic concepts: distributed windings, rotating magnetic field, electromotive force caused by the rotating magnetic field, winding coefficients.
4. Induction machines:
 - structure and principle of operation, equivalent diagram, dependence of torque on rotational speed, machines with a squirrel-cage rotor, phenomenon of current displacement in rods, regulation of rotational speed. Starting and braking of the induction machine. Single-phase induction motors.

Teaching methods

Teaching methods - lectures with multimedia presentations that are supported by blackboard exercises.

Bibliography

Basic

1. A. M. Plamitzer, Maszyny Elektryczne, wyd. VII, WNT Warszawa, 1986.
2. W. Karwacki, Maszyny Elektryczne, Wyd. Pol. Wrocławskiej, Wrocław, 1994.
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

Additional

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

2. Praca zbiorowa, Poradnik Inżyniera Elektryka, Tom 2, wyd 3, WNT Warszawa 2009.

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 |