COURSE DESCRIPTION CARD - SYLLABUS

Course name

Special electromechanical transducers in RES systems

Course

Field of study
Electrical power engineering

Year/Semester
2/3

Area of study (specialization)
Renewable energy sources and storage of energy

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
10

Laboratory classes
10

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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Prerequisites

Knowledge of the principles of electromagnetic energy processing. Lagrange equations. Hamilton equations. Ability to solve differential equations describing the operating states of electromechanical transducers.

Course objective

Analysis of the possibility of using special electromechanical transducers in the process of power energy generation, control, safety systems. Acquisition and consolidation of knowledge in the application of special electromagnetic and electromechanical transducers in RES systems.

Course-related learning outcomes

Knowledge

He/she has an in-depth knowledge of electrical engineering laws and areas of use of electromagnetic field theory and circuit theory.

He/she has knowledge of the operation and use of equipment for the processing and conversion of electrical energy.

Skills

He/she can design elements and electrical systems for the set criteria and implement the prepared project, partially or entirely, using the right methods and tools.

Social competences

He/she correctly identifies and resolves dilemmas related to general energy security; can think and act in a creative and entrepreneurial way; understands the need to raise public awareness of the development of electricity.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: passing on the basis of a knowledge test during a written exam. The crediting of the lecture is attested by ratings.

Laboratory exercises: knowledge checking is carried out in three stages, through: (a) an assessment of the preparation for laboratory exercise; (b) an assessment of the activity and increase in knowledge and skills during laboratory exercises; (c) an assessment of the reports carried out on the laboratory activities. The crediting of the Laboratory exercises is attested by ratings.

Programme content

Lecture: Operating states of electromechanical transducers - motor, generator, brake and compensator. Induction machine powered from two-side. Synchronous machines with permanent magnets. Synchronous machines working with bridge systems. Cooperation of electromechanical transducers with two-way power transmission converters. Electromagnetic and electromechanical elements working in open and closed automation systems. Electromechanical systems as components of feedback loops. Transducers for measuring angle, moment, angular acceleration, position, force. Actuators working in RES systems. Non-invasive metods of current and power measurements. Temperature measurement.

Laboratory: testing of a ring induction machine with double-side supply, testing of the synchronous generator with permanent magnet excitation, testing of the generator set with a synchronous generator with electromagnetic excitation (or by means of permanent magnets) coupled with energy consumers through a transducers, testing of the transformer of angular position, testing of magnetic static amplifier, testing of the drive train powered by a photovoltaic source of electrical energy, testing of stepper motors: reluctance motor, hybrid motor.

Teaching methods

Lecture with multimedia presentation supplemented by examples on the board and examples for self-realization.

Laboratory: implementation of measurements and discussion on the results obtained from testing, detailed review of reports by the teacher.

Bibliography

Basic

1. Wróbel T., Silniki krokowe, WNT, Warszawa, 1993

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

3. Sochocki R., Mikromaszyny elektryczne, Ofic. Wyd. PW, Warszawa, 1996

4. Pavel Ripka, Magnetic Sensors and Magnetometers, Artech House, 2001

5. Owczarek J. (red), Elektryczne maszynowe elementy automatyki, WNT, Warszawa 1983

6. Meisel J., Zasady elektromechanicznego przetwarzania energii, WNT, 1970

Additional

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, reports preparation, project preparation, preparation of final essay, preparation for test, preparation for exam) [1]	30	1,0

[1] delete or add other activities as appropriate