COURSE DESCRIPTION CARD - SYLLABUS

Course name

Testing of electric drive systems

Course

Field of study

Electrical engineering

Year/Semester

1/1

Area of study (specialization)

Propulsion Systems in Industry and Electromobility

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

15

Other (e.g. online)

Tutorials

Projects/seminars

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 construction and principle of operation of electromechanical transducers. Knowledge of mathematical models and mathematical apparatus necessary for the analysis of selected operating states of electromechanical transducers.

Course objective

To learn about the problems associated with the operation of electromechanical equipment. Acquiring knowledge of methods of eliminating hazards associated with the operation of electromagnetic drive systems with particular emphasis on environmental hazards arising during the operation of these systems.

Course-related learning outcomes

Knowledge

She/he has an extended knowledge of measurements of electrical quantities and selected non-electrical quantities; he has an in-depth knowledge of developing experimental results.

Skills

Able to work individually and in a team, can lead a team in a way that ensures completion of a task within a set deadline; can identify directions for further learning and organize the process of self-education. Can formulate and test hypotheses related to engineering problems and simple research problems. Can plan the process of testing complex electrical equipment and systems.

Social competences

Recognizes the importance of knowledge in solving cognitive and practical problems, and understands that in technology, knowledge and skills quickly become obsolete, and therefore require constant replenishment. He is aware of the need to develop professional achievements and observe professional ethics, fulfill social obligations, inspire and organize activities for the benefit of the social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: credit on the basis of a test of knowledge during a written exam. Passing of the lecture is certified by grades.

Laboratory exercises: checking of knowledge is carried out in three stages, by: (a) evaluation of the preparation for the laboratory exercise; (b) evaluation of the activity and growth of knowledge and skills during the implementation of laboratory exercises; (c) evaluation from the reports on the implemented laboratory activities. Passing of the laboratory is evidenced by grades.

Programme content

Lecture: Legal acts permitting drive systems for operation (Polish Standard, EU Directives). Methods of measuring force, mechanical stress, torque, moment of inertia, speed and slip occurring in electromechanical and magnetic transducers. Determination of quantities characterizing the electromagnetic field. Sources of heat in electric drive systems and ways to dissipate it. Ventilation systems of drive systems. Sources of acoustic interference and sources of mechanical vibrations. Measurement of vibrations and noises produced by the said transducers. Problems of electromechanical compatibility of power train components. Simulation of operating states of selected machines. Analysis of the electromagnetic field in selected electromagnetic devices.

Laboratory: study of the noise emitted by a selected drive system in an anechoic chamber, determination of heating and cooling curves of a machine supplied with a distorted voltage, temperature measurement using a pyrometer, measurement of the cooling air output by the calorimetric method, determination of the electromagnetic emission level of a low-power transformer, dynamic balancing of a low-power induction machine.

Teaching methods

Lecture with multimedia presentation (including: drawings, photos, animations) supplemented by examples given on the blackboard and examples for independent implementation.

Laboratory: demonstrations, implementation of measurements and discussion of the obtained research results, interpretation of observed physical phenomena, detailed review of reports by the instructor.

Bibliography

Basic

1. Elektrodynamika Techniczna, wyd. II, J. Turowski, WNT, Warszawa, 1993

2. The Mechatronics Handbook, Bishop R. H., Austin, Texas, CRC Press

3. Konstrukcja maszyn elektrycznych, Dąbrowski M., PWN, Warszawa, 1985

4. Badanie maszyn elektrycznych w przemyśle, Latek W., WNT, Warszawa, 1987

5. Analiza zjawisk sprzężonych zachodzących w maszynach prądu stałego, Idziak P., Seria Rozprawy nr 510, Wydawnictwo Politechniki Poznańskiej, Poznań 2013

6. Rules Publication 42/P: Testing of Electric Rotating Machines, Polski Rejestr Statków, Gdańsk, 2022

7. Prawo energetyczne, Dz. U. 2013

8. IEC Standard

9. ISO Standard

10. Polska Norma PN-IEC-34-1; 4; 17

11. www.komel.katowice.pl/zeszyty.html

Additional

1. Mechatronika, Schmid D., tłum. z niem. oprac. wersji pol. Olszewski M., Wyd. REA, Warszawa, 2002

2. Podstawy Elektrodynamiki, Griffiths D.J., PWN, Warszawa, 2001

3. Dynamics of Rotating Machines, Rivera G.,Willford Press, 2020

4. Czasopismo: Napęd i sterowanie

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for exam) [1]	30	1,0

[1] delete or add other activities as appropriate