COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electromechanical Propulsion Systems

Course

Field of study

Electrical 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

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Dr hab. inż. Wiesław Łyskawiński

email: Wieslaw.Lyskawinski@put.poznan.pl

tel. 616652781

Wydział Elektryczny

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Dr inż. Jacek Mikołajewicz

email: Jacek.Mikolajewicz@put.poznan.pl

tel. 616652396

Wydział Elektryczny

ul. Piotrowo 3A, 60-965 Poznań

Prerequisites

Basic knowledge in the area of theory, characteristics and the method of electrical machine control.

Matrix calculus on the basic level. Ability of the effective self-education in the field associated with chosen subject.

The student is aware of a need to expand its competence, readiness to undertake the cooperation in the team.

Course objective

The student should obtain knowledge of the mathematical models of induction and synchronous machines, as well as the brushed and brushless direct current motors.

Getting knowledge about modern algorithms of vector control of induction motor and optimal control of the synchronous motor. Understanding of the principles of operation of regulated driving systems

Course-related learning outcomes

Knowledge

1. Student has a knowledge about developmental trends and the most significant new achievements in the electrical engineering, electronics, computer science and energetics.

2. Student has a knowledge about formulating equations describing simple driving systems, principles of the identification and using computer simulations software; has a knowledge in the scope of designing simple driving systems.

3. Student has a knowledge in the possibility and restrictions of methods used in CAD in the area of electrical engineering.

Skills

1. Student is able to work individually and in the team, is able to assess tasks the time consumption; is able to manage the small team in the way guaranteeing the completion of setting in the established time.

2. Student is able to draw up detailed documentation of results of the experiment, of design or research task.

3. Student is able to assess the possibility of using new technological achievements for the design and productions of the electrical devices and systems, containing innovative solutions.

Social competences

1. The student understands the need of formulating both handing over to the society information and opinions of achievements in the area of electrical engineering and other aspects of activity of an electrical engineer.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- constant judging on every classes (awarding a bonus to the activity and qualities of the perception),

- evaluation of the knowledge and abilities on a written examination.

Laboratory:

- the test and awarding a bonus to the essential knowledge of problems for the accomplishment stated in given area of laboratory tasks,

- constant judging, on every classes - awarding a bonus to the increase in the ability of using with found principles and methods,

- the evaluation of the knowledge and the abilities associated with the accomplishment of the exercise task, the evaluation of the report from the performed exercise.

Getting additional points for the activity during classes, particularly for:

- proposing discussing additional aspects of the issue,

- ability of the cooperation in the team performing the task in the laboratory;

- remarks about improving teaching materials.

- quality of the elaborated reports.

Programme content

Lecture:

Circuit models of induction machine, voltage equation in natural coordinate frame. Two-axis model of induction machine, transformation of impedance matrix. Equilibrium equations for drive with induction motors: steady state and transients. Scalar and field-vector control of induction motor drives Magnetic circuits. Equations of synchronous machines. Converter fed motor. Drives with stepping motors. Brushes DC motors and universal motors. Drives with brushless DC motors. Structures of control systems for electric drives.

Laboratory:

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. Wykłady z elektromechanicznych przemian Energii, Sobczyk T., Węgiel T., Wydawnictwo Politechniki Krakowskiej, Kraków 2014

2. Zasady elektromechanicznego przetwarzania energii (tłum. z angielskiego), Meisel J., Wydawnictwo Naukowo Techniczne, Warszawa, 1970.

3. Napęd elektryczny i jego sterowanie, Sidorowicz J., Oficyna Wydawnicza Politechniki Warszawskiej , Warszawa, 1994.

4. Wprowadzenie do napędu elektrycznego, Koczara W., Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2012.

5. Automatyka napędu elektrycznego, Deskur J., Kaczmarek T., Zawirski K., Wydawnictwo Politechniki Poznańskiej, Poznań 2012.

Additional

1. Sterowanie silnikiem synchronicznym o magnesach trwałych, K. Zawirski, Wydawnictwo Politechniki Poznańskiej, Poznań, 2005.

2. Bezczujnikowe układy napędowe z silnikami indukcyjnymi, Orłowska-Kowalska T., Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2003.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	38	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	22	1,0

[1] delete or add other activities as appropriate