Electrical machines and drives II - course description

General information

Course name	Electrical machines and drives II
Course ID	06.2-WE-ELEKTP-EMaD02-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Electrical Engineering
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2017/2018

Course information

Semester	6
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	• prof. dr hab. inż. Robert Smoleński

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Exam
Laboratory	15	1	-	-	Credit with grade

Aim of the course

- familiarizing of students with the construction, principle of operation and electromechanical characteristics of the electrical machines;
- creations of skills in the exploitation of electrical machines;

Prerequisites

Physics I and II, Fundamentals of Electrical Engineering, Circuit Theory I, Materials Engineering, Fundamentals of electronics and power electronics

Scope

Selected electromechanical elements of automatic control systems. Tachogenerators (DC, induction, synchronous), selsyns, selsyn systems, transmitters and indicators.
Step motors. Reluctance, permanent magnet, hybrid.
Basis of electric drives. Star-up methods, speed control and braking of described motors. Motion equation of drive. Inertia of the drive systems on motor shaft.
Electric drives. Drive system and its elements. Electric drive classification. Motion equation of drives. Proprieties of second and higher order systems. Modeling of steady state and transients of electric drives.
Power converter drives. Two-quadrant asynchronous drives. Direct current and asynchronous power converter drives.
Automatic control of electric drive. Control methods of electric drives. Scalar control. Automatic control of speed, torque and position. Servo drives.

Teaching methods

Lecture, laboratory exercises.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Can analyze simple drive systems using the method of bringing moments of inertia on the side of the motor shaft		• an evaluation test • an exam - oral, descriptive, test and other • an oral response	• Lecture • Laboratory
Can choose a converter drive to the specific requirements of working machines		• an evaluation test • an exam - oral, descriptive, test and other • an oral response	• Lecture • Laboratory
Can present boot methods, methods of rotation speed regulation and methods of braking AC/DC electric motors		• an evaluation test • an exam - oral, descriptive, test and other • an oral response	• Lecture • Laboratory

Outcome description	Outcome symbols	Methods of verification	The class form
Can explain the servo motor working principle		• an evaluation test • an exam - oral, descriptive, test and other • an oral response	• Lecture • Laboratory

Assignment conditions

Lecture – the main condition to get a pass is Exam positive mark
Laboratory – the main condition to get a pass are sufficient marks for all exercises and tests conducted during the semester.

Calculation of the final Grade: lecture 60% + laboratory 40%

Recommended reading

1. Boldea I., Nasar S.A, Electric Drives, CRC Press, 1999
2. Sen P. C., Principles of Electrical Machines and Power Electronics, John Willey and Sons Inc., USA, New York, 1997
3. Kaźmierkowski M. P., Tunia H., Automatic Control of Converter-Fed Drives, Warsaw - Amsterdam - New York - Tokyo: PWN-ELSEVIER SCIENCE PUBLISHERS, 1994
4. Kaźmierkowski M. P., Blaabjerg F., Krishnan R., Control in Power Electronics, Selected Problems, Elsevier, 2002
5. Kaźmierkowski M. P., Orłowska-Kowalska T., Neural Network estimation and neurofuzzy control in converter-fed induction motor drives, Chapter in Soft Computing in Industrial Electronics, Springer-Verlag, Heidelberg, 2002
6. Lonhard W., Control of Electrical Drives, Springer, Berlin, New York, 2001
7. Miller T. J .E., Brushless Permanent-Magnet and Reluctance Motor Drives, Oxford University Press, Oxford, England, 1989
8. Rutkowska D., Intelligent computing systems, Genetic algorithms and neural networks in fuzzy systems, Akademicka Oficyna Wydawnicza, Warsaw, 1997

Further reading

Notes

Modified by dr hab. inż. Radosław Kłosiński, prof. UZ (last modification: 04-05-2017 09:45)