RTU Course "Electrical Drives (Study Project)"

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General data

Code	EEI213
Course title	Electrical Drives (Study Project)
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Leonīds Ribickis
Academic staff	Inna Buņina Anastasija Žiravecka Agris Treimanis
Volume of the course: parts and credits points	1 part, 3.0 credits
Language of instruction	LV, EN
Annotation	DC electric drive characteristics and calculation of the electric drive for mechanism including its drive operating mode calculations, principal circuitry creation, parameter estimation. AC electric drive characteristic calculation, the electric drive creation for mechanism of the project, including creation of the work estimates, the principal circuitry and parametric calculations.
Goals and objectives of the course in terms of competences and skills	The goal of the study course is to teach students to calculate and create specific electric drives, including the development of the basic electrical scheme and technical documentation, to provide knowledge about the influence of parameters on electrical drive characteristics, about methods of speed regulation, about methods of calculation of transient processes, to develop skills how to calculate electrical drive power-generating characteristic and to choose motor for different electrical drive operation regimes, to analyse and develop new electrical drive systems. The objectives of the study course are to develop skills how to calculate the parameters and characteristics of different types of electric drive, to design systems of electric drive with power electronic converters, how to choose electrical drives motors and calculate circuit elements, as well as to calculate transient processes influence on electrical drive operations.
Structure and tasks of independent studies	Students at home must calculate three characteristic sets for different electrical motors. Must be done computer modeling in Virtuallab of given drives. Establish a study project on a concrete mechanism electrical drive realization.
Recommended literature	Obligātā/Obligatory: 1. Donalds V. Novotnijs, Tomass A. Lipo, Tomass A. Džans. Ievads elektriskajās mašīnās un elektropiedziņā, 2009 - 384 lpp. (tulkojums L.Ribicka redakcijā) 2. L. Ribickis, J. Valeinis. Elektriskā piedziņa mehatronikas sistēmās. RTU izdevniecība, 2008. 286 lpp. 3. D.W.Novotny, T.A.Lipo, T.M.Jahus. Introduction to Electric Machines and Drives WEMPEC, University of Wisconsin-Madison, 2009 - 384 p. 4. N. Mohan. Electric Drives an Integrative Approach. MNPERE Minneapolis, 2001. 424 lpp.
Course prerequisites	Knowledge of electrical machines, Power Electronics and Electrical Drive.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
DC Independent excitation motor electromechanical characteristic calculation in starting and braking modes.	4	4	2	6
DC series excitation motor electromechanical characteristic calculation in starting and braking modes.	4	4	2	6
AC induction motor electromechanical characteristic calculation in starting and braking modes.	4	4	2	6
Calculation of electromagnetic transition process for electrical drive.	4	4	2	6
Calculation of motion process of electrical drive.	4	4	2	6
The project assignment - metal-planning machine drive development.	2	2	1	3
Description of metal-planning machine operation process and motor operating mode.	2	2	1	3
Metal-planning machine electrical motor selection and load characteristic calculation.	4	4	2	6
The drive power converter and its control system.	4	4	2	6
Description of the principal electric scheme and creation of technical documentation and its presentation.	4	4	2	6
Work with Virtual Lab 2.	2	2	1	3
Consultation on the project.	2	2	1	3
Total:	40	40	20	60

Learning outcomes and assessment

Learning outcomes	Assessment methods
Able to calculate the electric characteristics of the various technical parameters of the electric drive.	Defence of the three homeworks.
Able to calculate the wire-led mechanism for the motion processes of the technological process.	Advocacy of calculate mechanism motion chart.
Able to set up principal electric scheme and make the parameter estimates for electrical drive of concrete mechanism.	Successful defence of parameter calculation of principal scheme.
Able to create electrical technical documentation and to defend it for specific mechanism.	Successful defence of study project.

Evaluation criteria of study results

Criterion	%
Calculation of the three homework's	30
Calculation of machine motion charts	10
Calculation of principled schema and parameters	10
Defence of the study project	50
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	3.0	0.0	2.0	0.0			*