

Specification for the book of courses

Study program		Electrical Power Engineering		
Module		Electrical Power Engineering		
Type and level of studies		Master studies		
The name of the course		Control of Power Converters and Drives		
Lecturer (for lectures)		Petronijević P. Milutin		
Lecturer/associate (for exercises)		Filipović R. Filip		
Lecturer/associate (for OFE)		Filipović R. Filip		
Number of ECTS	6	Course status (obligatory/elective)	Obligatory	
Prerequisites	None			
Course objectives	Acquiring knowledge about modern control methods in power converters, adjustable speed drives, parameter calculation and settings and application of results on industry related equipments. Knowledge synthesis and its application in the AC and DC drives.			
Course outcomes	Mastering the control methods of power converters and drives with application in industry. Students should be able to choose control methods based on drive performances and control requirements. Understanding of the basic control principle and analysis of sensor-less drives.			
Course outline				
Theoretical teaching	Control oriented modelling of the basic electric drive components: control circuits, sensors, actuators, motors. Principle of operation, selection of control circuits and actuators. DC motor drives control. Basics, types and classification of Pulse Width Modulation (PWM). Space Vector Modulation. AC motor drives control: scalar, vector and direct torque control. PM motor control. Sensor-less control. Speed, torque and flux estimation. Control and optimization of converters in renewable energy sources.			
Practical teaching (exercises, OFE, study and research)	Numerical exercises: assignments in connection of theoretical teaching and laboratory exercises. Lab. exercises: Computer simulation and analysis of DC and AC drives. Analysis of vector controlled AC drive using Matlab. Experimental analysis of vector and DTC controlled drives. Analysis of sensorless motor drives.			
Textbooks/references				
1	N. Mitrović, V. Kostić, M. Petronijević, B. Jeftenić: "Implementation of torque and flux control algorithms for induction motor drives", Faculty of electronic Engineering, Niš, Serbia, 2009 (in Serbian).			
2	S. N. Vukosavic, "Digital Control of Electrical Drives", Springer, 2007.			
3	Vladan Vucković, Electric drives, Academic Mind, Belgrade, 2002 (in Serbian).			
4	W. Shepherd, L. N. Hulley, D. T. W. Liang, Power Electronics and Motor Control, CRC Press, 2004			
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	2	1		
Teaching methods	Lectures with help of PowerPoint slides, animations and computer simulations. Theoretical lectures are illustrated with numerical exercises. First part of lab exercises is with computer simulation of drives and converters using Matlab/Simulink. Second part is practical workout with laboratory made converters for performance verification and testing of current (torque), speed and position controllers.			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam	Points	
Activity during lectures	5	Written exam	20	
Exercises	15	Oral exam	20	
Colloquia	40			
Projects				