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	Modelling of Electrical Machines and Drives		
Lecturer (for lectures)	Mitrović N. Nebojša		
Lecturer/associate (for exercises)	Kostić Z. Vojkan, Banković G. Bojan		
Lecturer/associate (for OFE)			
Number of ECTS	5	**Course status (obligatory/elective)**	Elective
Prerequisites			
Course objectives	The objective of this course is to acquire knowledge about the dynamic modelling of asynchronous and synchronous drives under different conditions of power supply including power converter		
Course outcomes	On completion of this course the student will be able to • demonstrate knowledge and understanding of circuit modelling approach of electrical machines and basic transformations, • analyse, design and implement complex electrical drives with different types of electrical machines, • evaluate the applicability of electrical drives in different configurations and select the optimal control approach to fulfil the user requirements.		
Course outline			
Theoretical teaching	Terms and definitions related to the dynamics of electric drives. Electrical drive as a dynamic system. Mathematical model. Simulation methods. Simulation software. Coordinate transformation. Mathematical models of synchronous and induction machines. Transformed models with linear characteristics of core magnetization. Model in current coordinates. Models in mixed coordinates. Model in flux coordinates. Examples of trajectories of motion. Start-up during direct connection to network. Reconnection of motor. Drive reversal. Cyclic load. Soft-start of an induction motor. Power converters model. Voltage source inverter. Current source inverter with pulse width modulation (PWM). Vector and direct torque control of induction and synchronous motor drives. Mathematical model of vector and direct torque control. Realization of the model. Vector control of permanent magnet synchronous machine.		
Practical teaching (exercises, OFE, study and research	In laboratory experiments on real machines is implemented practical training which includes: - Drive with induction and synchronous machines (verification of simulation models and analysis of working regime). - The application of converters in AC drives.		
Textbooks/references			
1	V. Vučković, ”Electrical drives”, Akademska misao,Beograd, 1997. (In Serbian)		
2	Janusz Kacprzyk, "Advanced Control of Electrical Drives and Power Electronic Converters", Springer, 2017		
3	Piotr Wach,"Dynamics and Control of Electrical Drives", Springer, 2011		
4	Viktor M. Perelmuter, "Electrotechnical Systems Simulation with Simulink and SimPowerSystems", Taylor&Francis, 2013		
5	P. C., Krause, .., ”Analysis of Electric Machinery and Drive Systems”, Willey, 2013		

Number of classes of active education per week during semester/trimester/year				
Lectures	**Exercises**	**OFE**	**Study and research work**	**Other classes**
2	2	0		

Teaching methods	In laboratory experiments on real machines is implemented practical training which includes: - Drive with induction and synchronous machines (verification of simulation models and analysis of working regime). - The application of converters in AC drives.

Grade (maximum number of points 100)			
Pre-exam duties	**Points**	**Final exam**	**Points**
Activity during lectures	5	**Written exam**	30
Exercises		**Oral exam**	20
Colloquia	30		
Projects	15		