

Study program: Electrical and Computing Engineering – Module: Power Engineering			
Type and level of studies: Doctoral Academic Studies (third degree academic studies)			
Course unit: Electrical drives – selected chapters			
Course lecturer: Marko M. Rosić			
Language of instruction: English			
ECTS: 6			
Prerequisites: Passed exams: Electrical machines, Electric drives, Power Electronics			
Semester: Summer			
Course unit objective			
The course provides an additional knowledge in the specific fields related to electric drives and their control and estimation techniques. Depending on student's interest, he/she chooses one of the offered topics with specific project task.			
Learning outcomes of Course unit			
Students will be able to understand and solve specific demands and challenges in the field of electric drives.			
Course unit contents			
Theoretical classes			
Electrical drives dynamic characteristics. Realisation and evaluation of modern control structures in electric drives. Types and configurations of regulated drive with various topologies of power converts. Exploitation of vector control and direct flux and torque techniques with AC machines. Drive parameters identification and impact of machine parameters variation on the performances of vector controlled drive. Communication with high-supervised control structures and levels. Challenges in realization of multimotor drives. Synchronous machines in electric drives. Modern drives in electric vehicles.			
Practical classes			
Practical work in laboratory environment.			
Literature:			
[1] Boldea, I. Nasar, S. A., <i>Electric drives</i> , Taylor&Francis Group, 2006.			
[2] Boldea, I., Tutelea, L. <i>Electric Machines Steady State, Transients, and Design with MATLAB</i> , CRC Press Taylor&Francis Group, 2010.			
[3] El-Hawary E. M., <i>Principles of electric machines with power electronic applications</i> , The Institute of Electrical and Electronics Engineers, 2002.			
[4] Hughes, A., <i>Electric motors and drives fundamentals types and applications</i> , Third edition, Newnes, 2006.			
[5] Kenjo T., <i>Electric motors and their controls</i> , Oxford University press, 1991.			
[6] Mohan N., <i>ADVANCED ELECTRIC DRIVES analysis, control and modelling using SIMULINK</i> , MNPHERE, 2001.			
[7] Quang N. P., Dittrich J. <i>Vector control of three-phase AC machines</i> , Springer, 2008.			
[8] Subrahmanyam V., <i>Electric drives concepts and applications</i> , Mc Graw Hill, 1996.			
[9] Sul S. <i>Control of Electric Machine Drive Systems</i> , IEEE Press, 2011.			
[10] Vas P, <i>Artificial-intelligence-based electrical machines and drives</i> , Oxford Universit press, 1999.			
[11] Vukosavić S. <i>Digital Control of Electrical Drives</i> , Springer, 2007.			
Number of active teaching hours			Other classes
Lectures: 2	Practice: 2	Other forms of classes: 0	
Teaching methods: ex cathedra classes, consultations, independent individual home and laboratory work			
Examination methods (maximum 100 points)			
Exam prerequisites	No. of points:	Final exam	No. of points:
Student's activity during lectures	5	oral examination	30
Practical classes	10	written examination	30
Seminars/homework	10	
Project	15		
Grading system			
Grade	No. of points	Description	
10	91-100	Excellent	
9	81-90	Exceptionally good	
8	71-80	Very good	
7	61-70	Good	
6	51-60	Passing grade	
5	less than 50	Failing grade	