



COURSE: POWER ELECTRONICS CONVERTERS OPTIMIZATION		
MASTER: ELECTRONIC SYSTEMS ENGINEERING AND APPLICATIONS	YEAR: 2014-15	TERM: 1st

WEEKLY PLANNING								
WEEK	SESSION	DATE	DESCRIPTION	GROUPS (mark X)		WEEKLY PROGRAMMING FOR STUDENT		
				LECTURES	SEMINARS/ LAB ¹	DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
9	1	18/11/2014	1. Fundamentals 1.1 Fundamentals of switching dc-dc converters 1.1.1 Resistor, inductors and capacitors basis 1.1.2 Switch-Mode Conversion: Switching Power- Pole as the Building Block 1.1.3 Pulse Width Modulation (PWM)	X			1,5	
9	2	20/11/2014	1.2 Switching process: harmonics and frequency effects in power semiconductors and passive components 1.2.1 Hard switching 1.2.2 Soft switching : ZCS and ZVS 1.2.3 Resonant conversion 1.2.4 Frequency effects summary 1.3 Optimization drivers: efficiency, power density, size, weight and cost	X			1,5	

WEEKLY PLANNING

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				LECTURES	SEMINARS/ LAB ¹	DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
9	3*	21/11/2014	2. Selection of power semiconductors 2.1 Power diodes 2.2 Power MOSFETS * Making up missed class 06/01/2015	X			1,5	
10	4	25/11/2014	2.3 IGBT 2.4 SiC and GaN 2.5 Application map	X			1,5	
10	5	27/11/2014	3. Capacitors for power electronics 3.1 Fundamentals 3.2 Suitable Technologies for different fields of application 3.3 Ultracapacitors	X			1,5	
11	6	02/12/2014	4. Magnetic components design for low, medium and high frequency applications 4.1 Fundamentals 4.2 Magnetic laws in inductors and transformers 4.3 Core losses and winding losses 4.4 Core material and conductor type selection	X			1,5	
11	7	04/12/2014	4.5 High frequency magnetics: Ferrite, Iron Powder, amorphous and nanocrystalline 4.5.1 Case study 1: DC and AC inductors design	X			1,5	
12	8	09/12/2014	4.5.2 Case study 2:transformer design	X			1,5	
12	9	11/12/2014	4.6 Low frequency magnetics: Laminated silicon steel 4.6.1 Case study 3: DC and AC inductors design 4.6.2 Case study 2:transformer design	X			1,5	

WEEKLY PLANNING									
WEEK	SESSION	DATE	DESCRIPTION	GROUPS (mark X)		WEEKLY PROGRAMMING FOR STUDENT			
13	10	16/12/2014	5.1 Influence of the main component of the losses on the efficiency characteristic 5.2.1 Possibilities of minimizing semiconductor losses 5.2.2 Possibilities of minimizing passive component losses	X			1,5		
13	11	18/12/2014	5.2 Multiphase approach and optimal partitioning of total power 5.3 Topology selection	X			1,5		
14	12	08/01/2015	5.4 Economical aspects 5.5 Optimization techniques	X			1,5		
15	13	13/01/2015	6. Industrial realization of the power converter 4.1 Thermal management 4.2 Protection devices and techniques	X			1,5		
15	14	13/01/2015	4.3 MOSFET and IGBT drivers 4.4 Mechanical enclosures and IP code	X			1,5		
¹ A maximum of 1-2 lab sessions							Subtotal 1	21	34
Total 1 (Hours of class plus student homework hours between weeks 1-7)								55	
1-7		Tutorials, handing in, etc					10		
8		Assessment					3	7	
							Subtotal 2	3	17
Total 2 (Hours of class plus student homework hours at week 8)								20	
TOTAL (Total 1 + Total 2)								75	