



COURSE: MODELLING AND CONTROL OF POWER ELECTRONICS SYSTEMS		
MASTER: ELECTRONIC SYSTEMS ENGINEERING AND APPLICATIONS (3 ECTS)	YEAR: 2024-2025	TERM: 2st

WEEKLY PLANNING								
WEEK	SESSION	DESCRIPTION	GROUP (mark X)		Special room for session (computer classroom, audio-visual classroom...)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS/LAB ¹		DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
1	1	1. Modeling and control introduction for power converters and systems.	x			Previous reading Answering questions about background	1,5	4
1	2	2. Dynamics of power converters.	x		COMPUTER CLASSROOM	Study of topics developed	1,5	
2	3	3. Modeling and control oriented to converter-level design Simulation-oriented modeling	x			Study of topics developed	1,5	5
2	4	Modeling based on injected-absorbed-current dynamic analysis method	x			Study of topics developed	1,5	
3	5	Control loop design	x			Study of topics developed	1,5	5

3	6	Exercise I: Modeling of a Buck DC-DC converter with voltage mode control loop Exercise II: Modeling and control of a Boost DC-DC converter with average current mode control loop	X			Make and review exercises	1,5	
4	7	Exercise III: Adapter for battery charge in mobile phone applications	x		COMPUTER CLASSROOM	Make and review exercises	1,5	5
4	8	Modelling and control of Multiphase converters Exercise IV: Multiphase converter for high performance microprocessors.	x		COMPUTER CLASSROOM	Study of topics developed Make and review exercises	1,5	
5	9	4. Modeling and control oriented to system-level design: Behavioral modeling, system stability and Control loop design. Exercise V: Power distribution system for telecommunication application.	x		COMPUTER CLASSROOM	Study of topics developed Make and review exercises	1,5	5
5	10	5. Modulation, modeling and control of Inverters Inverter concepts and inverter topologies Basic Output Voltage Control: Square wave operation Fundamentals of PWM modulation Advanced Modulation Techniques	x			Study of topics developed	1,5	
6	11	Exercise VI: Modelling and control of Single-Phase Voltage Source Inverters.	x			Make and review exercises	1,5	5
6	12	Exercise VII: Three-phase inverter with d-q control for renewable energy applications	x			Make and review exercises	1,5	
7	13	Digital control (I)	x		COMPUTER CLASSROOM	Study of topics developed	1,5	5
7	14	Digital control (II)	x		COMPUTER CLASSROOM	Study of topics developed	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