



<b>COURSE: MODELLING AND CONTROL OF POWER ELECTRONICS SYSTEMS</b>		
<b>MASTER: ELECTRONIC SYSTEMS ENGINEERING AND APPLICATIONS (3 ECTS)</b>	<b>YEAR: 2023-2024</b>	<b>TERM: 2st</b>

WEEKLY PLANNING								
WEEK	SESSION	DESCRIPTION	GROUP (mark X)		Special room for session (computer classroom, audio-visual classroom...)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS/LAB <sup>1</sup>		DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
1	1	<b>1. Modeling and control introduction for power converters and systems.</b>	x			Previous reading Answering questions about background	1,5	4
1	2	<b>2. Dynamics of power converters.</b>	x		COMPUTER CLASSROOM	Study of topics developed	1,5	
2	3	<b>3. Modeling and control oriented to converter-level design</b> 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	<b>Exercise I:</b> Modeling of a Buck DC-DC converter with voltage mode control loop <b>Exercise II:</b> Modeling and control of a Boost DC-DC converter with average current mode control loop	X			Make and review exercises	1,5	
4	7	<b>Exercise III:</b> 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 <b>Exercise IV:</b> Multiphase converter for high performance microprocessors.	x		COMPUTER CLASSROOM	Study of topics developed Make and review exercises	1,5	
5	9	<b>4. Modeling and control oriented to system-level design:</b> Behavioral modeling, system stability and Control loop design. <b>Exercise V:</b> Power distribution system for telecommunication application.	x		COMPUTER CLASSROOM	Study of topics developed Make and review exercises	1,5	5
5	10	<b>5. Modulation, modeling and control of Inverters</b> 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	<b>Exercise VI:</b> Modelling and control of Single-Phase Voltage Source Inverters.	x			Make and review exercises	1,5	5
6	12	<b>Exercise VII:</b> 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	

<sup>1</sup> 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**