Universidad Carlos III de Madrid
www.uc3m.es

COURSE: System-on-Chip and efficient electronic circuit integration techniques		
MASTER: ELECTRONIC SYSTEMS ENGINEERING AND APPLICATIONS	**YEAR: 2017-18**	**TERM: 2nd**

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	GROUPS (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	General Course Information. Introduction and overview of SoC. Trends for Mixed-Signal SoC. Deep submicron effects related challenges. SoC architectures.	X			Previous reading. Answering questions about background.	1,5	4
1	2	Microelectronics review: - Advanced transistor models and second-order effects in CMOS technology. - Spice models and simulator limits. - Examples: Bias point and AC analysis parameters	X			Previous reading. Conclusions of discussions in class.	1,5	

2	3	SoCs devices fundamentals: - Mixed-Signal related challenges: substrate coupling, substrate isolation techniques, crosstalk, electro-migration, power supply voltage drop, interconnect delays. - Solutions: robust circuits, frequency planning	X			Previous reading. Conclusions of discussions in class.	1,5	5
2	4	Chip-level design: - PVT - Mismatch - Noise - Layout solutions	X			Previous reading. Conclusions of discussions in class.	1,5	
3	5	Robust Design on SoC: - Calibration - Mismatch correction - Designs tolerant to PVT	X			Previous reading. Conclusions of discussions in class.	1,5	5
3	6	Key concepts in analog design (I): - Differential signals and CM regulation - Cascode architectures - Advanced current mirrors - Examples	X			Previous reading. Conclusions of discussions in class.	1,5	
4	7	Key concepts in analog design(II): - Frequency Response - The Miller effect. Pole splitting. - Gain-bandwidth product and phase margin - Examples	X			Previous reading. Conclusions of discussions in class. Study for Test1	1,5	5
4	8	**TEST 1**	X				1,5	

5	9	Mixed-signal circuits (I): - Systematic design of CMOS transconductors and opamps. - Fully differential amplifiers (FDA) - Rail-to-rail input and output stages	X			Previous reading. Conclusions of discussions in class.	1,5	5
5	10	Mixed-signal circuits (II): - Current and voltage comparators. - Low voltage switched circuits: VCOs - TDCs - Digitally-assisted analog circuits	X			Previous reading. Conclusions of discussions in class.	1,5	
6	11	Mixed-signal circuits (III): - Sigma Delta modulation SoC example: - WLAN - Practical design flow of a test chip - Design for testability	X			Previous reading. Conclusions of discussions in class.	1,5	5
6	12	CADs tools for SoC: - Cadence demo (corners) - LTspice examples		X	Computer room	Previous reading. Conclusions of discussions in class.	1,5	
7	13	Examples of CMOS circuit design for SoC using CAD tools.		X	Computer room	Previous reading. Exercises proposed.	1,5	5
7	14	Design and characterization of a CMOS circuit for SoC applications.		X	Computer Room	Previous reading. Exercises proposed.	1,5	
						Subtotal 1	**21**	**34**
						Total 1 *(Hours of class plus student homework hours between weeks 1-7)*	**55**	

[1] **A maximum of 1-2 lab sessions**

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**