DENOMINATION OF THE SUBJECT: Analysis and design of networks		
Degree: G95, G65, G69	**Course: 2**	**Term: 2**

WEEKLY PLAN

WEEK	SESSION	Session content description	Group (check with X)		If different from classroom, specify	Specify if it is a session with 2 professors	Student weekly work		
			BIG	SMALL			DESCRIPTION	CLASSROOM HOURS	WORK HOURS (Max. 7h per week)
1	1	Theoretical Session unit 1. Sinusoidal Steady State. Linear system response to exponential function. SSS circuits analysis. Phasor concept. SSS passive elements: R, L, C. Impedance and admittance. Impedances associations.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
1	2	Practical session unit 1. Exercises on SSS.		X		No	Resolution of suggested exercises.	1,66	
2	3	Theoretical Session unit 1. Systematic methods: meshes and dots. Review of some circuit concepts. Equivalence of real generators. Thevenin and Norton equivalents. Generator Mobility. Superposition.	X			No	Study of the theory taught in the classroom session.	1,66	6,64

2	4	Practical session unit 1. Exercises on systematic methods of meshes and dots. Thevenin and Norton equivalents. Generator mobility. Power, available power and conjugate match.		X		No	Resolution of suggested exercises.	1,66	
3	5	Theoretical Session unit 1. Mutual inductance between coils. Point criterion. Systematization of mesh method for circuits with mutual inductances. Ideal transformer. Operational Amplifier.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
3	6	Practical session unit 1. Exercises on systematization of mesh method for circuits with mutual inductance. Circuit analysis exercises with Operational Amplifiers with dots method and the principle of virtual circuit.		X		No	Resolution of suggested exercises.	1,66	
4	7	Theoretical Session unit 2. Unilateral Laplace Transform (LT). Definition. Properties. V-I relations in elements R, L and C. Application of LT to RLC circuits TL with initial conditions.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
4	8	Practical session unit 2. Exercises on unilateral Laplace transform and its properties. Systematic analysis of RLC circuits using meshes and dots with initial conditions.		X		No	Resolution of suggested exercises.	1,66	
5	9	Theoretical Session unit 2. LT of elementary functions including step function derivatives. Limit Theorems. LT of periodic functions.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
5	10	Practical session unit 2. Exercises on LT calculation and its application to problems of systematic analysis of RLC circuits using meshes and dots with initial conditions. Application of limit theorems.		X		No	Resolution of suggested exercises.	1,66	
6	11	Theoretical and practical session Unit 2. Inverse LT calculation. Concept of transfer function. Exercises on inverse LT applied to rational functions. Exercises of full circuit analysis yielding the final time response illustrating its connection with the properties of the natural frequencies of the system (obtained in the Laplace domain).	X			No	Half session for study of the theory taught in the classroom session, and half session for resolution of suggested exercises.	1,66	6,64
6	12	Theoretical and practical session Unit 2. Exercises on Inverse LT. Concept of transfer function. Exercises on inverse LT applied to rational functions. Exercises of full circuit analysis yielding the final time response		X		No	Half session for study of the theory taught in the classroom session, and half session for resolution of suggested exercises.	1,66	

		illustrating its connection with the properties of the natural frequencies of the system (obtained in the Laplace domain).							
7	13	Theoretical session Unit 3. Two port networks: Definition of two port network. Z and Y parameters. Reciprocal and symmetrical 2-port networks. Parallel and serial association. Brune conditions.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
7	14	Practical session unit 3. Exercises in Z and Y parameters Equivalent circuits. Other parameters (g and h). Transformation of parameters.		X		No	Resolution of suggested exercises.	1,66	
8	15	Theoretical Session unit 3. Parameters F and inverse F. Cascade association. 2-port. Image parameters of reciprocal 2-port networks: image impedance and propagation function.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
8	16	1st Lab exercise: Laplace domain analysis using PSpice. SESSION 1.		X	LAB4.0.B01A/C	Yes	**Lab exercise with PSpice.**	1,66	
9	17	Theoretical Session unit 3. Sinusoidal steady state two-port networks (loaded two-port network, power transmission). Units: neper and decibel. Insertion losses, transmission losses.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
9	18	Practical session unit 3. Full exercises on 2-port networks (including RPS power calculation in general and matching conditions).		X		No	Resolution of suggested exercises.	1,66	
9	19	1st Lab exercise: Laplace domain analysis using PSpice. SESSION 2.		X	LAB4.0.B01A/C	Yes	**Lab exercise with PSpice.**	1,66	
10	20	Theoretical Session unit 4: LC analogue filters. Frequency response. Ideal filters and realizability. Actual filter specifications. Functions characterizing doubly terminated filters: Transfer Function and Characteristic Function. Properties in terms of its poles and zeros. Feldtkeller equation.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
10	21	Theoretical-practical Session Unit 4: Approximation theory. Selectivity and discrimination parameters. Synthesis of low-pass Butterworth filters and Chebyshev. Frequency and resistance normalization. Exercises on synthesis of low-pass Butterworth and Chebychev filters.		X		No	Resolution of suggested exercises.	1,66	

11	22	Theoretical Session unit 4. High-pass, band-pass and stop-band frequency transformations.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
11	23	Practical session unit 4: Exercises on synthesis of band-pass Butterworth and Chebychev filters.		X		No	Resolution of suggested exercises.	1,66	
12	24	Practical session unit 4: Exercises on synthesis of high-pass, band-pass and stop-band Butterworth and Chebychev filters.	X			No	Study of the theory taught in the classroom session.	1,66	6,64
12	25	2nd Lab exercise: design and simmulation of analogue filters using PSpice. SESSION 1.		X	4.2.B.01A-C	Yes	**Lab exercise with PSpice.**	1,66	
13	26	Practical session unit 4: Exercises on synthesis and analysis of analogue filters.	X			No	Resolution of suggested exercises.	1,66	6,64
13	27	2nd Lab exercise: design and simmulation of analogue filters using PSpice. SESSION 2.		X	4.2.B.01A-C	Yes	**Lab exercise with PSpice.**	1,66	
14	28	Theoretical Session unit 5: Digital filters. Review of concepts of discrete-time systems. Transfer Function. Frequency Response. IIR and FIR filters. Direct Architectures. Design of IIR filters from analogue filters: bilinear transformation.		X		No	Resolution of suggested exercises.	1,66	7
14	29	Practical session unit 5: Exercises on digital filter synthesis lowpass, highpass, bandpass and bandstop filters.	X			No	Study of the theory taught in the classroom session.	1,66	
							Subtotal 1	**48,14**	**93,32**

Total 1 *(class hours and student work between weeks 1-14)*	141,46

15		Office hours, homework submission, etc.						6	
16		Assessment						3	6
							Subtotal 2	**3**	**6**

Total 2 *(class hours and student work between weeks 15-18)*	15

TOTAL A *(Total 1 + Total 2)*	**156,46**

WEEKLY PLAN: LAB SESSIONS						
WEEK	**SESSION**	**Session content description**	**Lab room**	**Student weekly work**		
				DESCRIPTION	CLASSROOM HOURS	WORK HOURS (Max. 7h per week)
8	16	SSS circuit analysis using CAD tool (PSpice)	Room LAB 4.0.B01A (Tª Señal) and/or LAB 4.0.B01C (Tª Señal).	Lab exercise that should be done by student pairs. A previous homework is mandatory and it will be collected before the lab session. A lab manual will be provided during the session and collected at the end, complete with the students answers. Typically, the lab exercises main goal is to compare the theoretical computations with the simulated results.	Already considered (see weekly plan above)	Already considered (see weekly plan above)
9	19	Laplace domain circuit analysis using CAD tool (PSpice)	*idem*			
12	25	Simulation of analogue filters using CAD tool (PSpice).	*idem*			
13	27	Design of analogue filters using CAD tool (PSpice).	*idem*			
				Subtotal 3	-	
			Total 2 *(lab hours and student work for the four lab sessions)*		-	
			TOTAL B *(Total 3)*		**Inc. in TOTAL A**	
TOTAL *(Total A + Total B. Max 180 hours)*					**156,46**	