Universidad Carlos III de Madrid
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DENOMINATION OF THE SUBJECT: Analysis and design of networks		
Degree:	**CURSO: 2**	**CUATRIMESTRE: 2**

PLANIFICACIÓN SEMANAL DE LA ASIGNATURA

SEMANA	SESIÓN	Session content description	Group (check with X)		If different from classroom, specify	Specify if it is a seesion with 2 professorses	Weekly work for the student		
			Big	Small			DESCRIPTION	CLASSROOM HOURS	WORK HOURS (Max. 7h 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.	1,66	6,64
1	2	Practical session unit 1. Exercises on SSS.		X		No	Solving 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.	1,66	6,64
2	4	Practical session unit 1. Exercises on systematic		X		No	Solving suggested exercises.	1,66	

		methods of meshes and dots. Thevenin and Norton equivalents. Generator mobility. Power, available power and conjugate match.							
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.	1,66	6,64
3	6	Practical session unit 1. Exercises on systematizing mesh method for circuits with mutual inductance. Circuit analysis exercises with Operational Amplifiers with dots method and the principle of virtual circuit.		X		No	Solving 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	Half session for Study of the theory taught in the classroom y **half session for continuous assessment.**	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	Solving 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.	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	Solving suggested exercises.	1,66	

6	11	heoretical 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 y media para la realización de los ejercicios propuestos.	1,66	6,64
6	12	1st Lab: Analysis in the Laplace domain using CircuitLab tool. 4.0.B01A LAB / C		X	Computer room	Yes	**First practice with Circuitlab.**	1,66	
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	Half session for Study of the theory taught in the classroom y **half session for continuous assessment.**	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	Solving 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.	1,66	6,64
8	16	Practical session unit 3. Exercises on F parameters and image parameter calculation. Using reciprocity and symmetry to simplify the calculation of parameters.		X		No	Solving suggested exercises.	1,66	
9	17	Theoretical Session unit 3. Sinusoidal steady state quadrtwo-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.	1,66	6,64
9	18	Practical session unit 3. Full exercises on 2-port networks (including RPS power calculation in general and adaptation conditions).		X		No	Solving suggested exercises.	1,66	

10	19	Theoretical Session unit 4: LC analog filters. Review of concepts of linear analog systems. Transfer function. Frequency response. Filtering concept. Ideal filters. Realizability. Actual filter specifications. Filter structures.	X			No	Half session for Study of the theory taught in the classroom y **half session for continuous assessment.**	1,66	6,64
10	20	Practical session unit 4. Functions characterizing dual filter structures with resistive termination: Transfer Function and Characteristic Function. Properties in terms of its poles and zeros. Feldtkeller equation. Exercises on ideal and real filters.		X		No	Realización de los ejercicios propuestos.	1,66	
11	21	Theoretical Session unit 4. Approximation theory. Selectivity and discrimination parameters. Synthesis of low-pass Butterworth filters and Chebyshev. Standardization in resistance and frequency.	X			No	Study of the theory taught in the classroom.	1,66	6,64
11	22	Practical session unit 4. Exercises in synthesis of lowpass filters Butterworth and Chebyshev.		X		No	Solving suggested exercises.	1,66	
12	23	Theoretical Session unit 4. Transformation of frequencies for high-pass filters, band-pass and band-stop.	X			No	Study of the theory taught in the classroom y **half session for continuous assessment.**	1,66	6,64
12	24	Practical session unit 4: Exercises on synthesis of Butterworth and Chebychev filters: highpass, low-pass and band-stop.		X		No	Realización de los ejercicios propuestos.	1,66	
13	25	Theoretical Session unit 5: Digital filters. Review of concepts of discrete-time systems. Transfer Function. Frequency Response. IIR and FIR filters. Direct Architectures.	X			No	Half session for Study of the theory taught in the classroom.	1,66	7
13	26	Practical session unit 5: Exercises on digital filter synthesis lowpass, highpass, bandpass and bandstop filters and analog simulation using digital filters.		X		No	Realización de los ejercicios propuestos.	1,66	
13	27	2nd Lab: design and simulation of analog filters withCircuitLab tool. 4.0.B01A LAB / C		X	Computer room	Yes	**Second practice with Circuitlab.**	1,66	

14	28	Theoretical Session unit 5. Design ofIIR filters from analog filters, and bilinear transformation. Simulation of analog filters using digital filters.	X			No	Half session for Study of the theory taught in the classroom y la realización de los ejercicios propuestos, y **half session for continuous assessment.**	1,66	6,64
14	29	Lab 3rd: assembly and measures of analog filters. Room 4.2.B.01		X	Laboratory	Yes	**Third practice**	1,66	
							Subtotal 1	**48,14**	**93,32**
							Total 1 (class hours and student work between weeks 1-14)		141,46

15		Recoveries, 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 *(Total 1 + Total 2. Max. 180 hours)*	**156,46**

PLANIFICACIÓN SEMANAL LABORATORIOS EXPERIMENTALES						
SEMANA	**SESIÓN**	**DESCRIPCIÓN DEL CONTENIDO DE LA SESIÓN (El grupo se subdivide en dos. En el horario se programan dos sesiones en el laboratorio en esa semana)**	**LABORATORIO EN ELQUE SE REALIZAN LAS SESIONES**	**TRABAJO SEMANAL DEL ALUMNO**		
				DESCRIPCIÓN	HORAS PRESENCIALES	HORAS TRABAJO (Max. 7h semana)
6	12	Práctica sobre análisis en el dominio de Laplace con ayuda de la herramienta CircuitLab.	Aulas LAB 4.0.B01A (Tª Señal) y LAB 4.0.B01C (Tª Señal).	La práctica consta de cierto trabajo previo que se debe completar antes de asistir al laboratorio. Se facilitará un guion con las actividades/ejercicios a completar en el laboratorio. Éstos estarán orientados, típicamente, a comparar los resultados obtenidos con la herramienta de simulación con los obtenidos previamente de manera teórica fuera del laboratorio.	Ya se ha tenido en cuenta (ver cronograma)	Ya se ha tenido en cuenta (ver cronograma)
13	27	Práctica sobre diseño y simulación de filtros analógicos empleando la herramienta CircuitLab.	Aulas LAB 4.0.B01A (Tª Señal) y LAB 4.0.B01C (Tª Señal).	La práctica consta de cierto trabajo previo que se debe completar antes de asistir al laboratorio. Se facilitará un guion con las actividades/ejercicios a completar en el laboratorio. Éstos estarán orientados, típicamente, a comparar los resultados obtenidos con la herramienta de simulación con los obtenidos previamente de manera teórica fuera del laboratorio.		
14	29	Práctica sobre montaje y medidas de filtros analógicos.	Laboratorio 4.2.B01	La práctica consta de cierto trabajo previo que se debe completar antes de asistir al laboratorio. Se facilitará un guion con las actividades/ejercicios a completar en el laboratorio. Éstos estarán orientados, típicamente, a comparar los resultados obtenidos con la herramienta de simulación con los medidos experimentalmente en el laboratorio.		