Universidad Carlos III de Madrid

COURSE: Signal and Systems		
DEGREE: Bachelor in Biomedical Engineering	YEAR: 3rd	TERM: 1st

WEEKLY PROGRAMMING

WEEK	SESSION	DESCRIPTION	GROUPS		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	Inidicate YES/NO If the session needs 2 teachers: Maximum 4 sessions	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURE	SEMINAR			DESCRIPTION	CLASS HOURS	HOMEWORK HOURS Maximum 7 H
1	1	Unit 1 - Signals • Presentation of the course contents • Examples of biomedical sisgnals. • Properties of the signals	X		No			1,66	4
1	2	Unit 1 - Signals • Characterization of signals: energy and average power. • Basic operations with signals: time reversal, scaling, shifting		X	No			1,66	
2	3	Unit 1 - Signals • Random processes	X		No			1,66	6
2	4	Unit 1 - Signals • Exercises		X	No			1,66	
3	5	Unit 2- Systems • Introduction. Examples of systems. • Properties of the systems: causality, stability, time invariance, linearity	X		No			1,66	4
3	6	Unit 2- Systems • Linear Time-Invariant Systems (LTI) • Convolution		X	No			1,66	
4	7	Unit 2- Systems • Properties of LTI systems • Random processes and LTI systmes	X		No			1,66	6
4	8	Unit 2- Systems • Exercises.		X	No			1,66	

5	9	Unit 3- Fourier series • Introduction: Response of LTI Systems to Complex Exponentials • Fourier Series Representation of Continuous-Time Periodic Signals: Analysis and Synthesis Equations	**X**		No			1,66	6
5	10	Quiz Unit 3- Fourier series • Properties of Continuous-Time Fourier Series. Examples.		**X**	No			1,66	
6	11	Unit 3- Fourier series • Fourier Series Representation of Discrete-Time Periodic Signals: Analysis and Synthesis Equations • Properties of Discrete-Time Fourier Series and comparisons with the Continuous Case. Examples	**X**		No			1,66	4
6	12	Unit 3- Fourier series Exercises		**X**	Yes			1,66	
7	13	Unit 4- Fourier Transform • Introduction • The Continuous-Time Fourier Transform for Aperiodic Signals	**X**		No			1,66	6
7	14	Laboratory Session 1 – Signals and Systems in the time domain.		**X**	No			1,66	
8	15	Unit 4- Fourier Transform • The Continuous-Time Fourier Transform for Aperiodic Signals • The special case: FT of Periodic Signals • Properties of the Continuous-Time Fourier Transform. Examples. Parseval's Theorem	**X**		No		.	1,66	
8	16	Unit 4- Fourier Transform • The Discrete-Time Fourier Transform. Properties and examples		**X**	No			1,66	4
9	17	Unit 4- Fourier Transform • Characterization of Random Processes in the Frequency Domain	**X**		No			1,66	6
9	18	Unit 4- Fourier Transform • Exercises		**X**	No			1,66	
10	19	Unit 5- Sampling • Introduction • The Sampling Theorem • Reconstruction of Continuous-Time Signals from Its Samples Using Interpolation	**X**		No			1,66	4
10	20	Laboratory Session 2 – Fourier Transform.		**X**	Yes			1,66	
11	21	Unit 5- Sampling • Discrete-Time Processing of Continuous-Time Signals • Decimation and Interpolation	**X**		No			1,66	6
11	22	Quiz Unit 5- Sampling • Exercises		**X**	No			1,66	

12	23	Unit 5. Sampling • Decimation and interpolation • More examples and exercises	**X**		No			1,66	4
12	24	Laboratory Session 3– Sampling.		**X**	Yes			1,66	
13	25	Unit 6- Discrete Fourier Transform • Introduction • Sampling of the Fourier Transform • Discrete Fourier Transform •	**X**		No			1,66	6
13	26	Quiz Unit 6- Discrete Fourier Transform • Properties • Circular Convolution and Linear Convolution. Examples • Exercises		**X**	No			1,66	
14	27	Unit 7: Z-transform • Introduction • The z-Transform • The Region of Convergence. Properties • The Inverse z-Transform	**X**		No			1,66	6
14	28	Unit 7: Z-transform • Properties of the z-Transform. • Evaluation of the Frequency Response from the Pole-Zero Plot • Analysis and Characterization of LTI Systems Using the z-Transform • Block Diagram Representation		**X**	No			1,66	
14	29	Laboratory: Exam		**X**	Yes			1,66	
SUBTOTAL								**48,33 + 72 = 120,33**	
15		Tutorials, Handing in, etc							
16-18		Assessment			No			3	16,66
TOTAL								**140**	