Universidad Carlos III de Madrid

SUBJECT:		
MASTER DEGREE:	ECTS:	QUARTER:

TIMETABLE FOR THE SUBJECT								
WEEK	SESSION	DESCRIPTION OF EACH SESSION	GROUP (X mark)		Indicate if a different lecture room is needed (computer, audiovisual, etc.)	HOMEWORK PER WEEK		
			1	2		DESCRIPTION	ATTENDING HOURS	HOMEWORK
1	1	Introduction to the channel coding problem Examples: BSC, BEC and BGC			No	- Review course material	1,5	2
1	2	Random coding bounds: - RCU bound			No	- Review course material	1,5	2
2	3	Random coding bounds: - DT bound			No	- Review course material - Exercises	1,5	4
2	4	Hypothesis testing and lower bounds: - Meta-converse bound - Verdú-Han bound			No	- Review course material - Exercises	1,5	4
3	5	Application to memoryless channels: BSC, BEC and BGC			No	- Review course material - Exercises	1,5	4
3	6	Lab session: Bounds for the BSC and BEC			Computer Room	- Complete the programming assignment	1,5	6

4	7	Lab session: Bounds for the BGC			Computer Room	- Complete the programming assignment	1,5	3
4	8	Graphical Models: - Factor Graphs - Applications in Communications			No	- Review course material - Read Chapter 4 of David Barber book.	1,5	2
5	9	Exact Inference in Factor Graphs: - Belief Propagation Algorithm - Max Product Algorithm			No	- Review course material - Read Chapter 5 of David Barber book.	1,5	3
5	10	Approximate Inference in Factor Graphs: - Loopy Belief Propagation - Implementation aspects of BP			No	- Review course material - Read Chapter 5 of David Barber book.	1,5	2
6	11	Lab session: - BP-inference in HMMs - The Forward/Backward Algorithm			Computer Room	- Complete the programming assignment	1,5	4
6	12	Lab session: - BP-inference in HMMs - The Forward/Backward Algorithm			Computer Room	- Complete the programming assignment	1,5	4
7	13	LDPC Codes (I): - BP decoding of Linear Block Codes over the BEC - LDPC ensembles and Degree Distribution			No	- Review course material - Read Sections 3.1 to 3.5 of Richardson & Urbanke Book.	1,5	3
7	14	LDPC Codes (II): - Asymptotic Analysis of BP-decoded LDPC ensembles over the BEC: Density Evolution			No	- Review course material - Read Sections 3.6 to 3.9 of Richardson & Urbanke Book.	1,5	3
8	15	Lab session: - Irregular LDPC ensembles for transmission over the BEC			Computer Room	- Complete the programming assignment	1,5	5

8	16	Lab session: - Irregular LDPC ensembles for transmission over the BEC			Computer Room	- Complete the programming assignment	1,5	5
9	17	LDPC codes (III): - Structured LDPC codes			No	- Review course material - Read Dr. Thorpe paper on protograph-based LDPC codes	1,5	3
9	18	LDPC codes (IV): - Convolutional LDPC codes - Windowed-BP decoding of Convolutional LDPC codes			No	- Review course material - Read Prof. Costello monograph on convolutional LDPC codes	1,5	3
10	19	Lab session: - LDPC codes over the BGC			Computer Room	- Complete the programming assignment	1,5	6
10	20	Lab session: - LDPC codes over the BGC			Computer Room	- Complete the programming assignment	1,5	6
11	21	Lab session: - LDPC codes over the BGC			Computer Room	- Complete the programming assignment	1,5	6
11	22	Synchronization in communication systems - Introduction - Detection and estimation			No	- Review course material	1,5	3
12	23	Detection - Exploiting temporal correlation - Exploiting spatial correlation			No	- Review course material	1,5	3
12	24	Detection - GLRT - Some examples			No	- Review course material - Exercises	1,5	4

13	25	OFDM signals - OFDM signal structure - Channel state information via pilots			No	- Review course material	1,5	3
13	26	OFDM signals - Frame synchronization - Frequency synchronization			No	- Review course material	1,5	3
14	27	Lab session: - Online OFDM synchronization			Computer Room	- Complete the programming assignment	1,5	6
14	28	Lab session: - Online OFDM synchronization			Computer Room	- Complete the programming assignment	1,5	6
TOTAL HORAS							42	108