INTRODUCTION TO ERROR CORRECTION CODING

1	Course Title:	INTRODUCTION TO ERROR CORRECTION CODING
2	Course Code:	EEM4403
3	Type of Course:	Optional
4	Level of Course:	First Cycle
5	Year of Study:	4
6	Semester:	7
7	ECTS Credits Allocated:	4.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	None
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Prof. Dr. TUNCAY ERTAŞ
15	Course Lecturers:	Prof. Dr. Tuncay ERTAŞ
16	Contact information of the Course Coordinator:	Prof. Dr. Tuncay ERTAŞ tertas@uludag.edu.tr Tel: (224) 294 2013 Adres: Elektrik-Elektronik Mühendisliği Bölümü, 5. Kat, Ofis No:523
17	Website:	
18	Objective of the Course:	To provide students with the understanding of fundamental concepts and limits of information theory, source and channel coding, and the mathematical theory of communications.
19	Contribution of the Course to Professional Development:	To help students gain knowledge and experience in advanced topics in digital communications.
20	Learning Outcomes:	
		1	To calculate the entropy and the mutual information
		2	To calculate the Gaussian channel capacity in the case of white and coloured noise
		3	To implement various coding/decoding algorithms using Matlab
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21	Course Content:

Course Content:	
Week	Theoretical	Practice
1	Introduction to information theory and error correction coding	
2	Uncertainity, information, entropy, source coding theorem	
3	Data compression: Prefix, Huffman, Lempel-Ziv codes	

4	Discrete memoryless channels, mutual information, channel capacity	
5	Channel coding theorem, differential entropy, capacity theorem, capacity of binary input AWGN channel	
6	Channel capacity in colored noise, rate distortion	
7	Linear block codes	
8	Cyclic codes: CRC, BCH, RS codes	
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10	Convolutional coding and ML decoding	
11	Trellis coding and ML decoding	
12	MAP decoding	
13	Turbo coding	
14	LDPC coding	

22	Textbooks, References and/or Other Materials:	1. T. Cover, J. Thomas: Elements of Inf. Theory, Wiley & Sons, 1991. 2. T. K. Moon: Error Correction Coding, John Wiley & Sons, 2005.

23	Assesment

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT		
Activites		Number	Duration (hour)	Total Work Load (hour)
Theoretical		14	3.00	42.00
Final Exam	1	60.00		
Practicals/Labs		0	0.00	0.00
Self study and preperation		14	3.00	42.00
Contribution of Term (Year) Learning Activities to		40.00		
Homeworks		3	6.00	18.00
Projects		0	0.00	0.00
Contribution of Final Exam to Success Grade		60.00		
Field Studies		0	0.00	0.00
Midterm exams		1	9.00	9.00
Measurement and Evaluation Techniques Used in the		Measurement and evaluation are performed according to		
Others		0	0.00	0.00
Final Exams		Undergraduate Education	9.00	9.00
Total Work Load				129.00
Total work load/ 30 hr				4.00
ECTS Credit of the Course				4.00

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS

	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
ÖK2	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
ÖK3	5	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0

LO: Learning Objectives   PQ: Program Qualifications

Contribution Level:	1 very low	2 low	3 Medium	4 High	5 Very High

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