INFORMATION THEORY

1	Course Title:	INFORMATION THEORY
2	Course Code:	EEM5404
3	Type of Course:	Optional
4	Level of Course:	Second Cycle
5	Year of Study:	1
6	Semester:	2
7	ECTS Credits Allocated:	6.00
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:	Yok
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 understand the fundamentals concepts and limits of information and network information theory.
19	Contribution of the Course to Professional Development:	Helps students gain ability of theoretical design and analysis of information systems.
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 calculate achievable rates for various network channels
		4	
		5	
		6	
		7	
		8	
		9	
		10	

21	Course Content:	

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

4	Asymptotic equipartition property, law of large numbers, typical sequences	
5	Discrete memoryless channels, mutual information, channel capacity	
6	Channel coding theorem, differential entropy, capacity theorem, capacity of binary input AWGN channel	
7	Gaussian channel capacity	
8	Gaussian channel capacity	
9	Wireless Channel Capacity	
10	Rate distortion	
11	Multi-user Gaussian channels, joint typicality	
12	MA channels, Slepian-Wolf coding	
13	Broadcast channels, relay channels	
14	Review	

22	Textbooks, References and/or Other Materials:	T. Cover, J. Thomas: Elements of Inf. Theory, Wiley & Sons, 1991.
23	Assesment	

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	1	25.00
Quiz	0	0.00

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Contribution of Term (Year) Learning Activities to	50.00		
Practicals/Labs	0	0.00	0.00
Self study and preparation	14	4.00	56.00
Contribution of Final Exam to Success Grade	50.00		
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Measurement and Evaluation Techniques Used in the	Measurement and evaluation are performed according to
Field Studies	0	0.00	0.00
Midterm exams	Postgraduate Education	30.00	30.00
Others	0	0.00	0.00
Final Exams	1	52.00	52.00
Total Work Load			180.00
Total work load/ 30 hr			6.00
ECTS Credit of the Course			6.00

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	5	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	5	0	0	0	0	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

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