



## AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Information Theory & Coding							
Course Code		EEE537		Course Level		Second Cycle (Master's Degree)			
ECTS Credit	8	Workload	199 ( <i>Hours</i> )	Theory	3	Practice	0	Laboratory	0
Objectives of the Course		The goal of this course is to introduce the main concepts of information theory and to present the theory and applications of source and channel coding to the students.							
Course Content		Joint entropy, conditional entropy, mutual information, limits on source and channel coding, encoding and decoding of linear block codes, convolutional codes and maximum likelihood decoding, trellis coded modulation.							
Work Placement		N/A							
Planned Learning Activities and Teaching Methods				Explanation (Presentation), Discussion, Project Based Study, Individual Study, Problem Solving					
Name of Lecturer(s)									

### Assessment Methods and Criteria

Method	Quantity	Percentage (%)
Midterm Examination	1	25
Final Examination	1	35
Assignment	5	20
Project	1	20

### Recommended or Required Reading

1	T. M. Cover and J. A. Thomas, Elements of Information Theory,
2	Lin, S. ve Costello, D.J., Error Control Coding, Fundamentals and Applications, Prentice-Hall.
3	S. B. Wicker., Error control systems for digital communication and storage, Prentice-Hall.

Week	Weekly Detailed Course Contents	
1	Theoretical	Information measure, entropy
2	Theoretical	Joint entropy, conditional entropy, mutual information
3	Theoretical	Introduction to data compression and source coding
4	Theoretical	Huffman coding, Lempel-Ziv algorithm
5	Theoretical	Channel Capacity, Gaussian Channel, Shannon's channel coding theorem
6	Theoretical	Linear Block Codes: Encoders
7	Theoretical	Linear Block Codes: Decoders
8	Intermediate Exam	Midterm Exam
9	Theoretical	Reed-Muller codes
10	Theoretical	BCH and Reed-Solomon codes.
11	Theoretical	Decoding BCH and Reed-Solomon codes
12	Theoretical	Convolutional Codes, generator polynomials, state and trellis diagrams
13	Theoretical	Maximum likelihood decoding of convolutional codes, Viterbi algorithm
14	Theoretical	Trellis Coded Modulation
15	Theoretical	Project Presentations
16	Final Exam	Final Exam

### Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	3	3	84
Assignment	5	5	0	25
Project	1	20	0	20
Individual Work	14	3	0	42
Midterm Examination	1	12	2	14



Final Examination	1	12	2	14
Total Workload (Hours)				199
[Total Workload (Hours) / 25*] = <b>ECTS</b>				8
*25 hour workload is accepted as 1 ECTS				

### Learning Outcomes

1	To be able to determine entropy and mutual information
2	To acquire knowledge about source and channel coding theorems
3	To be able to apply linear block encoding and decoding methods
4	To gain insight about convolutional codes and maximum likelihood decoding
5	To be able to design trellis coded modulation schemes

### Programme Outcomes (Electrical and Electronics Engineering Master)

1	Developing and intensifying knowledge that requires expertise in the area of Electrical-Electronics Engineering, and gaining the skills necessary to analyze and solve problems using this knowledge
2	Grasping the inter-disciplinary interaction related to Electrical-Electronics Engineering, interpreting and forming new types of knowledge by combining the knowledge from Electrical-Electronics Engineering and the knowledge from various other disciplines
3	Developing new approaches to solve the complex problems arising in Electrical-Electronics Engineering, coming up with solutions while taking responsibility and carrying out a specific study independently
4	Assessing the knowledge and skill gained in the area of Electrical-Electronics Engineering with a critical view
5	Transferring the current developments and one's own work in Electrical-Electronics Engineering, to other groups in written, oral and visual forms
6	The ability to control the collecting, interpreting, practicing and announcing processes of the Electrical-Electronics Engineering related to data taking into consideration scientific, cultural and ethical values and the ability to teach these values to others
7	Developing application plans concerning the subjects related to Electrical-Electronics Engineering and the ability to evaluate the end results of these plans within the frame of quality processes

### Contribution of Learning Outcomes to Programme Outcomes 1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High

	L1	L2	L3	L4	L5
P1	4	4	4	4	4
P2	4	4	4	4	4
P3	4	4	4	4	4
P4	4	4	4	4	4
P5	4	4	4	4	4
P6	4	4	4	4	4
P7	4	4	4	4	4

