

COURSE CODE	COURSE TITLE	L	T	P	C
1151IT109	Information Coding Techniques	3	0	0	3

Course Category: Program Core

a. Preamble

Coding theory is the study of the properties of codes and their fitness for a specific application. Codes are used for compression, cryptography, error-correction and more recently also for network coding. Codes are studied by various scientific disciplines—such as information, electrical engineering, mathematics, and computer science—for the purpose of designing efficient and reliable data transmission methods.

b. Prerequisite Courses:

Sl. No	Course Code	Course Name
1	1150CS201	Problem Solving using C
2	1150MA202	Mathematics II

c. Related Courses:

Sl. No	Course Code	Course Name
1	1151IT108	Computer Networks
2	1152IT106	Multimedia Communication Networks

d. Course Outcomes :

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Explain Information Entropy Fundamentals.	K2
CO2	Describe voice and data encoding.	K2
CO3	Illustrate the methods to control errors in coding.	K3
CO4	Explain the methods to compress data using various formats.	K2
CO5	Explain the techniques for audio and video coding.	K3

e. Correlation of COs with POs :

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		L		L							
CO2	M		L		M							
CO3	M		M		M							

CO4	M				M							
CO5	M				M							

- H- High; M-Medium; L-Low

f. Course Content :

Unit I INFORMATION ENTROPY FUNDAMENTALS

Uncertainty - Information and entropy – Source coding theorem – Huffman coding – Shannon Fano coding – Discrete memory less channels – Channel capacity – Channel coding theorem – Channel capacity theorem.

Unit II DATA AND VOICE CODING

Differential pulse code modulation – Adaptive differential pulse code modulation – Adaptive sub-band coding – Delta modulation – Adaptive delta modulation – Coding of speech signal at low bit rates (Vocoders – LPC).

Unit III ERROR CONTROL CODING

Linear block codes – Syndrome decoding – Minimum distance consideration – Cyclic codes – Generator polynomial – Parity check polynomial – Encoder for cyclic codes – Calculation of syndrome – Convolutional codes.

Unit IV COMPRESSION TECHNIQUES

Principles – Text compression – Static Huffman coding – Dynamic Huffman coding – Arithmetic coding – Image compression – Graphics interchange format – Tagged image file format – Digitized documents – Introduction to JPEG standards.

Unit V AUDIO AND VIDEO CODING

Linear predictive coding – Code excited LPC – Perceptual coding – MPEG audio coders – Dolby audio coders – Video compression – Principles – Introduction to H.261 & MPEG video standards.

Total: 45

h. Learning Resources

i. Text Books

1. Simon Haykin, “Communication Systems”, 4th Edition, John Wiley and Sons, 2001.
2. Fred Halsall, “Multimedia Communications - Applications Networks Protocols and Standards”, Pearson Education, 2002

ii. Reference Books

1. Mark Nelson, “Data Compression Book”, BPB, 1992.
2. Watkinson J, “Compression in Video and Audio”, Focal Press, London, 1995.