National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	**Bachelor of Technology in Computer Science and Engineering**	Year of Regulation	**2019-20**
Department	**Computer Science and Engineering**	Semester	**VI**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
CS318	**Information Theory and Coding**	3	0	0	3	50	50	100	200

Course Objectives		Course Outcomes		
	To develop the student's ability to understand the concept of information theory.		CO1	Able to acquire **knowledge** about concept of mutual information and entropy in information theory.
	To provide the students about various codes used for data compression.		CO2	Able to acquire **knowledge** about various data compression codes
	To develop the student's ability to analyse the error correcting codes used for reliable transfer of data.		CO3	Able to **understand** and **analyse** the various error correcting codes used for reliable transfer of data.
	To familiarize the student with the various decoding techniques.		CO4	Able to **understand** and **analyse** the decoding techniques.
	To familiarize the student the cryptographic algorithms used in information theory.		CO5	Able to **understand** and **analyse** some of the cryptographic algorithms used in information theory.

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	2	0	0	0	0	0	0	0	0	0	0	2	0	3
2	CO2	3	3	1	0	0	0	0	0	2	0	1	0	3	2	2
3	CO3	3	3	3	1	2	0	2	0	2	0	0	0	3	3	2
4	CO4	2	3	3	1	2	2	2	0	2	0	1	1	2	2	3
5	CO5	2	3	3	1	2	2	2	0	2	0	3	1	1	2	3

SYLLABUS

No.	Content	Hours	COs
I	Uncertainty, Information, Concept of mutual information, Entropy and their properties, Channel Capacity, Shannon's Theorems, Gaussian Channel	**06**	**CO1**
II	Noiseless coding, Huffman coding and its optimality, Kraft and McMillan's inequality, Shannon-Fano code, Elias code, Arithmetic coding and universal coding.	**10**	**CO2**
III	Algebraic codes-Linear Block codes, Cyclic codes-BCH codes, perfect code, galley codes, Finite geometry codes, Hadamard codes, Maximal distance separable codes, sphere packing and singleton bounds. Codes for random access memories, tapes and disc, fault tolerant computation with arithmetic codes and redundant number systems.	**10**	**CO3**
IV	Exact techniques of decoding, relationship between complexity of algorithms in poly-digital circuits and VLSI with algebraic coding.	**07**	**CO4**
V	Cryptographic codes-Random number generation, DES scheme, RSA scheme and Diffie & Hellman's Public Key Crypto systems.	**07**	**CO5**
	Total Hours	**40**	

Essential Readings

1. Blahut, R.E, Theory and practice of error control codes, Addison Wesley, 1st Edition, 1983, reprint 1992.
2. Blahut, R.E, Principles of transmission of digital information, Addison Wesley, 1st Edition, 1990.
3. Behrouz A. Forouzan, "Cryptography and Network Security", McGraw-Hill publication, 2nd Edition, 2010.

Supplementary Readings

1. James V Stone, Information Theory: A Tutorial introduction, Sebtel Press, 1st Edition, 2015.
2. Thomas M Cover and Joy A Thomas, Elements of Information Theory, Wiley India, 2nd Edition, 2006.
3. Jorge Castiñeira Moreira, Patrick Guy Farrell, Essentials of Error-Control Coding, Wiley, 1st Edition, 2006.