BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus

Instruction Division
First Semester 2016-2017
Course Handout (Part II)

Date: 27.07.2016

In addition to Part I (General Handout for all courses appended to the Time Table), this portion gives further specific details regarding the course.

Course No : **BITS G554**
Course Title : **Data Compression**
Instructor-in-charge : **Pawan K. Ajmera**

1. Course Description: The course covers data compression for signal and image. The data compression has always been an important enabling technology for computer and communication engineers. The increased important of sound and video necessitates the use of at least small measure of data compression due to vast storage and transmission requirements. The course provides necessary foundations for data compression methods, in particular: basic concepts of information theory, transforms, and filters.

2. Prerequisites: Basic knowledge of Signal Processing, Image processing Communication systems and MATLAB programming is desirable.

3. Text Book:

T1: Khalid Sayood, "Introduction to data compression", Third Edition, Elsevier Publication, 2006.

Reference Books:

R1: Thomas M. Cover, and Joy A. Thomas, "Elements of Information Theory", Second Edition, Wiley Publication, June 2006.

R2: Stéphane Mallat, "A Wavelet Tour of Signal Processing", Third Edition, Academic Press, December 2008.

4. Course Plan:

Lecture No.	Learning Topics	Contents to be covered	Reference to Text Book
1	General introduction		
1-5	Basic coding Techniques	Huffman coding, Arithmetic Coding, adaptive, Dictionary techniques.	Ch 1-5
6 - 7	Context based compression	Predictions with partial match, Burrows-Wheeler transform.	Ch 6
8 - 9	Lossless image compression	JPEG Standards	Ch 7
10 - 12	Lossy compression	Distortion criteria, Rate distortion theory,	Ch 8

		Models	
13 - 15	Sampling and Quantization	Sampling, Scalar quantization, vector Quantization, Differential Encoding.	Ch 9, 10, 11
16 - 19	Transform coding	KL Transform, DCT, DST, DWH transform	Ch 13
20 - 22	Subband coding	Subband coding algorithms, design of filter banks, and applications	Ch 14
23 - 29	Wavelet based compression	Wavelet based compression algorithms, Multiresolution analysis, JPEG 2000	Ch 15
30 - 32	Audio coding	Masking, models, MPEG coding	Ch 16
33 - 34	Speech coding	Speech compression	Ch 17
35 - 40	Video coding	Compression algorithms, motion compensation, model based coding	Ch 18

4. Evaluation Scheme:

Evaluation Component	Duration	Weightage	Date, Time	Remarks
Mid-semester Test	90 Minutes	30 %	08/10/2016 (8:00-9:30)	Close Book
Seminars/ Presentations/ Research Summaries	Regular	20 %	To be announced in class	
Experimental or Quantitative Analysis of processes/ products/ phenomena		20 %		
Comprehensive Examination	180 Minutes	30%	12/12/2016 AN	Open Book

5. Chamber Consultation Hour: To be announced in the class.

6. Notices: Notices concerning the course will be put up on the EEE notice board only.

7.Make-up Policy: Makeup will be granted to ***extremely genuine*** cases only, *provided the IC has been informed.*

Instructor-in-Charge
BITS G554