

1.	Name of Course	Data Compression and Coding			
2.	Course Code	CCPS3643			
3.	Name(s) of academic staff				
4.	Rationale for the inclusion of the course/module in the programme	Elective The amount of data is an important issue to be considered. Since Data coding and compression aims to reduce the amount of data being stored and transmitted it is an important topic for CS students. The aim of this module is to provide detailed concepts and methods of data compression and their effectiveness and give an informative and balanced introduction to different approaches, for module students will be expected to do a fair amount of reading on their own.			
5.	Semester and Year offered	1 / 4			
6.	Total Student Learning Time (SLT)	Face to Face			Total Guided and Independent Learning
	L = Lecture T = Tutorial P = Practical O = Others	L 28	T 14	P O	Independent= 84 Total= 126
7.	Credit Value				3
8.	Prerequisite (if any)				none
9.	Objectives: - To provide students with contemporary knowledge in Data Compression and Coding. - To equip students with skills to analyze and evaluate different Data Compression and Coding methods.				
10.	Learning outcomes: Upon the successful completion of this module a student should be able to: - Explain the evolution and fundamental concepts of Data Compression and Coding techniques. - Analyze the operation of a range of commonly used Coding and Compression techniques - Identify the basic software and hardware tools used for data compression. - Identify what new trends and what new possibilities of data compression are available.				
11.	Transferable Skills: - Distinguish between different text, image, video, and audio file formats - Analyze the operation of a range of commonly used Coding and Compression techniques. - Communicate effectively about Data Compression and Coding techniques, with specialists and non-specialists.				

12.	Teaching-learning and assessment strategy A variety of teaching and learning strategies are used throughout the course, including: - Classroom lessons. Lectures and Power Point presentations - Tutorial sessions: Practice exercises - brainstorming; - student-Lecturer discussion - collaborative and co-operative learning; - Independent study. Assessment strategies include the following: - Ongoing quizzes - Midterm tests - Performance Assessment (Participation, Assigned exercises) - Lecturer Observation																	
13.	Synopsis: This module provides detailed concepts and methods of data compression / coding and their effectiveness. It also provides an informative and balanced introduction to different methods such as Intuitive, Statistical and Dictionary Methods for different types of data text, image, audio and video.																	
14.	Mode of Delivery: Classroom lessons / Tutorial sessions																	
15.	Assessment Methods and Types: The assessment for this course will be based on the following: <table><tr><td>Coursework</td><td>40%</td></tr><tr><td> - Quizzes - Assignments - Mid-Semester Exam </td><td> 10% 10% 20% </td></tr><tr><td>Final Examination</td><td> <u>60%</u> 100% </td></tr></table>												Coursework	40%	- Quizzes - Assignments - Mid-Semester Exam	10% 10% 20%	Final Examination	<u>60%</u> 100%
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16.	Mapping of the course/module to the Programme Aims																	
	A1	A2	A3	A4	A5	A6	A7	A8	A9									
	4	2	3	1	3	2	1	3	0									
17.	Mapping of the course/module to the Programme Learning Outcomes																	
	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12						
	3	3	2	1	3	1	1	2	2	1	1	0						
18.	Content outline of the course/module and the SLT per topic																	
		Details								SLT								
										L	T	Indep.	Total					
	Topic 1	Introduction Definitions, Historical background,, Applications, Taxonomy,								2	1	6	9					

Topic 2	Intuitive Compression. Run-Length Encoding, RLE Text Compression, RLE Image Compression, Move-to-Front Coding, Scalar Quantization	2	1	6	9
Topic 3	Statistical Methods Information Theory Concepts, Variable-Size Codes, Prefix Codes, Golomb Codes, The Kraft-MacMillan Inequality, The Counting Argument, Shannon-Fano Coding, Huffman Coding, Adaptive Huffman Coding, MNP5, MNP7, Arithmetic coding, Adaptive Arithmetic Coding, QM Coder, Text Compression, Context-Tree Weighting	4	2	12	18
Topic 4	Dictionary Methods String Compression, Simple Dictionary Compression, LZ77 (Sliding Window), LZSS, Repetition Times, QIC-122, LZX, File Differencing: VCDIFF, LZ78, LZFG, LZRW1, LZRW4, LZW, LZMW, LZAP, LZJ, LZP, Repetition Finder, UNIX Compression, The V.42bis Protocol, XML Compression: XMill, EXE Compressors, CRC, Data Compression Patents	4	2	12	18
Topic 5	Image Compression Approaches to Image Compression; Image Transforms, Orthogonal Transforms. The Discrete Cosine Transform JPEG, JPEG-LS. Progressive Image Compression, JBIG, JBIG2, Simple Images: EIDAC, Vector Quantization, Adaptive Vector Quantization, Block Matching, Block Truncation Coding, Context-Based Methods, FELICS, Progressive FELICS, Differential Lossless Compression,	4	2	12	18
Topic 6	Wavelet Methods Fourier Transform, The Frequency Domain, Fourier Image, Compression, Multiresolution Decomposition, The Laplacian Pyramid, SPIHT, CREW. EZW, DjVu, JPEG 2000	4	2	12	18
Topic 7	Video Compression Analog Video , Composite and Components Video , Digital Video , Video Compression , MPEG , MPEG-4 , H.261	2	1	6	9
Topic 8	Audio Compression Sound, Digital Audio , The Human Auditory System , μ -Law and A-Law Companding , ADPCM Audio Compression , MLP Audio , Speech Compression , Shorten MPEG-1 Audio Layers	2	1	6	9
Topic 9	Other Methods and application Zip and Gzip, PNG, The Burrows-Wheeler Method ,Symbol Ranking, ACB , Sort-Based Context Similarity , Sparse Strings , Word-Based Text Compression , Textual Image Compression, Dynamic Markov Coding , FHM Curve Compression , Sequitur , Triangle Mesh Compression: Unicode Compression	4	2	6	12
Total		28	14	78	120

19.	Main references supporting the course: • David Salomon , A Concise Introduction to Data Compression, 1st edition, Springer, 2008. Additional references supporting the course: • David Salomon, G. Motta, D. Bryan, Data Compression: The Complete Reference, 4nd edition, Springer(2006) • D.C. Hankerson, Greg A. Harris , Peter D. Johnson Jr, Introduction to Information Theory and Data Compression, Second Edition, Chapman & Hall/CRC; 2 edition 2003
20	Other additional information All materials will be available to the students online.