Module specification

1. Factual information

Module title	**TM297: Compression Methods for Multimedia**	**Level**	**2**
Module tutor	TBA	**Credit value**	**10**
Module type	Taught	**Notional learning hours**	**3**

2. Rationale for the module and its links with other modules

Data compression aims at finding new ways of representing data so that it takes very little storage, while still being able to reconstruct the original data from the compressed version. Compression is applied namely when storage space is at a premium or when data needs to be transmitted and bandwidth is at a premium (which always is the case). The most important thing about compression is that it is not ``one size fits all'' approach: essentially, compression aims at specifying the characteristics of the data that needs to be compressed (mainly looking for patterns to be explored in order to achieve compact data representation). This module defines a variety of data modeling and representation techniques, which is at the heart of compression. Recently, the convergence in the field of communications, computing and entertainment industries enabled data compression to be a part of everyday life (e.g. MP3, DVD and Digital TV) and has created a number of exciting new opportunities for new applications of compression technologies.

3. Aims of the module

The aims of this module are to illustrate methods for handling and compressing different kinds of data, such as text, images, audio and video data and show data compression techniques for multimedia and other applications, especially the once used in the Internet.
After finishing successfully this Module you should be able to:
1. Compute basic statistics of data.
2. Apply nontrivial algorithms to real-world problems.
3. Outline the principles of data compression.
4. Discover different compression methods for text, image, audio, and video data.
5. Extend different compression methods and their applications in different aspects of computing.

4. Pre-requisite modules or specified entry requirements

TM112 & MT131

5. Intended learning outcomes	
A. Knowledge and understanding	**Learning and teaching strategy**
Upon completing this module, students will be able to: A1. Develop a well-founded knowledge in the field of study. A2. Relate other disciplines to the field of study. A3. Develop an international perspective on the field of study.	• 25% face-to-face tutorial sessions. • TMA, MTA and final exam. • Text Book and support material.

B. Cognitive skills	**Learning and teaching strategy**
Upon completing this module, students will be able to: B1. Analyse and explore information and ideas and to convey those ideas clearly and fluently, in both written and spoken forms. B2. Experiment effectively with others in order to work towards a common outcome. B3. Select and make use of appropriate level, style and means of communication. B4. Experiment appropriately with information and communication technologies.	• 25% face-to-face tutorial sessions. • TMA, MTA and final exam. • Text Book and support material.

C. Practical and professional skills	**Learning and teaching strategy**
Upon completing this module, students will be able to: C1. Apply different compression methods for text, image, audio, and video data C2. Examine nontrivial algorithms to real-world problems C3. Extend different compression methods and their applications in different aspects of computing.	• 25% face-to-face tutorial sessions. • TMA, MTA and final exam. • Text Book and support material.

D Key transferable skills	**Learning and teaching strategy**
Upon completing this module, students will be able to: D1. Analyse and conclude independently. D2. Develop ideas and adapt innovatively to changing environments.	• 25% face-to-face tutorial sessions. • TMA, MTA and final exam. • Text Book and support material.

D3. Identify problems constructs solutions, innovate and improve current practices.	

6. Indicative content.

- **Unit 1-2:** Raw multimedia data representation, Transmission medium characteristics, Data compression, Adaptive and non-adaptive methods, Lossy and lossless compression, Introduction to information theory and Theoretical limits of compressibility

- **Unit 3-4:** Compressing symbolic data: Run-length coding, Entropy coders: Huffman coding, arithmetic coding, Dictionary coders: LZ77, LZW, Other text compression methods: Block-sorting. Standard text compression utilities: compress, zip

- **Unit 5-6:** Image compression: Monochrome, facsimile and grayscale compression, GIF compression, JPEG compression, Video compression: Frame-by-frame compression: M-JPEG. Inter-frame compression: MPEG. Audio compression: Speech coding: ADPCM; CD-quality audio: MPEG layer 3

- **Unit 7-8:** Raw multimedia data representation, Transmission medium characteristics, Data compression, Adaptive and non-adaptive methods, Lossy and lossless compression, Introduction to information theory and Theoretical limits of compressibility

- **Unit 9-10:** Compression applications: Computer system applications, Communication network applications, Broadcast media applications, Consumer electronics applications, Publishing applications, Entertainment applications, Healthcare applications

- Unit 11-12: Managing compressed data: Self-identifying compressed data, Error-proofing compression algorithms, Interaction between compression and other functions, Interaction between compression algorithms, Operating on compressed data, Archiving compressed data.

7. Assessment strategy, assessment methods and their relative weightings

TMA Work: 20% (2 on-line TMA as practical session)

MTA: 30%

Final Exam: 50%

8. Mapping of assessment tasks to learning outcomes												
Assessment tasks	**Learning outcomes**											
	A1	**A2**	**A3**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**
TMA'S	✓	✓			✓	✓	✓	✓		✓		✓	
MTA	✓		✓	✓			✓	✓	✓				✓
Final	✓		✓		✓	✓		✓	✓	✓	✓	✓	✓

9. Teaching staff associated with the module
Name and contact details
TBA

10. Key reading list				
Author	Year	Title	Publisher	Location
Roy Hoffman (Author)	(1997)	Data compression in digital systems	Chapman and Hall Digital Multimedia Standards Series	

11. Other indicative text (e.g. websites)
https://www.coursera.org/learn/digital