Arab Academy for Science and Technology and Maritime Transport
Computer Science Curriculum
Course Syllabus

Course Code: **CS411**	**Course Title:** Data Compression	**Classification:** **E**	**Coordinator's Name:** Dr. Saleh Mesbah **Lecturer's name:** Dr. Radwa Fathalla	**Credit Hours:** 3
Pre-requisites: **None.**	**Co-requisites:** None	**Schedule:** Lecture: 2 hours Tutorial-Lab: 2 hours		

Office Hours: (Room 405)
Thursday 10:30 a.m. -12:30 p.m.

Course Description:
This course provides an overview of classical and modern techniques and algorithms of various types of data compression. It covers statistical and dictionary methods, lossless and lossy compression algorithms in text, image, audio, and video compression.

Textbook:
Introduction to Data Compression, 4th ed. By Khalid Sayood. 2012

References:
Data Compression the Complete Reference, 4th ed. By David Salomon

Course Objective/Course Learning Outcome:	**Contribution to Program Student Outcomes:**

Realize the need for data compression.	(SO 6)Apply computer science theory and software development fundamentals to produce computing-based solutions.
Differentiate between lossless and lossy compression techniques.	(SO 6)Apply computer science theory and software development fundamentals to produce computing-based solutions.
Understand three statistical lossless compression encoding techniques (Run-length, Huffman, Adaptive Huffman, Arithmetic).	(SO 2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
Understand two dictionary lossless compression encoding techniques (LZ77, LZW)	
Understand the main idea behind JPEG standard for compression of still images.	
Understand the main idea behind MPEG standard for compression of video and its relation to JPEG.	
Implement some of the mentioned compression encoding techniques using Python or Matlab.	(SO 6)Apply computer science theory and software development fundamentals to produce computing-based solutions.

Course Outline:

1. Introduction to data compression, lossy and lossless techniques
2. Information Content and Entropy
3. Huffman Coding
4. Adaptive Huffman Coding
5. Arithmetic coding
6. Dictionary Coding, LZW, LZ77
7. 7^{th} week exam
8. Audio Compression
9. Audio Compression
10. Image Compression
11. Image Compression
12. 12^{th} week exam
13. Video Compression
14. Video Compression
15. Revision
16. Final exam

Grade Distribution:

7th Week Assessment (30%):
Exam (30%)

12th Week Assessment (20%):
Exam (10%) + Programming assignment 10%

Year Work (10%):
Homework Assignments (10%)

Final Exam (40%)

Policies:

Attendance:
AASTMT Education and Study Regulations (available at aast.edu)

Academic Honesty:
AASTMT Education and Study Regulations (available at aast.edu)

Late Submission:
Late submissions are graded out of 75% (1 week late), 50% (2 weeks late), 25% (3 weeks late), 0% (more than 3 weeks late)