CS4185: MULTIMEDIA TECHNOLOGIES AND APPLICATIONS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Multimedia Technologies and Applications

Subject Code
CS - Computer Science
Course Number
4185

Academic Unit
Computer Science (CS)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
(CS2310 Computer Programming or CS2311 Computer Programming or
CS2313 Computer Programming) AND (CS2303 Data Structures for Media or CS3334 Data Structures)

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The course aims at providing students with theoretical and technical understanding on multimedia components and systems. The course covers contemporary, interactive multimedia technology systems, focusing on types, applications, and theories of operation. Basic technologies such as multimedia data representation, compression, retrieval and communication will be covered in an integrated manner. On the completion of the course, students should be able to understand the fundamental concepts and make critique to the technologies associated with various multimedia data types such as image, video, audio, graphics and animation.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain approaches to represent multimedia data in digital format and identify their properties.		x		
2	Derive the rational of the multimedia representation format and compression algorithms based on the human visual and auditory perception.		x		
3	Analyze image, video and audio in the frequency domain to identify important components to be encoded.			x	
4	Explain the major steps in some of the image, video and audio compression standards.			x	
5	Apply multimedia data and techniques on a practical application.				

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	The lecture will focus on the introduction of basic technologies such as multimedia data representation, frequency domain features, human perception, lossy and lossless compression, compression standards, etc.	1, 2, 3, 4, 5	3 hours/week
2	Tutorials	Students will work on some class exercises each week during the tutorial sessions. In particular, they will have group discussions to solve problems related to various topics. The solutions will be reviewed at the end of each tutorial session.	1, 2, 3, 4, 5	8 hours/semester
3	Course Project	The students will solve problems that require them to analyze the scenarios and apply related techniques learnt from the lectures. While the problem is being solving, the students will discover the rational behind the particular approach. They are required to explain their solutions to demonstrate their understanding of the concepts.	3, 5	3 hours for 7 weeks

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quiz	1, 2, 3	20	
2	Course Project	3, 5	20	

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Additional Information for ATs
For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)

Assessment Task
Quiz

Criterion
Capacity in understanding the key concerns of multimedia data and techniques

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Note even reaching marginal levels

Assessment Task
Course Project

Criterion
Ability to apply multimedia techniques on a practical application

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Note even reaching marginal levels

Assessment Task
Examination

Criterion
Ability to analyse and evaluate multimedia data and techniques and apply multimedia techniques on applications

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Note even reaching marginal levels

Part III Other Information

Keyword Syllabus

Multimedia Data Compression, Multimedia Data Representation, Image and Video Compression, Digital Audio, Multimedia Database Systems.

Syllabus

- Image Representation
- Color Science and Color Models
- Lossless and Lossy Compression
- JPEG Image Compression Standard
- Video Representation
- Basic Video Compression Techniques
- Video Coding Standards: H.26X and MPEG
- Basics of Digital Audio
- Audio Compression

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Ze-Nian Li and Mark Drew (2004). Fundamentals of Multimedia. Prentice Hall.
2	J. Buford (1994). Multimedia Systems. Addition Wesley.
3	P. Andleigh and K. Thakra (1996). Multimedia Systems Design. Prentice Hall.