

City University of Hong Kong
Course Syllabus

offered by Department of Computer Science
with effect from Semester A 2024/25

Part I Course Overview

Course Title:	<u>Multimedia Technologies and Applications</u>
Course Code:	<u>CS5185</u>
Course Duration:	<u>One semester</u>
Credit Units:	<u>3 credits</u>
Level:	<u>P5</u>
Medium of Instruction:	<u>English</u>
Medium of Assessment:	<u>English</u>
Prerequisites: <i>(Course Code and Title)</i>	<u>Nil</u>
Precursors: <i>(Course Code and Title)</i>	<u>Nil</u>
Equivalent Courses: <i>(Course Code and Title)</i>	<u>Nil</u>
Exclusive Courses: <i>(Course Code and Title)</i>	<u>Nil.</u>

Part II Course Details

1. Abstract

The course aims at providing students with theoretical and technical understanding on multimedia components, communications, and systems. The course covers contemporary, interactive multimedia technology and communication 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 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.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Explain approaches to represent multimedia data in digital format and identify their properties based on the human visual and auditory perception.	20%	✓		
2.	Discuss image, video and audio properties in the frequency domain to identify important components to be encoded.	20%		✓	
3.	Explain the major steps in some of the image, video and audio compression standards, including quantization, coding techniques and coding standards.	25%		✓	
4.	Explain multimedia streaming and QoS for real-time multimedia data transmission.	15%	✓		
5.	Apply lossless and lossy compression techniques on multimedia data.	20%		✓	✓
		100%			

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.

3. Learning and Teaching Activities (LTAs)

(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	5	
Lecture	Student will engage in formal lectures to learn basic technologies such as multimedia data representation, frequency domain features, human perception, lossy and lossless compression, compression standards, etc..	✓	✓	✓	✓	✓	2 hours/ week
Tutorial	Students will participate in some class exercises each week during the tutorial sessions. In particular, they will engage in group discussions on how to solve various multimedia-related problems.	✓	✓	✓	✓	✓	1 hour/ week
Project	Students will engage in solving scenarios-based problems that involve applying related techniques learnt from the lectures. While the problem is being solved, the students will also engage in discovering the rationale behind the particular approach and explaining their proposed solutions.		✓			✓	

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.					Weighting	Remarks
	1	2	3	4	5		
Continuous Assessment: 40%							
Quiz	✓	✓		✓		20%	
Course Project		✓			✓	20%	
Examination [^] : 60% (duration: 2 hours)							
						100%	

[^] For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Quiz	Capacity in understanding the key concerns of multimedia data and techniques	High	Significant	Moderate	Basic	Note even reaching marginal levels
2. Course Project	Ability to apply multimedia techniques on a practical application	High	Significant	Moderate	Basic	Note even reaching marginal levels
3. Examination	Ability to analyse and evaluate multimedia data and techniques and apply multimedia techniques on applications	High	Significant	Moderate	Basic	Note even reaching marginal levels

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Quiz	Capacity in understanding the key concerns of multimedia data and techniques	High	Significant	Moderate	Note even reaching marginal levels
2. Course Project	Ability to apply multimedia techniques on a practical application	High	Significant	Moderate	Note even reaching marginal levels
3. Examination	Ability to analyse and evaluate multimedia data and techniques and apply multimedia techniques on applications	High	Significant	Moderate	Note even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

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

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Ze-Nian Li and Mark Drew (2004). <i>Fundamentals of Multimedia</i> . Prentice Hall.
2.	J. Buford (1994). <i>Multimedia Systems</i> . Addison Wesley.
3.	Jens-Rainer Ohm (2015). <i>Multimedia Signal Coding and Transmission</i> . Springer.
3.	Mario Marques da Silva (2012). <i>Multimedia Communications and Networking</i> . CRC Press.