City University of Hong Kong
Course Syllabus

offered by Department of Computer Science
with effect from Semester A 2017/18

Part I   Course Overview

Course Title: Multimedia Technologies and Applications

Course Code: CS5185

Course Duration: One semester

Credit Units: 3 credits

Level: P5

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title)   Nil

Precursors:
(Course Code and Title)   Nil

Equivalent Courses:
(Course Code and Title)   Nil

Exclusive Courses:
(Course Code and Title)   Nil.

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.	Analyze image, video and audio 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 self-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. Teaching and Learning Activities (TLAs)

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

Teaching pattern:
Suggested lecture/tutorial/laboratory mix: 2 hours lecture; 2 hours laboratory

TLA	Brief Description	CILO No. 1	2	3	4	5	Hours/week (if applicable)
Lecture	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.	✓	✓	✓	✓	✓	
Tutorial	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.	✓	✓	✓	✓	✓	
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.		✓			✓	

4. Assessment Tasks/Activities (ATs)

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

Assessment Tasks/Activities	CILO No. 1	2	3	4	5	Weighting	Remarks
Continuous Assessment: <u>40%</u>							
Quiz	✓	✓		✓		20%	
Course Project		✓			✓	20%	
Examination^: <u>60%</u> (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.)

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

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). *Fundamentals of Multimedia*. Prentice Hall.
2.	J. Buford (1994). *Multimedia Systems*. Addison Wesley.
3.	Jens-Rainer Ohm (2015). *Multimedia Signal Coding and Transmission*. Springer.
3.	Mario Marques da Silva (2012). *Multimedia Communications and Networking*. CRC Press.