City University of Hong Kong  
Course Syllabus  

offered by Department of Computer Science  
with effect from Semester A 2015/16

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### Part I  Course Overview

**Course Title:** Multimedia Technologies and Applications

**Course Code:** CS4185

**Course Duration:** 1 semester

**Credit Units:** 3 credits

**Level:** B4

- Arts and Humanities
- Study of Societies, Social and Business Organisations
- Science and Technology

**Proposed Area:**

(for GE courses only)

**Medium of Instruction:** English

**Medium of Assessment:** English

**Prerequisites:**

(Course Code and Title)

(CS2310 Computer Programming or CS2311 Computer Programming or CS2313 Computer Programming or CS2331 Problem Solving and Programming)

AND (CS2303 Data Structures for Media or CS3334 Data Structures)

**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
   (A 150-word description about the course)

   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.

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.)

<table>
<thead>
<tr>
<th>No.</th>
<th>CILOs*</th>
<th>Weighting* (if applicable)</th>
<th>Discovery-enriched curriculum related learning outcomes (please tick where appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Explain approaches to represent multimedia data in digital format and identify their properties.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>2.</td>
<td>Derive the rational of the multimedia representation format and compression algorithms based on the human visual and auditory perception.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>3.</td>
<td>Analyze image, video and audio in the frequency domain to identify important components to be encoded.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>4.</td>
<td>Explain the major steps in some of the image, video and audio compression standards.</td>
<td></td>
<td>✓</td>
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<tr>
<td>5.</td>
<td>Apply multimedia data and techniques on a practical application.</td>
<td></td>
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</table>

* If weighting is assigned to CILOs, they should add up to 100%.
* Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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/labouratory mix: 2 hrs. lecture; 1 hr. tutorial.*

<table>
<thead>
<tr>
<th>TLA</th>
<th>Brief Description</th>
<th>CILO No.</th>
<th>Hours/week (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>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.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>2 hours / wk</td>
</tr>
<tr>
<td>Tutorials</td>
<td>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.</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>1 hour / wk</td>
</tr>
<tr>
<td>Course Project</td>
<td>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.</td>
<td>✓ ✓</td>
<td>3 hours for 7 weeks</td>
</tr>
</tbody>
</table>

4. **Assessment Tasks/Activities (ATs)**
   *(ATs are designed to assess how well the students achieve the CILOs.)*

<table>
<thead>
<tr>
<th>Assessment Tasks/Activities</th>
<th>CILO No.</th>
<th>Weighting*</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment: 40%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Quiz</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Course Project</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>20%</td>
<td></td>
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</tbody>
</table>

Examination*: 60% (duration: 2 hours)

*The weightings should add up to 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.)*

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

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