Subject Description Form

Subject Code	EIE4431
Subject Title	Digital Video Production and Broadcasting
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject provides a broad knowledge of digital video production and broadcasting.
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the fundamentals of digital video systems with emphasis on production and broadcasting. 2. Work with digital video editing tools. 3. Understand the system design principles of video broadcasting. 4. Design simple systems related to video broadcasting. 5. Facilitate for further development in advanced digital video production and broadcasting. Category B: Attributes for all-roundedness. 6. Learn independently.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to Video Production and Broadcasting Elements of a video production and broadcasting system. Video services in Hong Kong. Video production and broadcasting standards and current development. 2. Fundamental of Video Production Production process, pre-production, production and post-production. Digital video editing. 3. Video Production Equipment Digital camera and video camera, image sensors, sensor architectures. 4. Fundamental of Digital Video Coding Digital video representation, digital video compression, intraframe coding, motion estimation and compensation. 5. Fundamental of Digital Video Broadcasting Digital video coding standards and video codecs – MPEG-2, H.264, HEVC, VP9 and AV1. Video transport layer. Transmission layer. 6. Transport Protocol for Digital Video Data encapsulation, multiplexing and de-multiplexing. Transmission protocols: packet structure: Program Association Table (PAT), Program Map Table (PMT) and Conditional Access Table (CAT), MPEG-2 Transport Stream (MPEG-2 TS), MPEG-2 Program Stream (MPEG-2 PS). Conditional access for digital TV. Real-time Transport Protocol (RTP) 7. Error Control for Digital Video Quality of service requirements for video communications. Error resilience and concealment techniques for digital video.

8. Digital Video Broadcasting Techniques and Standards
Channel coding for error control in digital TV, block and convolution codes, concatenated coding in digital TV. Digital modulation, different modulation schemes – APSK, BPSK, QPSK, QAM, Coded Orthogonal Frequency Division Multiplexing.

9. Internet Protocol Television (IPTV) and Over-the-Top (OTT) TV
IPTV versus OTT. Video streaming over the Internet. Content Delivery Network (CDN), OTT platform, OTT business operation, OTT advertising.

Laboratory Experiments:

1. Digital video editing – Basic tools and visual effects
2. Digital video editing – Layering and keying clips
3. Digital video coding for broadcasting systems

Teaching/ Learning Methodology

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures	1, 3, 4, 5, 6	fundamental principles and key concepts of the subject are delivered to students
Tutorials	1, 3, 4, 5, 6	supplementary to lectures and are conducted with smaller class size; students will be able to clarify concepts and to have a deeper understanding of the lecture material; problems and application examples are given and discussed
Laboratory sessions	2, 6	students will make use of digital video editing tools

Assessment Methods in Alignment with Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)					
		1	2	3	4	5	6
1. Continuous Assessment (total 40%)							
• Short quizzes/ Assignments	10%	✓		✓	✓	✓	✓
• Tests	20%	✓		✓	✓	✓	✓
• Laboratory sessions	10%		✓				✓
2. Examination	60%	✓		✓	✓	✓	✓
Total	100%						

The continuous assessment will consist of laboratory reports, a number of short quizzes, assignments, and tests.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Specific Assessment Methods/Tasks	Remark
Short quizzes	mainly objective tests (e.g., multiple-choice questions, true-false, and matching items) conducted to measure the students' ability to remember facts and figures as well as their comprehension of subject materials
Assignments, tests and examination	end-of chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom; students need to think critically and creatively in order to come with an alternate solution for an existing problem
Laboratory sessions	each group of students are required to produce a written report; accuracy and the presentation of the report will be assessed; oral examination based on the laboratory exercises will be conducted for each group member to evaluate his technical knowledge and communication skills

Student Study Effort Expected	**Class contact (time-tabled):**	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	**105 Hours**
Reading List and References	**Reference Books:** 1. Sanjoy Paul, *Digital Video Distribution in Broadband, Television, Mobile and Converged Networks: Trends, Challenges and Solutions*, Wiley, 2011 2. U. Reimers, *DVB: The Family of International Standards for Digital Video Broadcasting*, Springer, 2005. 3. Vijay K. Adhikari, Yang Guo, Fang Hao, Volker Hilt, Zhi-Li Zhang, Matteo Varvello, and Moritz Steiner, “Measurement Study of Netflix, Hulu, and a Tale of Three CDNs” IEEE Transactions on Networking, pp.1984-1997 vol. 23, no. 6, Dec. 2015	
Last Updated	July 2020	
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