City University of Hong Kong
Course Syllabus

offered by Department of Electronic Engineering
with effect from Semester A in 2016/2017

Part I Course Overview

Course Title:	Three Dimensional (3D) Video Display Technology
Course Code:	EE6618
Course Duration:	One Semester (13 weeks)
Credit Units:	3
Level:	P6
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	EE4115 Audio Visual Engineering or equivalent
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

This course aims at providing students with the fundamental knowledge, as well as the hands on experience on the design of three dimensional (3D) video display technology in industrial applications. It is expected that students will develop their ability to address the essential aspects in the world of 3D video systems including, the classical 3D display methods, lens free stereoscopic multi-view auto-stereoscopic, the volumetric 3D systems, and the advance digital holographic technology. Discovery learning experience will be provided for students via case studies and mini-projects to broaden their vision in a macro view of the 3D industry, as well as the trend of development in the consumers market.

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.	Describe the essential elements leading to 3D perception.		✓	✓	
2.	Explain the technologies involved in the development of conventional and holographic 3D display systems.		✓	✓	
3.	Describe the design of the core components in a 3D/holographic systems.		✓	✓	
4.	Demonstrate the understanding towards realization of 3D experience.		✓	✓	✓
		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.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5		
Lecture	Explain key concepts in 3D video technology and applications	✓	✓	✓				3 hrs/wk (*Some of the lecture hours will also be conducted as in-class exercises, case studies, and mini-projects)*
Tutorial	Explain key concepts in 3D video technology and applications	✓	✓	✓				
Case studies	With tasks assigned via the case studies of this course, and supported with discussion with students to assess their progress; students are feed-backed on their quality of their case studies for progression.	✓	✓	✓				
Mini-project	Conduct projects on 3D video technology and applications	✓	✓	✓	✓			

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	6		
Continuous Assessment: 60%								
Written-assignments, Presentations, Tests, Mini-Projects	✓	✓	✓	✓			60%	
Examination: 40% (duration: 2hrs)								
							100%	

Remark:

To pass the course, students are required to achieve at least 35% in course work and 35% in the examination.

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-)	Adequate (C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Coursework	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels

6. Constructive Alignment with Programme Outcomes

PILO	How the course contribute to the specific PILO(s)
1, 2, 3	The course provides students with a comprehensive view on the key components in 3D video display technology, enabling them to acquire the knowledge for realizing 3D visual perception. With the knowledge they have learnt, students will be able to take part in the analysis, and most important, hands on realization of simple conventional and holographic 3D displays.
4, 5, 6	Analysis and design of core components for realizing 3D visual experience.

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

1. Keyword Syllabus

Fundamentals of 3D display engineering

Human 3D visual perception, and early methods for generating 3D effects on planar display.

Conventional 3D display framework

Anaglyph and polarized lens 3D.
Mirage 3D.

Modern 3D lens free display framework

Multi-view auto-stereoscopic 3D display based on lenticular lens and parallax barrier.
Volumetric display.
Persistence of Vision 3D.
3D Fox screen.

Holographic framework

Principles of digital holography.
Generation and display of digital holograms.
3D video holography.

Case studies and mini-projects in 3D Video Display Technology

Case studies - Students will be guided to study various reports and marketing research from the internet to facilitate them in grabbing the latest information in the 3D video industry. (Emphasis will placed on understanding the products developed by the leading 3D display companies. Apart from enhancing their senses towards 3D systems, these kind of studies will also inspired their imagination on new technologies that will fit the market trends)

Mini-projects - Students are formed small groups for mini-projects on various kinds of 3D displays, after they have acquired sufficient knowledge on the 3D technology through lectures and the case studies, in realizing their 3D visual learning and experience. Including the cutting edge holographic technology.

(Through the discovery learning via the case studies and the mini-projects, which are supported with presentations and group discussions, students will be able to enhance their capability in effective communication, experience sharing, and team works)

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.)

1.	Applied Optics, (Journal OSA) (selected articles).
2.	Optics Express, (Journal OSA) (selected articles).
3.	Relevant articles from other optical journals.

2.2 Additional Readings

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

1.	Barry G. Blundell, "3D Displays and Spatial Interaction: From Perception to Technology Volume I: Exploring the Science, Art, Evolution and Use of 3D Technologies", Walker & Wood Limited, 2011.
2.	Ernst Lueder, "3D Displays", Wiley Series in Display Technology, 2012.
3.	Pascal Picart,Jun-chang Li, "Digital Holography", Wiley-ISTE, 2012.