City University of Hong Kong
Course Syllabus

offered by Department of Electrical Engineering
with effect from Semester A 2022/2023

Part I Course Overview

Course Title:	Antenna Design for Wireless Communications
Course Code:	EE6619
Course Duration:	One Semester (13 weeks)
Credit Units:	3
Level:	P6
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	EE3109 Applied Electromagnetics
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

To provide students with electromagnetic field fundamentals and with basic theory in the designs of planar and printed antennas, including dipole, slot, microstrip patch and dielectric resonator antennas for modern wireless communications. Techniques for bandwidth enhancement, multi-band operation, and size reduction are studied.

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.	Fundamentals of antenna design.		✓		
2.	Design of dipole antenna and array.		✓	✓	
3.	Design of microstrip patch antenna and array.		✓	✓	✓
		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				
Lecture	Antenna theory, measurement techniques, design techniques	✓	✓	✓				3 hrs/wk (*Some of the lectures will be conducted as in-class exercises, case studies, and mini-projects)*
Assignment	Analysis and design	✓	✓	✓				
Mini-project	Design, construct and test of a microstrip antenna for practical use		✓	✓				

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					
Continuous Assessment: 60%								
Tests (min.: 2)	√	√	√				35%	
#Assignments (min.: 3)	√	√	√				25%	
Examination: 40% (duration: 2 hrs , if applicable)								
Examination	√	√	√				40%	
							100%	

Remark:

To pass the course, students are required to achieve at least 30% in course work and 30% in the examination.

may include homework, tutorial exercise, project/mini-project, presentation

5. Assessment Rubrics

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

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B,)	Marginal (B-, C+, C)	Failure (F)
1. Examination	Achievements in CILOs	High	Medium	Low	Not even reaching marginal level
2. Coursework	Achievements in CILOs	High	Medium	Low	Not even reaching marginal level

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal level
2. Coursework	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal level

6. Constructive Alignment with Programme Outcomes

PILO	How the course contribute to the specific PILO(s)
1, 2, 3, 4	The course provides students with knowledge on the development of printed antennas for modern wireless communications. Upon completion of the course, students will be able to design planar and printed antennas.
1	Students are required to complete assignments to gain experience in the analysis of basic wire antennas and arrays.
2, 3, 4	An individual mini-project is allocated to allow students to practice the design, fabrication and measurement of printed antennas for various wireless applications.

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

1. Keyword Syllabus

Fundamentals of antenna design and measurement
Hertzian dipole, transmitting antenna parameters, receiving antenna, far-field and near-field antenna measurement.

Wire antenna and array
Half-wave dipole, balun, folded dipole, loop antennas, array factor, pattern multiplication, uniform array, mutual coupling, scan blindness, feed network, switch-beam array, Yagi-Uda antenna.
Microstrip patch antenna
Basic characteristics, transmission line model, cavity model, feed techniques, bandwidth enhancement techniques, size reduction techniques, circularly polarized patch antenna, dual polarized patch antenna, patch antenna arrays.

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.	Nil

2.2 Additional Readings

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

1.	Kai Fong Lee and Kwai Man Luk, Microstrip Patch Antennas, Imperial College Press, 2011.
2.	Eng Hock Lim and Kwok Wa Leung, Compact Multifunctional Antennas, Wiley, 2012.
3.	Warren L. Stutzman and Gary A. Thiele, Antenna Theory and Design, Wiley, 1998.