

City University of Hong Kong

Information on a Course  
offered by Department of Electronic Engineering  
with effect from Semester B in 2014/15

**Part I**

Course Title: Antenna Design for Wireless Communications

Course Code: EE6619

Course Duration: One Semester (13 weeks)

No. of credits: 3

Level: P6

Medium of Instruction: English

Prerequisites (*Course Code and Title*): Nil

Precursors (*Course Code and Title*): EE3109 Applied Electromagnetics

Equivalent Course (*Course Code and Title*):

Exclusive Courses: (*Course Code and Title*):

**Part II**

**Course Aims:**

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.

**Course Intended Learning Outcomes (CILOs)**

Upon successful completion of this course, students should be able to:

No.	CILOs
1.	Fundamentals of electromagnetic fields for antenna design
2.	Design of dipole and slot antenna and array
3.	Design of microstrip patch antenna and array
4.	Design of dielectric resonator antenna

**Teaching and Learning Activities (TLAs)**

(Indicative of the possible activities and tasks designed to facilitate students' achievement of the CILOs. Fine details will be provided for students upon the commencement of the course.)

CILO 1	Lecture, assignment
CILO 2, 3, 4	Lecture, assignment, mini-project

### Timetabling Information

Pattern	Hours
Lecture:	39*
Tutorials:	
Laboratory:	
Other activities:	

\* Some of the lectures will be conducted as in-class exercises, case studies, and mini-projects.

### Assessment Tasks/Activities

(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs. Final details will be provided to students in their first week of attendance in this course)

	Type of assessment tasks	Weighting (if applicable)
Continuous Assessment	Assignment, test, mini-project	100% CW

Remarks: To pass the course, students are required to achieve at least 35% in the continuous assessment.

### Grading of Student Achievement:

Letter Grade	Grade Point	Grade Definitions
A+	4.3	Excellent
A	4.0	
A-	3.7	
B+	3.3	Good
B	3.0	
B-	2.7	
C+	2.3	Adequate
C	2.0	
C-	1.7	
D	1.0	Marginal
F	0.0	Failure

### 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****Keyword Syllabus:**Revision of electromagnetic field theory for antenna

Maxwell's equations, Wave equation and its solution, plane waves reflection and refraction, waveguide theory

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

Slot antenna

Huygen's Principle, waveguide-fed slot antenna array, stripline-fed slot antenna array

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

Dielectric resonator antenna

Basic characteristics, analytical and numerical techniques, wideband design, multi-mode operation.

**Recommended Reading:**

Kai Fong Lee and Kwai Man Luk, Microstrip Patch Antennas, Imperial College Press, 2011

Eng Hock Lim and Kwok Wa Leung, Compact Multifunctional Antennas, Wiley, 2012

Warren L. Stutzman and Gary A. Thiele, Antenna Theory and Design, Wiley, 1998

**Online Resources (if any)**