City University of Hong Kong

Information on a Course offered by Department of Electronic Engineering with effect from Semester A in 2012/13

Part I

Course Title:	Wireless Communication Technologies
Course Code:	EE6603
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)*:	EE3008 Principles of Communications
Equivalent Course *(Course Code and Title)* :	Nil.
Exclusive Courses: *(Course Code and Title)*:	Nil.

Part II

Course Aims:

This course aims to provide students with an understanding of the principles of wireless communication theory, with emphasis on problem-solving techniques via discovery learning, leading to the solutions of signal and system design problems of practical wireless communication networks such as cellular networks and WiFi networks.

Course Intended Learning Outcomes (CILOs)

No.	CILOs	Importance, if applicable (1 = most important)
1.	Describe the characteristics of fading channels and recognize the statistical modelling approach of wireless channels.	1
2.	Apply the diversity techniques to overcome fading.	1
3.	Explain multiple access techniques and their application in practical wireless systems.	1
4.	Understand the requirements and evaluation methods and apply to practical wireless systems.	2

Teaching and Learning Activities (TLAs)
(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)

CILO 1, 2	Lecture
CILO 3, 4	Lecture, case study, course project.

Discovery Learning Experience (DLE) is a key to this course. In particular, each student will choose an advanced topic in the area of wireless communications as their course project, and present his/her findings and ideas in class. Comments on their presentations will be provided so that they could better prepare for the final project reports.

Timetabling Information

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

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)

Coursework: 40%

Examination: 60% 2 Hours

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

CILO No.	*Type of assessment tasks/*	*Weighting (if applicable)*	*Remarks*
1, 2, 3, 4	Examination	60%	
3, 4	Course project	40%	

Grading of Student Achievement:

Letter Grade	Grade Point	Grade Definitions	Description of Student Achievement
A+ A A-	4.3 4.0 3.7	Excellent:	Evidence of excellent grasp of any three CILOs and good grasp of the remaining CILO
B+ B B-	3.3 3.0 2.7	Good:	Evidence of good grasp of all CILOs
C+ C C-	2.3 2.0 1.7	Adequate:	Evidence of satisfactory grasp of all CILOs
D	1.0	Marginal:	Evidence of satisfactory grasp of CILO 1, and some evidence of the remaining three CILOs
F	0.0	Failure:	Little or no evidence of grasp of any CILOs

Constructive Alignment with Programme Outcomes

PILO	How the course contribute to the specific PILO(s)
1, 2, 3	The course provides students with amble opportunities in acquiring knowledge of and evaluation of new wireless communication technologies, and also the applications of mathematics and engineering problem solving skills which are central to the aims of this program. Students are encouraged to develop the ability to integrate their learning into a real-world design in wireless communications.
4, 5	Students are required to complete a course project to gain practical experience in wireless communication system design and reflect on how to apply what they have learned in this course to solve practical problems. The analytical and research skills developed are central to the aims of this program.

Part III

Keyword Syllabus:

Wireless channel
Fading, path loss, shadowing, flat fading, frequency-selective fading, slow fading, fast fading, delay spread, Doppler spread, coherence bandwidth, coherence time

Diversity
Time diversity, coding, interleaving, frequency diversity, time-domain equalization, OFDM, CDMA, rake receiver, space diversity, transmit diversity, receive diversity, space-time coding, beamforming

Centralized Multiple Access
CDMA, OFDMA, TDMA, Scheduling, Cellular networks

Random Access
Aloha, CSMA, WiFi networks

Students are required to choose an advanced topic in wireless communications as their course projects;topics include (but not limited to):
1. Cross-layer optimization in wireless networks
2. Network coding for wireless networks
3. Interference management of cellular systems
4. Resource allocation in cooperative networks
5. Relay strategies of cooperative networks
6. Distributed scheduling algorithms for wireless networks
7. Routing strategies in mobile ad hoc networks

8. Energy-efficient design of wireless sensor networks
9. A comparative study of LTE and WiMax
10. Recent update on wireless PAN