Form 2B

City University of Hong Kong

Information on a Course offered by Department of Electronic Engineering with effect from Semester A 2011/12

Part I

Course Title:	Radio Frequency (RF) Circuit Engineering
Course Code:	EE6426
Course Duration:	One Semester (13 weeks)
No. of credits:	3
Level:	P6
Medium of Instruction:	English
Prerequisites *:*	EE5425 Fundamentals of Radio Frequency (RF) Circuit Engineering; or EE6425 Fundamentals of Radio Frequency (RF) Circuit Engineering; or equivalent
Precursors *:*	Nil
Equivalent Course *:*	Nil
Exclusive Courses:	Nil

Part II

Course Aims:

This course aims to acquire the fundamental concepts, basic theory of advanced circuit design and important techniques in radio frequency circuits.

Course Intended Learning Outcomes (CILOs)
Upon successful completion of this course, students should be able to:

No.	CILOs
1.	Design of RF receivers and transmitters
2.	Understand the basics of large-signal concept and non-linear operation
3.	Design of high power amplifier systems, oscillators and mixers
4.	Apply measurement techniques to large signal devices

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

Timetabling Information

Pattern	**Hours**
Lecture:	*26*
Tutorials:	*13**
Laboratory:	
Other activities:	

**Some tutorials will be conducted in the laboratory.*

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	Tutorial Questions, Discussion and Assignments, Mini projects	50%
Examination	Written exam	50% 2 hours

Remarks: To pass the course, students are required to achieve at least 35% in course work and 35% in the examination. Also, 75% laboratory attendance rate must be obtained.

Grading of Student Achievement:

Letter Grade	**Grade Point**	**Grade Definitions**
A+ A A-	4.3 4.0 3.7	Excellent
B+ B B-	3.3 3.0 2.7	Good
C+ C C-	2.3 2.0 1.7	Adequate
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 opportunities in acquiring knowledge of and evaluation of RF circuit design, and also the applications of basic concept and skills for RF engineering problem solving.

Part III

Keyword Syllabus:

RF Receiver and Transmitter
RF receiving system, design consideration and examples.
RF transmitting system, design consideration and examples.
Heterodyne and zero-IF systems, Basic measurement for transmission and reception

Large Signal Amplifier
Classes of operation and their characteristics.
Design considerations of power amplifier.
Efficiency enhancement.
Large signal scattering parameters and measurement.

Oscillator
Theory of oscillation.
Oscillator design, VCOs.
Frequency stabilised oscillator.

Non-linear RF Circuits and applications
Passive and active mixers.
Passive and active detectors.
Frequency multiplication.
Frequency up-conversion and down-conversion.

Recommended Reading:

Essential Reading

Reinhold Ludwig & Pavel Bretchko: RF Circuit Design, (Prentice Hall)

G Vendelin, A Pavio & U Rohde : Microwave Circuit Design Using Linear and Nonlinear Techniques, (John Wiley & Sons, 1990)

Herbert L Krauss, Charles W Bostian & Frederick H Raab: Solid State Radio Engineering, (John Wiley & Sons, 1980)

Ravender Goyal, : High-Frequency Analogue Integrated Circuit Design (John Wiley & Sons, Inc., 1995)

Supplementary Reading

Christian Gantili : Microwave Amplifiers and Oscillators, (North Oxford Academic, 1986)

Irving M & Gottlieb P E : Solid-State High-Frequency Power, (Reston Publishing Co. Inc. A Prentice-Hall Co., 1982)

Stephen Maas : Microwave Mixers, (Artech House, 1988)

Stephen Maas : Non-linear Microwave Circuits, (Artech House, 1988)

Gary M Miller : Modern Electronic Communication, (Prentice-Hall, 1988)

K Clark & D Hess : Communication Circuit Analysis and Design, (Addison-Wesley, 1971)

Stephen Erst : Receiving Systems Design, (Artech House, 1984)

Ferenc Kovacs : High Frequency Application of Semiconductor Devices, (Elsevier Scientific Publishing Co, 1981)

R S Carson : High Frequency Amplifiers, (Wiley, 1982)

G Vendelin : Design of Amplifiers and Oscillators by the S parameter Method, (Wiley, 1982)

K Chang : Hand book of Microwave and Optical Components, vol. 1, (Wiley, 1990)

Morris Engelson : Modern Spectrum Analyser Theory and application, (Artech House, 1984)

Online Resources (if any)
Nil