City University of Hong Kong

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

Part I

Course Title:	Advances in Digital Signal Processing
Course Code:	EE6802
Course Duration:	One semester (13 weeks)
No. of credits:	3
Level:	P6
Medium of Instruction:	English
Prerequisites *:*	EE5410 Signal Processing; or EE5802 Digital Signal Processing (old code IT5302); or equivalent
Precursors *:*	Nil
Equivalent Course *:*	Nil
Exclusive Courses:	Nil

Part II

Course Aims:

The course aims to provide students with theoretical and practical knowledge in selected topics of Advanced Digital Signal Processing, oriented toward contemporary research and practice in signal processing and related technologies.

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

No.	CILOs
1.	Describe the essence of Digital Signal Processing
2.	Describe the concept, apply mathematical formulations and framework of Digital Signal Processing and their essential building blocks.
3.	Express and apply techniques in Digital Signal Processing.
4.	Apply and integrate knowledge in practice.

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, tutorial
CILO 3	Lecture, test, discussion, mini project
CILO 4	Lecture, mini project

Case studies will be provided to expose students to the latest research front of digital signal processing technology and its broad applications to other engineering fields. Mini-projects are designed for students to gain practical experience in real world design problems.

Timetabling Information

Pattern	**Hours**
Lecture:	26
Tutorials:	13*
Laboratory:	
Other activities:	0

**Some of the 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	Tests, Case Studies and 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.

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	The course provides students with adequate opportunities in acquiring knowledge of the Digital Signal Processing technologies, and familiarize with the applications of mathematics and engineering problem solving skills The learning experience will be enhanced and broadened by case studies on latest developments in the field.
4, 5	Students are required to work on mini-projects to gain practical experience in implementing real world Digital Signal Processing applications.

Part III

Keyword Syllabus:

Essence of Digital Signal Processing
Fourier and z transform, Fast algorithm, FIR and IIR Filter Design, Optimal Window Function, Optimal Filter Design.

Fundamentals of Multi-rate System
Decimation, Interpolation, Aliasing Error, Polyphase Components, Equivalent Structures, Signal Analysis and Compression.

Advance Multi-rate Signal Processing
2 Bank Filter, Regular Binary Subband Tree Structure, M-bank Structure, Perfect Reconstruction (PR), Higher Order PR System.

Time Frequency Analysis
Forward and Inverse Wavelet Transform, Wavelet families, Multi-resolution analysis, EZW Coding, Application in Image Processing and Compression.

Case studies on selected articles

Recommended Reading:

A.N. Akansu et. al.: Multiresolution Signal Decomposition (2nd edition, Academic Press, 2001)

P.P. Vaidyanathan: Multirate Systems and Filter Banks (Prentice Hall, 1992)

T.B. Welch: Real-Time Digital Signal Processing from Matlab to C with the TMS320C6x DSK (CRC, 2005)

P.Embree: Real-Time Digital Signal Processing from Matlab to C with the TMS320C6x DSK (Prentice Hall PTR; US Ed edition May 27, 1995)

Online Resources (if any)
Nil