City University of Hong Kong

Information on a Course
offered by Department of Electronic Engineering
with effect from Semester A in 2014/2015

Part I

Course Title:	Signals and Systems
Course Code:	EE3210
Course Duration:	One Semester (13 weeks)
No. of credits:	3
Level:	B3
Medium of instruction:	English

Prerequisites *(Course Code and Title)*:	MA2001 Multi-variable Calculus and Linear Algebra; or MA2149 Mathematical Analysis; or MA2170 Linear Algebra and Multi-variable Calculus
Precursors *(Course Code and Title)*:	Nil
Equivalent Course *(Course Code and Title)* :	EE3118 Linear Systems and Signal Analysis
Exclusive Courses: *(Course Code and Title)*:	Nil

Part II

1. Course Aims:

The aim of this course is to introduce the fundamental concepts of signals and systems to students in such a way as to enable them to specialize in diverse areas like communication systems, control systems, and signal processing.

2. Course Intended Learning Outcomes (CILOs)

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

No.	CILOs
1.	Classify signals and systems and describe their properties on continuous and discrete domains.
2.	Describe and perform different domain transformations.
3.	Analyze the input-output relationship of linear, time-invariant systems using time-domain techniques and transform methods.
4.	Analyze the stability of linear, time-invariant systems.

3. Teaching and Learning Activities (TLAs)

CILO 1	lecturing, work-along exercise, chapter preview and review, think-pair-share, one minute paper, in-class exercise, lab work, problem Q&A, case study and reporting, guided on-line exercise through Blackboard, self-study of circuit responses using simulation software, self-test multiple choice and short questions
CILO 2	
CILO 3	
CILO 4	

Timetabling Information – According to guideline on contact hours, 3 hours of lab = 1 hours of Lect/ Tut. The total contact hours should be 39.

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

4. Assessment Tasks/Activities

	Type of assessment tasks	*Weighting (if applicable)*
Continuous Assessment	Assignments, Test, simulation Report	40%
Examination	Written exam	60% 2 hours

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

5. Grading of Student Achievement:

Refer to Grading of Courses in the Academic Regulations.

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

6. Constructive Alignment with Major Outcomes

MILO	How the course contribute to the specific MILO(s)
1, 2, 5	To understand certain mathematical skills in modelling. The application of mathematics, science and engineering is central to the aims of this course with ample opportunity to apply these applications to the solution of engineering problems in class and in the laboratory.
4, 7, 10	A compulsory Software based simulation assignment allows students to practice this type of work which is directly linked to the theory learnt during the lecture. The assignment details are available in a format of lab instruction and students can conduct the work either at home or at EE Lab. Through this assignment, students will be given a chance to practice the use of software such as MatLab, or C++ in their analysis and their communication skills in report writing and demonstrations.

Part III

Keyword Syllabus:

Signals

What is a signal; Operating on functions to produce new functions: composition, linear combinations, series, time scale changes; Basic continuous-time and discrete-time signals; Dirac impulse function, unit step function, complex exponentials; Energy and power signals.

Systems

What is a system; Classification of systems: linear v. nonlinear, time-invariant v. time-varying, causal v. non-casual, memoryless v. memory, stability; Representation of signals in terms of Dirac impulses; Continuous-time LTI systems with the concepts of convolution integral; Discrete-time LTI systems with the concepts of convolution sum; Properties of LTI systems; Systems described by differential and difference equations.

Fourier Analysis for Continuous-Time Signals and Systems

Representation of periodic signals by continuous-time Fourier Series; Approximation of Periodic Signals using Fourier Series and the convergence of Fourier series; Representation of aperiodic and periodic signals by continuous-time Fourier Transform; Properties of the continuous-time Fourier Transform; Frequency response of LTI systems.

Fourier Analysis for Discrete-Time Signals and Systems

Representation of periodic signals by discrete-time Fourier Series; Representation of aperiodic and periodic signals by discrete-time Fourier Transform; Properties of the discrete-time Fourier Transform; Frequency response of discrete-time LTI systems.

The Laplace Transform

Definition of the Laplace Transform; Region of convergence for Laplace Transforms; Inverse Laplace Transform; Geometric evaluation of the Fourier Transform from the pole-zero plot; Properties of the Laplace Transform; Analysis and characterization of LTI systems using the Laplace Transform; Partial fraction Expansion; Solution of differential equations; Transfer function, Stability.

The z-Transform

Definition of the z-Transform; Relationship with Laplace and Fourier transforms; Region of convergence for z-Transforms; Properties of the z-Transform; Inverse z-Transform; Geometric evaluation of the Fourier Transform from the pole-zero plot; Solution of difference equation; Analysis and characterization of LTI systems using z-Transform; Stability; Transformation between continuous-time and discrete-time systems.

Applications

Ideal versus practical filters; High-pass and low-pass filters; Modulation and demodulation; Analysis of Electrical Networks

Recommended Reading:

Alan V. Oppenheim and Alan S. Willsky with S. Hamid Nawab: Signals and Systems, 2nd edition, Prentice Hall, 1983.