

**City University of Hong Kong
Course Syllabus**

**offered by Department of Electrical Engineering
with effect from Semester A in 2020/2021**

Part I Course Overview

Course Title: Introduction to Electronic Design

Course Code: GE1354

Course Duration: One Semester (13 weeks)

Credit Units: 3

Level: B1

Proposed Area: Arts and Humanities
(for GE courses only) Study of Societies, Social and Business Organisations
 Science and Technology

Medium of Instruction: English

Medium of Assessment: English

Prerequisites: Nil
(Course Code and Title)

Precursors: Nil
(Course Code and Title)

Equivalent Courses: EE1003 Introduction to Electronic Design and Workshop
(Course Code and Title)

Exclusive Courses: Nil
(Course Code and Title)

Part II Course Details

1. Abstract

Since the invention of first electronic transistor in 1947, there is a tremendous development of electronic technology over the past 70 years. Nowadays, electronic technology has been penetrating almost every aspect of our life and creating huge impact in our community. A few examples are mobile phones, TV, and Octopus card which are all popular electronic products used by everyone. In fact, our ways of living are greatly influenced by these technologies. All these products consist of a key electronic component – a tiny computer chip for executing all the desired functions of the devices or appliances. Attributed to the years of efforts by different scientists and engineers, these computer chips are now much faster, smaller, cheaper and easier for users even without much technical background.

Regardless of your science or arts background, have you ever thought about building an electronic product to control a system or to measure signals such as heart pulses? In fact, there are endless ideas in applying these fascinating computer chips in project design relevant to your specific needs.

The course teaches the basic electronic systems, signals and basic computing theory. The aim of this course is to develop students from different disciplines on their fundamental understanding of simple electronic systems, in order to allow students to turn their ideas into a simple design work, supplemented by lectures and hands-on training. At the final four weeks of the course, students from different majors will form multi-disciplinary project groups for exploring real problems and their possible electronic and computing design. Each project group will be provided with a low-cost and easy-to-use tiny computer board (unit) with some build-in features for sensing body movements, displaying texts and graphics, informing the environmental temperature, etc., that allow the students to realize their own functional products.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs [#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Identify recent technology developments for modern electronic applications		✓		
2.	Describe the fundamental and basic principles of electronic systems and signal processing applications.		✓	✓	✓
3.	Apply programming techniques and integrate electronic components and units for simple product design		✓	✓	✓
4.	Demonstrate processes from design idea to product realization		✓	✓	
5.	Demonstrate presentation skills to describe design idea and product		✓	✓	✓

* If weighting is assigned to CILOs, they should add up to 100%.

100%

Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5		
Lecture and Tutorials	Lectures on various fundamental knowledge and concepts in simple electronic. systems	✓	✓	✓				Lecture: 2 hrs/wk for 13 weeks; Tutorial: 1hr, 4 weeks.
Laboratories	Labs to reinforce key concepts covered in lectures and tutorials.		✓	✓				2 hrs/wk for 2 weeks
Project	Student is to apply the knowledge learnt in the course to complete a simple project design in the last 4 weeks to extend the experience to realize a self-initiated project in group		✓	✓	✓	✓		2 hrs/wk for 4 weeks

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4	5			
Continuous Assessment: <u>50%</u>								
Project: demo, presentation, report.	✓	✓	✓	✓	✓		20%	
Tests (min.: 2)	✓	✓	✓	✓			30%	
Examination: <u>50%</u> (duration: 2 hrs)								
Examination	✓	✓	✓	✓			50%	
							100%	

* The weightings should add up to 100%.

Remark:

To pass the course, students are required to achieve at least 30% in the continuous assessment and 30% in the examination. Also, 75% laboratory attendance rate must be obtained.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Coursework	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus:

Waves and Acoustic

Waves: vibrations, simple harmonic motions, the relationship among wavelength, period, frequency and speed, interactions of two or more waves, the Doppler effect; Acoustic: amplitude and loudness, frequency and pitch, interference and beats, fundamental frequency and harmonics.

Basic Signal Processing

Introduction to Signals (e.g. heart pulses), time and frequency domains, bandwidth, noise and gain in db, continuous-time and discrete-time signal, analogue to digital signal conversion, audio systems, basic difference equations, simple digital low pass filtering.

Computation implementation

Introduction to basic Python, implementation on simple microprocessor platform.

Basics of Electronic Design

Four weeks of laboratory work to implement a mini project, such as voice filtering, heart pulse waveform measurement and walking steps measurement, using basic signal processing and electronic circuit techniques.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Nil
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2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Electronics All-in-One for Dummies, 2nd Edition by Doug Lowe, Publisher: Wiley, 2017. ISBN: 978-1-119-32079-1
2.	Getting Started with the BBC Micro:Bit Mike Tooley, Bernard Babani Publishing, 2017
3.	Beginning Programming with Python® For Dummies® by John Paul Mueller Publisher: John Wiley & Sons, Inc., 2014. ISBN 978-1-118-89145-2
4.	Signals & Systems, Alan Oppenheim, Pearson New International Edition.

A. Please specify the Gateway Education Programme Intended Learning Outcomes (PILOs) that the course is aligned to and relate them to the CILOs stated in Part II, Section 2 of this form:

GE PILO	Please indicate which CILO(s) is/are related to this PILO, if any <i>(can be more than one CILOs in each PILO)</i>
PILO 1: Demonstrate the capacity for self-directed learning	The CILO 1-5 are closely related to this PILO. Online materials and exercises are to facilitate students with self-directed learning. Also, students will demonstrate the capacity when they manage the labs and projects.
PILO 2: Explain the basic methodologies and techniques of inquiry of the arts and humanities, social sciences, business, and science and technology	The CILO 1-3 are closely related to this PILO. The TLAs such as lecture and design case discussion are to facilitate students with this skill.
PILO 3: Demonstrate critical thinking skills	The CILO 3 and 4 are closely related to this PILO. Students are to demonstrate their skills in reflective writing and when they manage the projects.
PILO 4: Interpret information and numerical data	The CILO 2-4 are closely related to this PILO. Students will have to collect information and data, and perform analysis for design case discussion and for the projects.
PILO 5: Produce structured, well-organised and fluent text	The CILO 3-5 are closely related to this PILO. Students have to submit reports and give presentations to describe their work for the projects.
PILO 6: Demonstrate effective oral communication skills	The CILO 3-5 are closely related to this PILO. Students are to work out the projects in a team, describe their work during the demonstration, and give presentations.
PILO 7: Demonstrate an ability to work effectively in a team	The CILO 3 and 4 are closely related to this PILO. Students are to work as a team for the projects.
PILO 8: Recognise important characteristics of their own culture(s) and at least one other culture, and their impact on global issues	
PILO 9: Value ethical and socially responsible actions	
PILO 10: Demonstrate the attitude and/or ability to accomplish discovery and/or innovation	The CILO 1, 3, 4 and 5 are closely related to this PILO. Students are to explore the possible applications and propose solutions in their projects.

GE course leaders should cover the mandatory PILOs for the GE area (Area 1: Arts and Humanities; Area 2: Study of Societies, Social and Business Organisations; Area 3: Science and Technology) for which they have classified their course; for quality assurance purposes, they are advised to carefully consider if it is beneficial to claim any coverage of additional PILOs. General advice would be to restrict PILOs to only the essential ones. (Please refer to the curricular mapping of GE programme: http://www.cityu.edu.hk/edge/ge/faculty/curricular_mapping.htm.)

Please select an assessment task for collecting evidence of student achievement for quality assurance purposes. Please retain at least one sample of student achievement across a period of three years.

Selected Assessment Task
Project Demo and Project Report.