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:	Design Project
Course Code:	EE3070
Course Duration:	One Semester (13 weeks)
Credit Units:	3
Level:	B3
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organizations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	EE2004 Microcomputer Systems
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	EE3004 Electronic Product Design or EE3274 Design Project or EE3316 Information Product Design
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

The aim of this course is to enable students to gain practical experience and nurture their creativity in Electronic Product Design under the In-house product design scheme. Another aim of this course is to provide students with a clear understanding of the practical design problems of electronic products at an introductory level. The objective is for students to become familiar with the concept of product design, component tolerances, production constraints, safety requirements, and EMC standards are dealt with through a case study.

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 and recognize the essential design and production procedures of electronic products		✓	✓	✓
2.	Apply fundamental analysis methods and theorems to the solution of the case study		✓	✓	✓
3.	Design and implement a prototype for meeting the case study requirements		✓	✓	✓
4.	Demonstrate problem-solving skills in product design		✓	✓	✓
5.	Present the design work		✓	✓	✓
6.	Form the foundation for the product manufacturing project, the penultimate part of the industrial training programme run in the summer semester		✓	✓	✓
		100%			

** If weighting is assigned to CILOs, they should add up to 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	6	
Seminar	Seminar on exploring design problem, report writing, technical specification, realizing prototypes, and preparing presentation.	√	√	√	√	√	√	3-hr seminar / wk (total 1 week)
Laboratory	Laboratory work	√	√	√	√	√	√	3-hr lab / wk (total 12 weeks)
OR								
Recognized open competition	Participation in recognized open competition	√	√	√	√	√	√	No less than 3 hrs lab / wk (total 13 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	6		
Continuous Assessment: 100%								
Project: Proposal, reports, presentation, demonstration	√	√	√	√	√	√	100%	
Examination: N/A								
** The weightings should add up to 100%.*							100%	

Remark:

To pass the course, students are required to achieve at least 40% of the coursework mark and a laboratory attendance of at least 75% recorded.

Students can participate in recognized open competitions, such as Robocon and MATE ROV, to replace the project case designed by the course leader. The coordinators of the open competitions will conduct the assessment.

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)
Laboratory Work	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels

6. Constructive Alignment with Major Outcomes

MILO	How the course contribute to the specific MILO(s)
1-10	This course integrates all necessary components that can inspire students to think and apply knowledge what they have learnt to deal with a practical case.

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

1. Keyword Syllabus

Modern Design Technology Manufacturability
Modular design, auto-insertion, surface mount technology, sources of design tips. Basic concepts of Design for Manufacture.

Electronic Circuit Testability Design
Testability: testing paradigms (in- circuit and functional); test points and accessibility of circuits for testing; principle of product partitioning.

Electronic Circuit Reliability
Design for circuit reliability: causes of component failure; reliability calculations and its prediction; means of improving circuit reliability. Environmental Stress Screening.

Tolerance Design
Tolerance analysis; Monte Carlo analysis; Design margins.

EMI, EMC and Safety Standards
Introduction to EMI, EMC and safety; standards, regulations and test methods applicable to the electronic products, systems and processes. Safety standards for mains supplied electronic products.

Firmware and Software Design
Modelling; In-circuit emulator and on-chip debug; Implementation; Validation and testing; interfacing techniques; firmware design; APP programming.

Software Design for Information Technology System Design
Conceptual model; context, description within life cycle, Design description; identification, stakeholders, design views and viewpoints, elements, overlays, rationale, languages, Design viewpoints; context, composition, logical, dependency, information, patterns, interface, structure, concerns, state dynamics, algorithm, resource.

3D printing
Design; modelling; fabrication.

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.	N/A

2.2 Additional Readings

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

1.	Weyerer M and Goldemund G: Testability of Electronic Circuits, (Prentice Hall, c1992)

2.	Ott Henry W: Noise Reduction Techniques in Electronic Systems, (Wiley- Interscience, 1989)
3.	Thomas L Lenders, William D Brown, Earnest W Fant, Eric M Malstrom, Neil M Schmitt: Electronics Manufacturing Processes, (Prentice Hall, c1994)
4.	Handbook of Product Design for Manufacturing: a Practical Guide to Low- Cost Production, (McGraw- Hill, c1986)
5.	R Spence, R S Soin: Tolerance Design of Electronic Circuits, (Addison Wesley, 1988)
6.	IEEE Std 1016™-2009, "IEEE Standard for Information Technology – Systems Design – Software Design Descriptions,"