

EE3070: DESIGN PROJECT

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Design Project

Subject Code

EE - Electrical Engineering

Course Number

3070

Academic Unit

Electrical Engineering (EE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

EE2004 Microcomputer Systems

Precursors

Nil

Equivalent Courses

EE3004 Electronic Product Design or EE3274 Design Project or EE3316 Information Product Design

Exclusive Courses

Nil

Part II Course Details

Abstract

The aim of this course is to enable students to work together in a group on a design project. Through the design project, students will be nurtured and be able to demonstrate their creativity, innovation and its impact on society. Working in a

group will allow students to resolve issues that arise technically and personally. Students will become familiar with the concept of product design, such as, component tolerances, production constraints, safety requirements, and EMC standards through a case study.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Students are able to demonstrate team work through the resolution of both technical and interpersonal problems	x	x	x
2	Apply fundamental analysis methods and theorems to the solution of the case study	x	x	x
3	Design and implement a prototype to meet the case study requirements	x	x	x
4	Demonstrate creativity and innovation in problem-solving and their impact on society	x	x	x
5	Communicate through demonstration and presentation of the design work	x	x	x

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 real-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.

Learning and Teaching Activities (LTAs)

LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1 Seminar OR Recognized open competition	Students will be presented with their design theme and the tools they will be provided with. They will be split into groups towards the end of the 2nd week.	1, 2	3 hrs/wk for 2 wks.
2 Student Readiness Laboratory Sessions	Student readiness: Students to prepare beforehand and to familiarize themselves with the hardware/software tools that will enable their design project in the laboratory	1, 2	3 hrs/wk for 2-3 wks

3	Laboratory	Design Project Implementation: Students in each group engage with each other to propose and implement a solution for their targeted scenario. This solution being their design project.	1, 2, 3, 4, 5	3 hrs/wk for 8-9 wks
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Additional Information for LTAs

Students can alternatively engage in a recognized open competition of no less than 3 hr/wk for 13wks.

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Project: Proposal, logbook, demonstrations, reports, presentation	1, 2, 3, 4, 5	100	-	Yes

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

40

Additional Information for ATs

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.

Assessment Rubrics (AR)**Assessment Task**

Laboratory Work

Criterion

Achievements in CILOs

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information**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.

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
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 1016TM-2009, "IEEE Standard for Information Technology – Systems Design – Software Design Descriptions,"