SYE4108: PRODUCT DEVELOPMENT AND INNOVATION

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Product Development and Innovation

Subject Code
SYE - Systems Engineering
Course Number
4108

Academic Unit
Systems Engineering (SYE)

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
Students under 2-year curriculum (ASII Entry):
Completion of at least 30 CUs of the programme requirement (excluding OOD, University Language) by semester B of the preceding academic year.

Students under 4-year and 3-year curriculum (both normative 4-year and ASI entry):
Completion of at least 45 CUs of the Major Requirement (excluding GE & College Requirements).

Precursors
Nil

Equivalent Courses
SEEM4034 Product Development: Managerial Approach &
SEEM4109 Product and Service Design and Innovation or
ADSE4108 Product Development and Innovation

Exclusive Courses

Nil

Part II Course Details

Abstract

In today's competitive global markets, continuous product design and innovation are essential for modern enterprises to maintain their edge. This course equips students with foundational knowledge and skills critical for successful product development and innovation. Students will learn a wide range of theories, methods, and tools to support empathy, ideation, prototyping, user discovery, and product optimization throughout the product innovation process. Special emphasis is placed on harnessing cutting-edge generative AI in design to boost creativity and drive innovation. Through a team-based design project, students will gain hands-on experience and may develop innovative products with commercialization potential. This course is tailored to prepare students for leadership roles in innovation-driven careers.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Learn theories and methods for creative design and innovation	30	x	x	
2	Experience and understand product development process	40		x	x
3	Develop system thinking and soft skills for collaboration	30	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	Lectures, tutorials, in-class excercises		1, 2, 3	39 hours/semester
2	Product development project activities		1, 2, 3	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Project reports and presentations	1, 2, 3	30	Team project
2	Project team peer evaluation	1, 2, 3	10	Team project

3	Homework assignments	1, 2	30	Course work
4	Classroom participation and contribution to collective learning	1, 2	10	Course work

Continuous Assessment (%)

80

Examination (%)

20

Examination Duration (Hours)

2

Additional Information for ATs

Examination: Students will be assessed via the examination to their understanding of the concepts and techniques learned as well as the capabilities to apply these concepts, theories and techniques. For a student to pass the course, at least 30% of the maximum mark for the examination should be obtained.

Assessment Rubrics (AR)

Assessment Task

Course work (

Criterion

Based on homework assignments (30%), and classroom participation and contribution to collective learning (10%)

Excellent (A+, A, A-)

Strong evidence of capacity to analyse and synthesize; superior grasp of subject matter.

Good (B+, B, B-)

Evidence of grasp of subject, some evidence of critical capacity and analytic ability.

Fair (C+, C, C-)

Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal (D)

Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)

Little evidence of familiarity with the subject matter; weakness in critical and analytic skills.

Assessment Task

Team project

Criterion

Based on team project reports and presentations (30%), and team peer evaluation (10%);

Excellent (A+, A, A-)

Strong evidence of capacity to analyse and synthesize; superior grasp of subject matter.

Good (B+, B, B-)

Evidence of grasp of subject, some evidence of critical capacity and analytic ability.

Fair (C+, C, C-)
Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal (D)
Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)
Little evidence of familiarity with the subject matter; weakness in critical and analytic skills.

Assessment Task
Examination

Criterion
Based on submitted written work

Excellent (A+, A, A-)
Strong evidence of capacity to analyse and synthesize; superior grasp of subject matter.

Good (B+, B, B-)
Evidence of grasp of subject, some evidence of critical capacity and analytic ability.

Fair (C+, C, C-)
Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal (D)
Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)
Little evidence of familiarity with the subject matter; weakness in critical and analytic skills.

Part III Other Information

Keyword Syllabus

- The drivers and challenges of innovative product development, e.g. economics of innovation, characteristics of successful products, traits of innovators;
- Empahty techniques for opportunities identification for designing new products;
- Creativity techniques for idea generation for designing new products;
- Prototyping and testing techniques for innovative product development;
- Patent and IP issues with new product development;
- Innovation taxonomy and strategy;
- Project planning and management for new product development;
- Marketing strategy and finance plan for a new product.

Reading List

Compulsory Readings

	Title
1	Lecture notes and slides provided by the instructor

Additional Readings

	Title
1	Karl T. Ulrich, Steven D. Eppinger, Maria C. Yang "Product Design and Development", 7th Edition, McGraw-Hill, 2019