ADSE4108: PRODUCT DEVELOPMENT AND INNOVATION

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Product Development and Innovation

Subject Code
ADSE - Advanced Design and System 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

Exclusive Courses

Nil

Part II Course Details

Abstract

Modern enterprises need to continually design and innovate new productsin order to stay competitive in the global marketplace. This course aims to help students acquire the fundamental knowledge and skills for product development and innovation. Students will learn a wide variety of methods and tools useful in different stages of the product development process, from need finding to concept generation, prototying, and design optimization. We will particularly empahsize the use of generative AI in-and-for design to augment creatviity and enhance innovation. Students will practice the methods and tools through a team-based design project for experiential learning of the design innovation process.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain issues surrounding the challenges of product development and innovation	20	x		
2	Use structured techniques and creativity to identify customer needs and innovation opportunities	20		x	x
3	Conduct IP and precedent search of the potential product ideas	10	x	x	
4	Use project planning and management techniques to streamline new product development	20		x	
5	Apply design innovation techniques to idea generation, prototyping and testing new design concepts, and create new products	30		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 and in-class discussions	Lectures, in-class exercises, in-class Q&A and discussions will be used to implement the CILOs. It will also include the final presentation of the group project in the last week.	1, 2, 3, 4, 5	39 hours/semester

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tutorial exercises and assignments Students need to participate actively in in-class activities such as case study, discussion, and exercises designed to facilitate their understanding of knowledge taught in new product development. Each student needs to complete a patent and precedent search report	1, 2, 3, 4, 5	30	
2	Team Project Students need to complete a team-based project which covers opportunity identification, idea generation, product design and managerial and economic analysis. A final presentation is also required.	2, 4, 5	30	

Continuous Assessment (%)

60

Examination (%)

40

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
Tutorial exercises and assignments;
Team project

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
Team project report and presentation

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 challenges of product and service development, e.g. the roles of intellectual property and product/service development economics, the characteristics of successful products;
- Knowledge engineering techniques for opportunities identification and augmenting creativity for designing new products;
- Patent and IP issues with new product development;
- Foundamentals of innovation, e.g., creativity, innovation sources, types, classification, and strategies;
- Project planning and management techniques for new product development;
- Techniques for concept generation, selection and testing techniques to create new products.
- 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 Ulrich, Steven Eppinger, Maria C. Yang "Product Design and Development", 7th Edition, McGraw-Hill, 2019.