

SYE4108: PRODUCT DEVELOPMENT AND INNOVATION

New Syllabus Proposal

Effective Term

Semester A 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

Modern enterprises need to continually design and innovate their products and services in order to stay competitive in the globalized marketplace. This course aims to give students fundamental knowledge and techniques useful for designing new products and services for modern enterprises. After an introduction to issues surrounding the challenges of product and service development, this course will provide students with the methodologies in identifying opportunities and customer needs for developing new products and/or services. The basics of planning and managing product/service design projects will be introduced. It will include creativity for concept generation, IP search and concept selection and concept testing for developing new products and/or services. The students will practice these techniques through a team project. The course covers both physical innovation and digital innovation.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain issues surrounding the challenges of product and service development,	20	x		
2	Use knowledge engineering techniques and creativity to identifying opportunities and customer needs for new products and services;	20		x	x
3	Conduct IP search of the potential product ideas	10	x	x	
4	Use project planning and management techniques to streamline new product/service development;	20		x	
5	Use concept generation, concept selection and concept testing techniques to create new products and services.	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.

Teaching and Learning Activities (TLAs)

	TLAs	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 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 and services;
- Knowledge engineering techniques for opportunities identification for designing new products and services;
- Knowledge engineering techniques and creativity for customer needs identification for designing new products and services;
- Patent and IP issues with NPD.
- Innovation classification and strategy, advantages and disadvantages of different types of innovation
- Project planning and management techniques for new product/service development;
- Techniques for concept generation, concept selection and concept testing techniques to create new products and services.
- 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	Ulrich K T, and Steven D. Eppin "Product Design and Development", 5th McGraw-Hill, 2016.
2	Macaulay, L.A., Miles, I. et al. "Case Studies in Service Innovation", Springer 2012.
3	Daim, T.U., Pizarro, M., Talla, R. "Planning and Roadmapping Technological Innovations", Springer, 2014.
4	Lilien, G. L., Morrison, P. D., Searls, K., Sonnack, M., & Hippel, E. V. (2002). Performance assessment of the lead user idea-generation process for new product development. Management science, 48(8), 1042-1059.