SYE2000: ADDITIVE MANUFACTURING AND INNOVATIVE PROTOTYPING

Effective Term
Semester A 2026/27

Part I Course Overview

Course Title
Additive Manufacturing and Innovative Prototyping

Subject Code
SYE - Systems Engineering
Course Number
2000

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
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

This course aims to explore the principles, applications, and opportunities of additive manufacturing and prototyping in engineering design and product development. Students will investigate this from a hands-on perspective, with an emphasis on 3D modeling, additive manufacturing techniques, material selection, and iterative design. Students will learn how these skills are transforming industries such as healthcare, aerospace, consumer goods, and more, by enabling faster, cost-effective, and customizable solutions. This course will help students understand the role of rapid prototyping in modern engineering and product development while developing key technical skills. Students will work on projects that involve designing, refining, and fabricating a functional 3D-printed prototype, fostering creativity and problem-solving abilities. By the end of the course, students will gain a foundational understanding of how to use rapid prototyping to bring their ideas to life.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand the fundamentals of 3D printing and rapid prototyping by explore materials and technologies used in rapid prototyping.	40	x	x	
2	Gain hands-on experience with 3D printers and the prototyping process.	20		x	x
3	Apply the design process to solve real-world challenges through a final project.	40		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	Lecture	Weekly lectures and discussions.	1, 2	2 hrs/week
2	Lab	Weekly lab for discussion, computer/software practice, equipment demonstration and construction of projects.	2, 3	1 hr/week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Lab report	1, 2	20	-	No
2	Project demonstration, presentation and report	2, 3	50	-	No

Continuous Assessment (%)
70

Examination (%)
30

Examination Duration (Hours)
2

Minimum Continuous Assessment Passing Requirement (%)
30

Minimum Examination Passing Requirement (%)
30

Additional Information for ATs
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
Lab report

Criterion
Includes lab deliverables (e.g., weekly exercises, 3D models, printed prototypes).

Excellent (A+, A, A-)
High (overall score more than 80%)

Good (B+, B, B-)
Significant (overall score more than 60%)

Fair (C+, C, C-)
Moderate (overall score more than 40%)

Marginal (D)
Basic (overall score more than 30%)

Failure (F)
Not even reaching marginal levels (overall score less than 30%)

Assessment Task
Project demonstration, presentation, and report

Criterion
Includes project proposal, design submission, final prototype, demonstration and report.

Excellent (A+, A, A-)
High (score more than 80%)

Good (B+, B, B-)
Significant (score more than 60%)

Fair (C+, C, C-)
Moderate (score more than 40%)

Marginal (D)
Basic (score more than 30%)

Failure (F)
Not even reaching marginal levels (score less than 30%)

Assessment Task
Final Exam

Criterion
To evaluate understanding of course contents, including theoretical concepts, materials, technologies, and design principles.

Excellent (A+, A, A-)
High (score more than 80%)

Good (B+, B, B-)
Significant (score more than 60%)

Fair (C+, C, C-)
Moderate (score more than 40%)

Marginal (D)
Basic (score more than 30%)

Failure (F)
Not even reaching marginal levels (score less than 30%)

Part III Other Information

Keyword Syllabus

- Prototyping
- 3D Printing
- Additive manufacturing
- Materials for Prototyping (plastics, metals, and composites)
- Design for manufacturability and printability
- Creative product design
- Innovation through rapid prototyping

Reading List

Additional Readings

	Title
1	Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing
2	Basics of 3D Printing with Josef Prus