SYE6301: SUSTAINABILITY AND GREEN SYSTEMS

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Sustainability and Green Systems

Subject Code
SYE - Systems Engineering
Course Number
6301

Academic Unit
Systems Engineering (SYE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate 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 provides a comprehensive overview of the principles, practices, and tools for addressing sustainability and green production systems. It explores the design concepts, methodologies, and technological solutions for optimizing the operational efficiency and sustainability of production and service systems.

The course covers the ESG (environmental, social, and governance) framework, including the design and maintenance strategies for developing eco-friendly, resource-efficient products, processes, and service offerings. Furthermore, it guides students in implementing holistic "greening" approaches across the entire lifecycle of production operations, facilities, and their associated supply chain networks.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the design concepts, methods, tools, the key technologies and the operation of sustainable green production and service systems.	10	x	x	
2	Apply the principles, techniques and methods to customize the learned generic concepts to meet the needs of a particular industry/service.	20	x	x	
3	Identify the strategies for the purpose of satisfying a set of given sustainable green production/service system requirements.	30		x	x
4	Design the rules and processes to meet the market need and the green production/ service system requirements by selecting and evaluating suitable technical, managerial / project management and supply chain management schemes.	40	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	Lecture/ Directed Studies	Large class activities: Lectures on the topics of the keyword syllabus.	1, 2	2 hours/week

2	Tutorial	Group work activities Group projects are given to students for the investigation in relation to the CILOs. Students will discuss the projects during the tutorial period. The group assessment is based on the group presentation and the group report.	1, 2, 3, 4	1 hours/week
3	Self-study	Individual work activities Students are required to carry out self-study on webs and search appropriate technical and managerial information/ data in conjunction with the lecturing materials to accomplish a set of given requirements. The work of the self-study will be presented as an individual report for assessment.	1, 2, 3, 4	20 hours/Sem

Additional Information for LTAs

Activity Type: Lecture/Tutorial/Laboratory Mix
Timetabled Activity (Hours per week): Lectures/Action learning activities/Projects (3)

Or

Activity Type: **Directed Studies/Group or Individual work**
Timetabled Activity (Hours per week): **Directed Studies Consultation (1); Group or Individual Work (2)**

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Group presentation & report	1, 2, 3, 4	25	5% of the marks is based on the presentation and 20% is based on the report of the softcopy of PPT.	No
2	Individual report	1, 2, 3, 4	25	20% of the marks is based on the accomplishment of satisfying the given requirements and 5% is based on the write-up of peer Assessment.	No

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Assessment Rubrics (AR)

Assessment Task

1. Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

1.1 Ability to explain in detail the design concepts and the operations of the sustainable green production and service systems
1.2 Ability to identify the strategies in satisfying a set of given requirements to a green production and service system
1.3 Capacity for applying accuracy methods to design green products/services.

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

Assessment Task

2. Group presentation & report (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to explain in detail and with accuracy methods of inquiry useful in analysing to develop sustainable green strategy and the design of a production/service system for greener environment

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

Assessment Task
3. Individual report (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
3.1 Capacity for self-directed learning on webs and search appropriate information/data in conjunction with the lecturing materials to accomplish a set of given requirements
3.2 Ability to assess the teamwork

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

Assessment Task
1. Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
1.1 Ability to explain in detail the design concepts and the operations of the sustainable green production and service systems
1.2 Ability to identify the strategies in satisfying a set of given requirements to a green production and service system
1.3 Capacity for applying accuracy methods to design green products/services.

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Moderate/Basic

Failure
(F) Not even reaching marginal levels

Assessment Task

2. Group presentation & report (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to explain in detail and with accuracy methods of inquiry useful in analysing to develop sustainable green strategy and the design of a production/service system for greener environment

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate/Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

3. Individual report (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

3.1 Capacity for self-directed learning on webs and search appropriate information/data in conjunction with the lecturing materials to accomplish a set of given requirements
3.2 Ability to assess the teamwork

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate/Basic

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Challenges and Drivers of Green Production and Service Systems. Principles of Lean, Sustainable, and Green Production/ Service. WEEE (Waste Electrical and Electronic Equipment) and RoHS (Restriction of Hazardous Substances). Eco-design. Recycling and Remanufacturing. Life Cycle Assessment. Environmental Impact Assessment. Industrial Ecology. Industrial Symbiosis. Sustainable Engineering. Humanity and Technology. ESG (Environmental, Social, and Governance). Green Rapid Production. Sustainable Green Systems Design and Management. Alternative Energy Resources. International industrial and research case studies from the USA, Europe, Japan, Hong Kong, China and elsewhere.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Thomas E. Graedel, Matthew J. Eckelman. “Industrial Ecology and Sustainability” World Industries Scientific Publishing Co Pte LTD. 2023.
2	Charbel Jose Chiappetta Jabbour, Syed Abdul Rehman Khan "Sustainable Production and Consumption Systems" Springer Nature. 2021.
3	Samuel Ayodele Iwarere. "Sustainable Engineering: concepts and Practices" Springer International Publishing A&G. 2024.
4	Edited By Sherin Zafar, Mohd Abdul Ahad, M. Afshar Alam, Kashish Ara Shakil. "Green Automation for Sustainable Environment". CRC Press. 2022.
5	Edited By K. Saravanan, G. Sakthinathan. "Handbook of Green Engineering Technologies for Sustainable Smart Cities". CRC Press. 2021.
6	Edited By V. Sivasubramanian. "Environmental Sustainability Using Green Technologies". CRC Press. 2020.