

SYE6612: THE FOURTH INDUSTRIAL REVOLUTION

Effective Term

Semester A 2026/27

Part I Course Overview

Course Title

The Fourth Industrial Revolution

Subject Code

SYE - Systems Engineering

Course Number

6612

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

The Fourth Industrial Revolution (4IR) is marked by the fusion of the cyber, physical, and human realms, driven by the advancement of intelligent technologies. The 4IR brings not only new benefits but also complex economic, societal, and ethical challenges for humanity. This course aims to help students deeply and systematically understand the forefront of 4IR (such as artificial intelligence, blockchain, and metaverse), discern emerging challenges and opportunities, and explore new policies, socioeconomic mechanisms, protocols, organizations, business models, products, systems, and services to shape its future. During this course, students will produce a rigorous review and thesis on their assigned technology—covering principles, applications, advantages, disadvantages, and socio-technical implications. The course emphasizes master-level research, technical writing, and collaborative knowledge synthesis.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Systematic understanding of the 4IR phenomenon, with deep expertise in one specific enabling technology	30	x	x	
2	Theories to analyze technology-industry co-evolution, including critical evaluation of advantages and disadvantages of a given technology	30	x	x	
3	Produce a structured, citation-rich, review article or thesis chapter that meets academic standards of clarity, evidence, and originality	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	Lectures	Instructor-led sessions on: 4IR landscape overview, how to write a critical technology review, thesis structuring, citation management, and the ethics of technology assessment.	1, 2, 3
			1.5

2	Individual Research & Peer Workshops	Students work individually on their assigned technology. Weekly sessions are split into technology clusters (e.g., AI, Blockchain). Students share progress, obtain peer and instructor feedback, and conduct structured peer reviews.	2, 3	1.5
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Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Technology Scoping & Annotated Bibliography	1, 2, 3	20	Scope and source annotated bibliography	Yes
2	Full Draft Review Article	1, 2, 3	40	First completed manuscript	Yes
3	Peer Reviews	1, 2, 3	15	Two structured peer reviews of classmates' drafts	No
4	Final Revised Review Article	1, 2, 3	25	Final revised version incorporating feedback.	Yes

Continuous Assessment (%)

100

Examination (%)

0

Examination Duration (Hours)

0

Minimum Continuous Assessment Passing Requirement (%)

60

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)**Assessment Task**

Technology Scoping & Annotated Bibliography

Criterion

Defines the technological scope of the project and curates a focused, relevant bibliography.

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

Full Draft Review Article

Criterion

Produces a complete, coherent manuscript synthesizing the literature.

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

Peer Reviews

Criterion

Provides constructive, actionable feedback to improve peers' drafts.

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

Final Revised Review Article

Criterion

Integrates feedback to deliver a polished final manuscript.

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

Part III Other Information

Keyword Syllabus

- The Fourth Industrial Revolution
- Artificial Intelligence
- Autonomous Vehicles
- Robotics
- Blockchain and Web 3
- Semiconductor
- Quantum Computing
- Ethics of Emerging Technologies
- Design Thinking
- Ecosystem Thinking
- Evolutionary Thinking
- Future and Foresights
- Systems Leadership

Reading List

Compulsory Readings

Title	
1	Shaping the Future of the Fourth Industrial Revolution Klaus Schwab. Penguin, 2018
2	Designing the Future of the Fourth Industrial Revolution Jianxi Luo. Journal of Engineering Design, 2023

Additional Readings

Title	
1	The Singularity Is Near: When Humans Transcend Biology Ray Kurzweil. Viking, 2005
2	Design for a Better World: Meaningful, Sustainable, Humanity Centered Don Norman. The MIT Press, 2023