

SYE8029P: DATA ANALYSIS AND ARTIFICIAL INTELLIGENCE FOR SYSTEMS ENGINEERING

Effective Term

Semester A 2026/27

Part I Course Overview

Course Title

Data Analysis and Artificial Intelligence for Systems Engineering

Subject Code

SYE - Systems Engineering

Course Number

8029P

Academic Unit

Systems Engineering (SYE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

D8 - Professional Doctorate

Medium of Instruction

Other Languages

Other Languages for Medium of Instruction

Chinese, supplemented by English

Medium of Assessment

Other Languages

Other Languages for Medium of Assessment

Chinese, supplemented by English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details**Abstract**

As one of the most popular disciplines in recent years, data-driven Artificial Intelligence (AI), particularly machine learning-based approaches, is gradually transforming nearly all industries, such as domain of the engineering management. Advances in artificial intelligence, such as deep learning methods, are widely employed in many engineering industries for data analysis and research. Therefore, for those who wish to join the waves of AI, this course covers fundamental but comprehensive concepts and the ability to integrate machine learning and data analytics into smart manufacturing processes. In addition, the course will help students to explore the application of AI, python coding and other advanced technologies in manufacturing and operations. This course will construct a solid foundation for more advanced courses in engineering, marketing, finance, economics, and more advanced data science, deep learning, and AI.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify the state-of-the-art key issues of a data analysis problem engineering management or manufacturing; and formulate these issues into machine learning or AI models for further analysis.	30	x	x	x
2	Grasp the principles and concepts of integrating AI and other advanced technologies into manufacturing and operations.	25		x	x
3	Apply the knowledge of different AI and advanced techniques to achieve smart manufacturing, process control and product design.	25		x	x
4	Evaluate all gathered information and formulate a comprehensive conclusion to support decision-making and planning in enterprise operations.	20		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	Concepts and specific subject knowledge are explained	1, 2, 3, 4	24 hours/sem
2	Individual survey, discussion and exercise	With the teacher acting as a facilitator, students work independently or as a team together on engineering problem sets to consolidate their understanding of the concepts and methods.	1, 2, 3, 4	15 hours/sem

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks	Allow Use of GenAI?
1	Coursework	1, 2, 3, 4	100	-	Yes

Continuous Assessment (%)

100

Examination (%)

0

Examination Duration (Hours)

0

Minimum Continuous Assessment Passing Requirement (%)

30

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for the continuous assessment should be obtained.

Assessment Rubrics (AR)**Assessment Task**

1. Independent report (for students admitted in Semester A 2025/26 & thereafter)

Criterion

Core concepts, ideas and data driven analysis

Pass (P)

Pass

Failure (F)

Fail

Part III Other Information**Keyword Syllabus**

- Concepts and Principles of AI
- Concepts and Principles of Intelligent/Smart Manufacturing
- Large Language Model, GPT, and Prompt Engineering
- Application of AI to Smart Manufacturing
- Machine Learning and Advanced Data Analysis
- Advanced technologies emerging in recent years

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	Python Crash Course, 2nd Edition: A Hands-On, Project-Based Introduction to Programming 2nd Edition
2	Statistics for Business: Decision Making and Analysis, by Robert Stine and Dean Foster
3	Deep Learning with Python
4	Machine Learning, Andrew Ng, coursera.org
5	ISAK KARABEGOVI, AHMED KOVAEVI, LEJLA BANJANOVI-MEHMEDOVI, PREDRAG DAI, Handbook of Research on Integrating Industry 4.0 in Business and Manufacturing (Advances in Business Information Systems and Analytics (Abisa)), IGI Global, 2020
6	S.K. ONG and A. Y. C. NEE, Virtual and Augmented Reality Applications in Manufacturing, Springer-Verlag, 2004
7	FEI TAO, MENG ZHANG and A.Y.C. NEE, Digital Twin Driven Smart Manufacturing, Academic Press Elsevier, 2019
8	MIKEL ARMENDIA, ERDEM OZTURK, MANI GHASSEMPOURI, FLAVIEN PEYSSON, Twin-Control: A Digital Twin Approach to Improve Machine Tools Lifecycle, Springer, 2019.