

SYE6621: AGENTIC AI FOR INNOVATION

Effective Term

Summer Term 2026

Part I Course Overview

Course Title

Agentic AI for Innovation

Subject Code

SYE - Systems Engineering

Course Number

6621

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

Agentic AI refers to artificial intelligence (AI) systems that exhibit agency, meaning they can make decisions, set goals, and take actions autonomously to achieve those goals within given constraints. Equipped with reasoning, planning, and

self-improving capabilities, agentic AI is poised to fundamentally transform the future of our society. This course aims to help students embrace and thrive in such an Agentic AI era by introducing fundamental concepts, discussing the latest advancements, and creating hands-on experiences in Agentic AI. The first part of this course provides a comprehensive review of foundational models, the cornerstone of Agentic AI, with a particular emphasis on their reasoning, planning, agentic frameworks, and infrastructure. The second part focuses on developing practical skills, such as multi-agent workflows, to design and deploy innovative real-world AI solutions. As a project-oriented, student-centered course, this course will equip the future workforce and innovators with the necessary skill sets and mindsets for AI innovation.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	To describe the basic concepts and frameworks in foundation models and large language models (LLMs). To understand the widely used technologies in LLM agents, including reasoning, planning, and decision-making.	20	x	x	
2	To identify and describe the technology advancements in representative Agentic AI applications and the motivations behind them. To understand and present the limitations and potential risks of current Agentic AI systems.	15	x	x	
3	To understand and practice the current state-of-the-art agentic AI frameworks, such as LangGraph, LangChain, and CrewAI. To develop practical skills and engineering mindsets for designing and building multi-agent AI systems with task automation and tool calling.	25	x	x	x
4	To conduct a collaborative Agentic AI innovation project with entrepreneurial thinking. To combine all the relevant technologies and apply them to address the current limitations and create an innovative AI agent with teamwork.	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	The instructor presents basic concepts, modulates student discussion, and invites guest lecturers.	1, 2, 3	9h/sem

2	In-class exercise	With the instructor acting as the facilitator, students work on assigned hands-on programming exercises.	1, 3	12h/sem
3	Group Project	Students team up with classmates to propose a project topic and seek approval from the instructor. They are expected to submit a report and a codebase.	3, 4	18h/sem

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3	30	GenAI is permitted with transparent disclosure	Yes
2	Project Report	4	30	-	Yes
3	Codebase	3, 4	25	-	Yes
4	Final Presentation	4	15	-	No

Continuous Assessment (%)

100

Examination (%)

0

Examination Duration (Hours)

0

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)**Assessment Task**

Assignment

Criterion

Accuracy of contents; depth of analysis; clarity and structure; references and academic integrity

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

Project Report

Criterion

Clarity of problem definition and relevance; soundness of proposed design and technical contribution; presentation quality

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

Codebase

Criterion

Functionality& code quality; user friendliness; documentation; creative use of AI tools

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

Oral Presentation

Criterion

Clarity and organization; teamwork and coordination; audience engagement

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

Artificial Intelligence

Systems Design and Optimization

Generative Models and Foundation Models

Large Language Models Agents

Multi-Agent AI and workflows

Agentic AI safety and security

Agentic AI innovation

Reading List**Additional Readings**

	Title
1	Guo, D., Yang, D., Zhang, H. et al. “DeepSeek-R1 incentivizes reasoning in LLMs through reinforcement learning.” <i>Nature</i> 645, 633–638 (2025). https://doi.org/10.1038/s41586-025-09422-z
2	Ahn, M., Dwibedi, D., Finn, C. et al. “AutoRT: Embodied Foundation Models for Large Scale Orchestration of Robotic Agents.” arXiv preprint (2024). https://arxiv.org/abs/2401.12963
3	Bommasani, R., Hudson, D.A., Adeli, E. et al. “On the Opportunities and Risks of Foundation Models.” arXiv preprint (2022). https://arxiv.org/abs/2108.07258
4	Li, T., and Zhu, Q. “Symbiotic Game and Foundation Models for Cyber Deception Operations in Strategic Cyber Warfare” <i>Foundations of Cyber Deception</i> , Springer Cham (2026). https://link.springer.com/book/9783031938665