National Cheng Kung University
Modular Courses 2026 Winter Program

Academic Year：114, Semester：2 Category：Natural and Engineering Sciences

代理式人工智慧
Agentic AI

Instructor	Affiliation	Graduation (Ph.D.)
吳馬丁Torbjörn Nordling martin@mail.ncku.edu.tw	**Department of Mechanical Engineering National Cheng Kung University**	**KTH Royal Institute of Technology, Sweden**

Category	Course Credit	Student Size (Maximum)
Interdisciplinary Integration	**1.5**	**16**

Student Background

Difficulty

☐ Challenging ■ Moderately Difficult ☐ Medium ☐ Entry Level (Basic)

Format of The Course

Lecture 55%, Hands-on Practice 36%, Report 9%

Additional Note: The course follows a lecture-type modular format: mornings are lecture-based; afternoons are dedicated to group exercises and project implementation.

Grading Policy

- **Homework 10 %：**

  Individual homework consist of writing a case brief. The case brief is to be handed in before lecture start on 3rd day. Scored based on quality of problem description and analysis in the case brief relative to the example brief provided.

- **Report 40 %：**

  Oral presentation of PBL case scored based on Contribution & Impact (10%), Technical Depth & Soundness (20%), Novelty / Creativity (10%), Presentation Delivery & Organization (20%), Evaluation & Validation (20%), Team Work (10%), Q & A Performance and Reflection (10%).

- **Attendance 10 %**

  Attendance (10%), Homework (10%), and the written technical report are individual assessment components, ensuring that each student remains actively engaged and demonstrates personal responsibility for learning.

- **Project work 40 % ：**

  The project deliverables must include agent system design (chart following UML), test cases with outcomes (document), a reflection on performance relative to a pure Chat-based solution (document), and a demonstration (in class). The chart and documents is to be handed in within one working day after the end of the course (each max one A4 page). The reflection is scored based on demonstrated understanding of why the performance difference occurs. The chart and test cases are scored base on technical quality. Each deliverable scored 1 if handed in/done with acceptable quality before the end of the course. Each student must also submit an individual

contribution assessment for his/her group, used to assign merit from group reports. In addition, each student needs to hand in a written technical report detailing the solution built by the group they belonged to within one week after the course ends.

Code of Conduct for The Course

1. **Students must attend all sessions and complete assigned group tasks. Absence for more than one day results in no credit.**
2. **Each group must submit a written case brief and deliver an oral presentation of the solution to the PBL case on the final day.**
3. **All code, datasets, and reports must be uploaded to the designated Git repository.**
4. **Evaluation considers project implementation, quality of the case brief, oral presentation, and teamwork.**

Course Description

Agentic AI and AI Agents represent a paradigm shift in artificial intelligence, moving beyond static model inference toward systems that can autonomously plan, act, and evaluate within dynamic workflows. Industry demand is rapidly increasing for engineers who understand not only the theoretical foundations of deep learning but also the design and deployment of agentic workflows. In almost all domains these capabilities are becoming essential for innovation, competitiveness, and workforce readiness.

This course investigates Agentic AI theory and applications. Students will learn agent system architecture and deployment of agentic workflows. The course uses problem-based learning (PBL): students form teams to design and execute an intelligent agent project to meet an industry need selected by the team. Cases from different industries are presented, such as healthcare technology, smart manufacturing, marketing/lead generation, and wealth management.

Keywords: Agentic AI, AI Agent, Smart Healthcare

Course Description (中文)

代理式人工智慧（Agentic AI）與人工智慧代理人（AI Agents）代表了人工智慧領域的一項典範轉移，使人工智慧超越靜態模型推論，邁向能在動態工作流程中自主規劃、執行與評估的系統。

產業界對於具備此能力的工程師需求正迅速增加，不僅要求理解深度學習的理論基礎，亦需掌握代理式工作流程的設計與部署。在幾乎所有領域中，這些能力已成為創新、競爭力與職場所需即戰力的關鍵。

本課程探討代理式人工智慧的理論與應用。學生將學習代理系統架構與代理式工作流程的部署方法。課程採用問題導向學習（PBL）方式：學生分組設計並執行一個智能代理專案，以解決小組所選定的產業需求。課程中將介紹多個產業案例，例如智慧醫療科技、智慧製造、行銷與潛在客戶開發，以及財富管理等。

關鍵字：代理式人工智慧、AI 代理人、智慧健康照護

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Timetable and Syllabus

Period	Timetable	Syllabus
2026/1/12(一)	9:00-12:00	Course introduction, Basics of AI & heart rate variability (HRV) Prompt engineering and contextual grounding. Clinical dialogue on AI and HRV, and exploration of application scenarios.
	13:00-15:30	Exercise: Group formation, Introduction of cases HRV signal processing, physiological principles, and practical measurement.
2026/1/13(二)	9:00-12:00	廖世偉副教授 講授 AI Agent Architectural Workflows Tools and Foundation Models for AI Agents
	13:00-15:30	Exercise: Retrospective on Chat-based AI Tools Writing of system case brief
2026/1/14(三)	9:00-12:00	廖世偉副教授 講授 Tools and Foundation Models for AI Agents Retrieval-Augmented Generation (RAG)
	13:00-15:30	Exercise: Design and implement AI agents/HRV data acquisition, feature labeling, and hands-on AI model building (carried out by different student groups in parallel).
2026/1/15(四)	9:00-12:00	HRV signal processing, physiological principles, and practical measurement.
	13:00-15:30	Exercise: Design and implement AI agents/HRV data acquisition, feature labeling, and hands-on AI model building (carried out by different student groups in parallel).
2026/1/16(五)	9:00-12:00	Model compression for edge deployment
	13:00-15:30	Assessment: Group outcome integration, presentation, and application reflection.

Goal of the Course

1. **Understand the concept and architecture of Agentic AI, and abstract real-world problems into intelligent agent workflows.**
2. **Design and implement AI agents.**
3. **Apply sensing, analysis, and integration into smart healthcare applications.**
4. **Complete a cross-disciplinary PBL project and present results through group reports and reflection.**

The Importance, Cross-Over Disciplinary and Contemporary of The Curriculum

Agentic AI represents a major paradigm shift beyond generative AI, transforming artificial intelligence from static inference to systems capable of autonomous planning, action, and evaluation. Its applications span smart manufacturing, healthcare, fintech, and marketing automation.

This course integrates perspectives from smart healthcare and AI systems engineering, enabling

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students to acquire cross-disciplinary competencies in data sensing, signal analysis, AI model construction, and intelligent agent workflow design—skills that directly address growing industrial demand for AI-enabled innovation and practice.

The course integrates two modules from the Miin Wu School of Computing (SOC):

1. **Let AI Understand Heartbeats: HRV Smart Healthcare Applications**
2. **AI Agent Basic Workflow Design**

Remarks

Lecture slides available through Moodle, Miin Wu SOC website, or Nordling Lab course website.

References:

1. **Russell, S. & Norvig, P. (2021). Artificial Intelligence: A Modern Approach (4th ed.). Pearson. https://aima.cs.berkeley.edu/global-index.html**
2. **Nordling, T. E. M. (2025). AI Agent Basic Workflow Design. Miin Wu School of Computing, NCKU.**
3. **Lin, M.-F. (2025). Let AI Understand Heartbeats: HRV Smart Healthcare Applications. Miin Wu School of Computing, NCKU.**

TA/Email/Ex.: 賴弘鈞 (Hank Lai)/hank.lai@nordlinglab.org/62159-73

本課程若因天災等不可抗力之因素或中央、地方政府公告停課，授課教師需依情況依建議補課方式調整課程進度與補課；若需使用假日、國定假日補課，則需與所有修課學生達成共識方能用例假日補課。

建議補課方式：

1. 線上授課方式補課；
2. 當預期可能會因天災(颱風、超大豪雨…等)宣佈停課時，建議老師先行調整加快課程進度或預先增加可能天氣預警之前幾次課程時數；
3. 停課後隔天起延後下課，補足停課延誤的進度；若停課超過 1 天，則在開始上課後延後下課補課，或當週星期六、日補課；

更改課程授課方式，例如：DEMO 改以考試、報告、作業取代。