The Hong Kong University of Science and Technology

UG Course Syllabus (Spring 2025-26)

[Course Title] Embedded AI Systems

[Course Code] COMP4901D

[No. of Credits]: 3 Credits

[Any pre-/co-requisites]: *(COMP 2012 OR COMP 2012H) AND COMP 2211*

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Course Description

This course will introduce the techniques on deploying AI models on ubiquitous yet resource-constrained platforms such as embedded, mobile, and edge devices. Students will develop a deep understanding of embedded and on-device AI systems, gain hands-on experience in implementation, and learn the practical challenges of applying AI in real-world scenarios.

The major topics include 1) Fundamentals of machine learning and embedded systems; 2) Data and system challenges in embedded AI 3) AI techniques and their efficient deployment on cutting-edge platforms 4) Real-world applications, such as mobile agent and smart health. The course structure will primarily consist of instructor lectures, paper presentations and hands-on projects/labs.

By the end of the course, students will be equipped to deploy AI models, including large language models (LLMs), on embedded, mobile and edge devices for applications such as mobile agents, smart health, and more.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Hands-on experience in implementing state-of-the-art AI models on real-world embedded, mobile and edge devices.

2. Design and develop end-to-end embedded AI systems for practical applications such as mobile agents and smart healthcare.

3. In-depth understanding of challenges in embedded AI systems.

4. Critical thinking ability to tackle problems in embedded AI systems.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
In-class discussion	10%	09/05/2026 *
Paper presentation	10%	09/05/2026 *
Team project	40%	09/05/2026 *
Final examination	40%	29/05/2026

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
In-class discussion	ILO2, ILO3	This quiz assesses students' ability to design and develop end-to-end embedded AI systems (ILO2) and in-depth understanding of challenges in embedded AI systems (ILO3).
Paper presentation	ILO3, ILO4	The presentation assesses students' ability for in-depth understanding of challenges in embedded AI systems (ILO3), and critical thinking ability to tackle problems in embedded AI systems (ILO4).
Team project	ILO1, ILO2	This lab assesses students' ability to implement state-of-the-art AI models on devices (ILO1), and the ability to design and develop new end-to-end embedded AI systems (ILO2).
Final examination	ILO2, ILO3, ILO4	This exam assesses students' ability to design and develop end-to-end embedded AI systems (ILO2) and in-depth understanding of challenges in embedded AI systems (ILO3), and critical thinking ability to tackle problems in embedded AI systems (ILO4).

Grading Rubrics

In-class quiz: class engagement and answers to questions posted in classes.

Paper presentation: clarity, organization, technical content, and question answering

Assignment or labs: execution, presentation, demo, and report

Final examination: score of the exam

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

The use of generative AI tools (e.g., ChatGPT, Copilot) is not permitted for completing assessment tasks except the final exam and in-class quiz.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

20% penalty per day for delayed submission of assignment or labs.

Required Texts and Materials

N.A.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The

University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

[Optional] Additional Resources

- Conference Papers: Proceedings of MobiCom / MobiSys / SenSys / Ubicomp / HotMobile
- Book: Siam, S.I., Ahn, H., Liu, L., Alam, S., Shen, H., Cao, Z., Shroff, N., Krishnamachari, B., Srivastava, M. and Zhang, M., 2024. Artificial Intelligence of Things: A Survey. *ACM Transactions on Sensor Networks*.