ISOM 4000D
Generative AI and Large Language Models
Spring 2025

Course Code: ISOM 4000D, 3 Credits
Course Name: Generative AI and Large Language Models
Instructor: Dr. Jin Chen
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Course Website: https://canvas.ust.hk

Class Schedule

Section	Day	Time	Venue
L1	Monday	16:30~17:50	2302
L1	Friday	12:00~13:30	2302

Course Description

This course offers a comprehensive exploration of Generative AI (GenAI) and Large Language Models (LLMs). We begin by establishing foundational knowledge, covering the history, evolution, and future challenges of GenAI and LLMs. The course combines conceptual understanding with practical applications, including hands-on experience in calling APIs and navigating the pipeline to successfully train toy models.

Students will gain a deeper understanding of LLM applications across diverse domains, tools integration, and critical issues. Additionally, we will examine the limitations and alignment challenges of these models. By the end of the course, participants will be equipped with both conceptual knowledge and practical skills to engage effectively with the rapidly advancing field of GenAI.

Intended Learning Outcomes

- **Knowledge**
  a) Students will understand the foundational concepts and principles of LLMs;
  b) Students will develop an understanding of which tasks LLMs are suitable for and their limitations.

- ❑ **Hands-On Experience**
  a) Students will learn to utilize APIs for different tasks; b) Students will gain practical experience by running a toy model
- ❑ **Valued/Attitude**
  a) Students will recognize the critical importance of data in the context of LLMs; b) Students will develop awareness of the limitations and risks associated with using ChatGPT and similar technologies.
- ❑ **Teamwork**
  a) Students will enhance their ability to work effectively in groups; b) Students will develop communication skills necessary for collaboration in technical and non-technical settings.

Required Background and Prerequisite Knowledge

This course assumes a foundational proficiency in Python, as it is essential for the hands-on components of the curriculum. Additionally, a basic understanding of machine learning concepts—particularly in natural language processing (NLP)—is recommended to fully grasp the processes involved in LLMs.

Evaluation Procedures

Course Component	Overall Weight
Participation	15%
Assignment 1	20%
Assignment 2	20%
Final Project Report	28%
Final Project Presentation	17%

Participation (15%)

As this course explores cutting-edge topics, active participation in lectures is highly encouraged. Students can earn participation credit through the following activities:
Open Discussion Several open discussions will address critical issues related to large language models (LLMs), such as trust, reliability, fairness, and ethical considerations. Students are encouraged to draw upon research papers, news articles, or other relevant materials to contribute to these discussions. Contributions can cover a wide range of aspects, including but not limited to: (1) The Problem: Identifying key issues and their root causes. (2) Impacts: Examining how these issues affect organizations, communities, or society at large. (3) Solutions: Proposing potential approaches to address the challenges. (4) Emerging Trends: Highlighting new developments in LLMs or the activities of leading firms in the field.
Survey Feedback Two feedback surveys will be distributed to gather students' opinions, comments, and suggestions about the course. Active and thoughtful participation in these surveys contributes to the participation grade.

In-class Quiz Approximately 2–3 in-class quizzes will be conducted to evaluate students' understanding of technical concepts. These quizzes are designed to reinforce key ideas discussed during the lectures.

Assignments (40%)

The course includes two individual homework assignments designed to provide hands-on experience with LLMs. Each assignment requires a report and, if applicable, a code submission.

The report must include: a) Screenshots or other evidence to demonstrate the completion of tasks. b) An explanation of the chosen method and its rationale. c) A summary of challenges encountered and the strategies used to overcome them.

If you are unsure if you will be able to turn in your assignments on time, submit them early. Assignments up to 24 hours late will have a 25% reduction in grade, while those up to 3 days late will have a 50% reduction. After 3 days, late assignments will not be credited.

Project (28% + 17%)

The final project is a team-based effort comprising two components: a project report (28%) and a project presentation (17%).

Project Report: Teams are required to submit a concise report, limited to 5 pages, addressing the following criteria:

- Technical Excitement (10%): Projects are encouraged to explore interesting, innovative, or practical ideas.
- Technical Soundness (10%): Demonstrate a solid technical foundation and appropriate methodologies.
- Clarity in writing (5%): The report should be well-organized and clearly written.
- Individual contribution (3%): Contributions of individuals will be evaluated.

Project Presentation: Each team will deliver a 10–15 minute presentation to share their work using a poster, PowerPoint slides, or a video. The presentation will be evaluated based on the following:

- Content quality (7%): The visual and informational quality of posters, slides, or videos will be assessed.
- Oral presentation (7%): Clear, logical, and enthusiastic delivery is highly valued.
- Overall subjective assessment (3%): Peer reviews from other groups will contribute to the evaluation, recognizing that subjective assessments are a part of real-world feedback.

Academic Integrity

Students at HKUST are required to adhere to the Academic Honor Code without exception (see http://acadreg.ust.hk/generalreg.html for more information).

You can use ChatGPT (or similar tools) to help conduct research for your group project, including revising your materials. Your idea is the most valuable. Tools to check whether the content is totally generated by AI would be used.

Tentative Lecture Course Content

Week	Date	Topics	Remarks
1	Feb. 3	Course Overview	
	Feb. 7	Concept of GenAI	
2	Feb. 10	What are LLMs —— Language Model	
	Feb. 14	What are LLMs —— Architecture	
3	Feb. 17	How to use LLMs	Assignment 1 Release
	Feb. 21		
4	Feb. 24	How to build LLMs —— Data Preparation	
	Feb. 28	How to build LLMs —— Train from scratch	
5	Mar. 3	How to build LLMs —— Fine-tuning	
	Mar. 7		Assignment 1 Due
6	Mar. 10	How to make LLMs faster	
	Mar. 14		
7	Mar. 17	Knowledge, Reasoning, and Prompt engineering	
	Mar. 21		Assignment 2 Release
8	Mar. 24		
	Mar. 28	Agent	
9	Mar. 31		
	Apr. 4	Public Holiday	
10	Apr. 7	Evaluate	Assignment 2 Due
	Apr. 11	Open Discussion and Challenges	
11	Apr. 14	Multi-Modal GenAI	
	Apr. 18	Public Holiday	
12	Apr. 21	Public Holiday	
	Apr. 25	In-class Presentation (Students)	
13	Apr. 28	In-class Presentation (Students)	
	May. 2	In-class Presentation (Students)	
14	May. 5	Public Holiday	
	May. 9	Overview	

NOTE: The above actual dates may be modified due to the requirements of the class. Also, the indicated dates may be moved backward or forward depending on class progress. **Exact dates and instructions will be announced on course webpage**.