MATH4999 Independent Capstone

Course Outline – Fall 2026

1. INSTRUCTOR

Prof. Shingyu Leung

Email: masyleung@ust.hk

Office:

Office hours:

2. TA

3. MEETING TIME AND VENUE

Lectures:
Tutorial:

4. COURSE DESCRIPTION

Credits: 3

Prerequisites: LANG3010 or LANG3011, and MATH3312

Exclusions: Nil

Independent capstone projects for students in MATH with an extended major in AI.

5. INTENDED LEARNING OUTCOMES

Upon successful completion of this course, students should be able to

No.	ILOs
1	Explain advanced mathematical theories, concepts and principles using precise mathematical language.
2	Apply independent judgment to investigative mathematical work.
3	Apply a rigorous logical and analytic approach to execute tasks and solve mathematical problems.
4	Work independently and collaborate effectively in a team.
5	Communicate mathematical concepts and methods effectively to a range of audiences, both orally and in writing.
6	Evaluate individual performance to identify and work towards targets for personal, academic and career development.
7	Apply the fundamental principles and conventions of ethical scientific practice and academic integrity.
8	Analyze the influence of mathematical sciences and their impact of human activity.
9	Draw on a global perspective and sound scientific evidence to evaluate the role of mathematical sciences in the international science community.

6. ASSESSMENT SCHEME

a. Final examination duration: Nil

b. Grading scheme

Weekly Progress (20%) + Meeting Reflections (10%) + Mid-Report (15%) + Final Report (25%) + Project Presentation (30%)

Assessment	Assessing Course ILOs
Assignment	1, 2, 3, 7
Proposal, Progress and Report	1, 2, 3, 4, 6, 7, 8, 9
Presentation	1, 5, 6, 9

Grade	Short Description	Elaboration On Subject Grading Description
A	Excellent	Demonstrates exceptional understanding of advanced mathematical theories; produces high-quality project work and presentations; effectively communicates complex concepts.
B	Good	Shows a strong grasp of mathematical concepts; produces solid project work with minor issues; communicates ideas clearly and effectively.
C	Satisfactory	Meets basic requirements of the course; demonstrates adequate understanding but may have inconsistencies in project execution or communication.
D	Marginal Pass	Shows limited understanding of key concepts; struggles with project work and communication; meets only the minimum criteria for passing.
F	Fail	Fails to demonstrate understanding of course material; unable to complete project requirements or communicate effectively; does not meet course expectations.

Reports Rubric

	Exemplary	Competent	Developing
Structure	The structure is **well organized** and easy to follow **throughout.**	The structure is **mostly organized** and **somewhat** easy to follow.	The structure is **somewhat organized** but **hard to follow** in places.
Clarity	**Most** ideas clearly expressed and **understandable**	Ideas clearly expressed **most of the time**	Ideas **lack details** at times **impeding understanding**.
Accuracy	**All** numerical results are accurately computed and are correctly described.	**Most** numerical results are accurately computed and are correctly described.	**Most** numerical results are accurately computed but **lack of any correct description**.
References	Ideas supported with **full references**	**Most** ideas supported with references	Ideas supported with **insufficient** references

Presentation Rubric

	Level 3	Level 2	Level 1
A. Explanation Skills (questions, pictures, analogies, etc.)	Variety of skills employed to accurately explain concepts with appropriate depth	Some skills employed to explain concepts accurately with adequate detail	Limited skills employed to explain concepts with inadequate detail
B. Accuracy	All numerical results are accurately computed and are correctly described.	Most numerical results are accurately computed and are correctly described.	Most numerical results are accurately computed but lack of any correct description.
C. Terminology	Key terminology well-defined & simplified to target level, building understanding	Key terminology defined & simplified, but some wording complex for understanding	Key terminology not defined and simplified enough, causing confusions
D. Timing	The presentation completed successfully within time; with good flexibility of QA session	The presentation completed successfully within time; with some flexibility of QA session	Some important teaching and activities not completed within time; with little flexibility of QA session
E. Facilitation	Observes interactions closely and fully responds to 'on-the-spot' needs	Good eye contact with learners, somehow responds to 'on-the-spot' needs	Lack eye contact with learners, not being aware of 'on-the-spot' situations

7. MEETING SCHEDULE

Weeks 2-4 Meeting 1
Weeks 5-7 Meeting 2
Weeks 8-10 Meeting 3
Weeks 11-13 Final Presentation

8. COMMUNICATION AND FEEDBACK

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Students who have further questions about the feedback, including marks, should consult the instructor within five working days after receiving the feedback.

9. COURSE AI POLICY

Generative AI is permitted and requested to assist students with brainstorming, drafting, and writing their papers.

10. ACADEMIC INTEGRITY

Students are expected to adhere to the university's academic integrity policy. Students must uphold HKUST's Academic Honor Code and maintain the highest academic integrity standards. The University has zero tolerance for academic misconduct. Please refer to Academic Integrity | HKUST - Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.