MATH2350 Applied Linear Algebra and Differential Equations
L1 (Fall 2026) Course Outline

1. Instructor

Name: Dr. CHENG Kam Hang Henry
Office: Room 3486 (L25–26)
Email: keroc@ust.hk
Office hours: (Tentative) Fri 12:00 – 14:00; you may also just drop in my office any time or make an email appointment beforehand to ensure I am there.

2. Teaching assistants

(T1A) Mr. SHI Xiao xshiau@connect.ust.hk
(T1B) Mr. WANG Kaibo kwangbi@connect.ust.hk

3. Meeting time and venue

Lectures:	(L1)	Mon 13:30 – 14:50	G001, CYT Building	
		Fri 9:00 – 10:20	G001, CYT Building	
Tutorials:	(T1A)	Thu 18:00 – 18:50	6573 (L29–30)	(Starting on **Sep 10**)
	(T1B)	Fri 11:30 – 12:20	2406 (L17–18)	(Starting on **Sep 11**)

Course website: https://canvas.ust.hk/courses/73341

4. Course description

This course provides a concise introduction to **linear algebra** and **differential equations**. Major topics include: systems of linear equations, matrix algebra, determinants, vector spaces, eigenvalues and eigenvectors, first order ODEs, linear second order ODEs and mechanical vibrations, homogeneous systems of first order ODEs with constant coefficients.

Credit points: 3
Exclusions: MATH2111/2121/2131; MATH2351/2352; PHYS2124
Prerequisite: **Calculus II** (MATH1014/1020/1024)

5. Intended learning outcomes (ILOs)

Upon successful completion of this course, students are expected to be able to:

1. perform computations regarding linear algebra and ordinary differential equations, and explain the logical reasoning behind the computations;
2. apply rigorous analytical and numerical approach to analyze and solve problems using concepts of linear algebra and differential equations;
3. demonstrate skills in reading, interpreting and communicating mathematical content which are integrated into other disciplines or appear in everyday life; and
4. develop mathematical maturity to undertake higher level studies in mathematically related fields.

6. Assessment scheme

- **Assignments (0%)**: Assessing ILOs 1, 2, 3 and 4
  Written assignment problems are designed for consolidating your understanding about the course materials and for your practice towards the mid-term test and the final exam. **Assignments will not be counted towards your final grade**. If you submit your work, feedback will be provided to you within two weeks after the submission deadline. You may consult any person or reference book or generative AI tool for assistance, but instead of directly copying AI outputs, you are encouraged to write down solutions on your own.

- **Midterm Test (45%)**: Assessing ILOs 1, 2, 3 and 4
  The mid-term test will be scheduled on **Wednesday, October 21 from 19:00 to 21:00**. It will cover all materials about **linear algebra** taught in this course.

- **Final Exam (55%)**: Assessing ILOs 1, 2, 3 and 4
  The final exam will take 3 hours and will be centrally scheduled by the Academic Registry in due course. It will mainly focus on materials about **differential equations** taught in this course, but some relevant topics about linear algebra will also be lightly touched on.

The mid-term test and the final exam will normally be **closed-book written tests**, and the usage of **HKEAA-approved calculators** will be allowed during the tests. The exact exam arrangements may be modified in the event of unexpected emergencies.

Letter grades:
The assignment of letter grades is **criterion-referenced** according to the grade descriptors below. In particular, this means neither "absolute grading" nor "curve grading". Although the exact "grade boundaries" vary due to the difficulty of the assessments, students should generally aim at getting a course total of 85% or above for A-/A/A+, about 70% or above for B-/B/B+, and about 50% or above for C-/C/C+.

Grade descriptors:

Grades	Short description	Elaboration on subject grading description
A	Excellent	The student has mastered almost all concepts and techniques of linear algebra **and** differential equations taught in the course, and has excellent and thorough understanding on the subject content.
B	Good	The student has mastered most computational techniques of linear algebra **and** differential equations taught in the course, yet the understanding of some challenging concepts may not be deep enough.

C	Satisfactory	The student meets the minimum expectation of the instructor, has acquired some basic computational techniques of linear algebra **and** differential equations, but some concepts were not clearly understood.
D	Marginal pass	The student is only able to recall some fragments of topics and is only able to complete some of the most elementary computations in both linear algebra **and** differential equations.
F	Fail	The student does not have sufficient understanding of even some fragments of topics in **either** linear algebra **or** differential equations, and is not even able to complete elementary computations.

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.

7. (Important) Policy on the use of AI tools

- **In assignments or in regular study**:

  You are **allowed** to consult AI tools to help with your assignments or regular study. However, you are advised to properly use these AI tools to assist your study rather than to directly ask them for answers and surrender your study opportunity. From the previous term (Spring 2026), it has been observed that the inappropriate use of AI has led to a drastic decline in students' exam performance in different courses, which consequently led to a decline in grades. Please visit this Canvas page (https://canvas.ust.hk/courses/73341/pages/learning-mathematics-effectively-with-ai) for some advice on properly using AI tools to assist your study. Apart from AI, you are highly recommended to **seek help from the course instructor or the TAs, especially during their office hours**.

- **In the mid-term test or the final exam**:

  The use of AI tools is **strictly prohibited** in the mid-term test and in the final exam. Students who are found wearing unauthorized electronic devices, including but not limited to **AI glasses** or **smart watches**, will be **disqualified** from the assessment.

8. Student learning resources

- Main reference: Lecture note by the instructor
  (Accessible via our course website https://canvas.ust.hk/courses/73341)

- Other references:
  J. R. Chasnov, *Matrix Algebra for Engineers* and *Differential Equations for Engineers*, Lecture Notes on Coursera.
  D. C. Lay, S. R. Lay and J. J. McDonald, *Linear Algebra and its Applications* (5th ed.), Pearson.
  W. E. Boyce, R. C. DiPrima and D. B. Meade, *Elementary Differential Equations and Boundary Value Problems* (12th ed.), Wiley.

9. Tentative course schedule

Week	Lecture dates	Topics
1	Sep 4, Sep 7	Complex number arithmetics
		Systems of linear (algebraic) equations
2	Sep 11, Sep 14	Gaussian elimination, Row echelon forms
		Matrix algebra, Inverse of a matrix
3	Sep 18, Sep 21	Vector spaces, bases and dimension
		Column space and null space of a matrix
4	Sep 25, Sep 28	Inner product spaces
		Orthogonal projection, Gram-Schmidt process
5	Oct 2, Oct 5	Determinants
		Eigenvalues and eigenvectors
6	Oct 9, Oct 12	Diagonalization of a square matrix
		Introduction to ordinary differential equations (ODEs)
7	Oct 16	First-order ODEs
8	Oct 23, Oct 26	Homogeneous linear second-order ODEs
9	Oct 30, Nov 2	Non-homogeneous linear second-order ODEs
		Mechanical vibrations
10	Nov 6, Nov 9	Laplace transform
11	Nov 13, Nov 16	Series solutions to a linear ODE
		Numerical methods for ODEs
12	Nov 20, Nov 23	Systems of linear first-order ODEs
13	Nov 27, Nov 30	Any other selected topic(s) and/or Final review