MATH3312 Numerical Analysis
L1 (Fall 2026) Course Outline

1. Instructor

Name:	Dr. Zhichao Peng
Office:	Room 3484 (L25-26)
Email:	pengzhic@ust.hk
Office hours:	Monday 19:00-19:45; students may also make an appointment by email.

2. Teaching assistants

(T1A)	Ning Tang	ntangad@connect.ust.hk
(T1B)	Jiawang Zhang	jzhangiw@connect.ust.hk

3. Meeting time and venue

Lectures:	(L1)	Mon 13:30-14:50	Room 5583 (L29-30)
		Fri 9:00-10:20	Room 5583 (L29-30)
Tutorials:	(T1A)	Thu 18:00-18:50	Room 4579 (L27-28)
	(T1B)	Fri 11:00-11:50	Multi-function Room, LG4, Library

Course website: https://canvas.ust.hk/courses/73389

4. Course description

This course presents numerical methods for solving mathematical problems. It focuses on the theory and application of numerical approximation techniques as well as their computer implementation. Major topics include computer arithmetic, nonlinear equations, interpolation and approximation, numerical integration and differentiation, ordinary differential equations, and matrix computation.

Credit points:	3
Exclusion:	MATH3311
Prerequisites:	COMP1002/COMP1004; MATH2121/MATH2111/MATH2350/MATH2131; and MATH2033/MATH2031/MATH2043

5. Intended learning outcomes (ILOs)

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

1. explain the mathematical principles, accuracy, stability, and limitations of basic numerical methods;
2. select and apply suitable numerical algorithms to solve nonlinear equations, approximation problems, differential equations, and matrix problems;
3. implement basic numerical methods in computer programs and interpret the computed results; and
4. analyze numerical errors and communicate mathematical and computational reasoning clearly.

6. Assessment scheme

- **Assignments (10%):** Assessing ILOs 1, 2, 3 and 4

  There will be four to five homework assignments, including computer projects. Homework credit is based on complete, on-time submission. The teaching assistants will nevertheless provide feedback on correctness and reference solutions. Homework must be uploaded digitally to the corresponding assignment on Canvas.

- **Midterm exam (30%):** Assessing ILOs 1, 2, 3 and 4

  There will be one in-class midterm exam. Its date, coverage, and detailed arrangements will be announced on Canvas.

- **Final exam (60%):** Assessing ILOs 1, 2, 3 and 4

  The final exam will last 120 minutes. Its date and detailed arrangements will be announced in due course.

- **Optional bonus project (up to 5 points):** A semester-long project will be offered. Requirements and submission arrangements will be announced separately.

Late homework policy: Late homework is subject to a score penalty. No homework will be accepted more than one week after its deadline. A student who cannot submit on time for an accepted reason, such as a medical issue supported by documentation, should contact the instructor in advance whenever possible.

Letter grades: This course uses criterion-referenced assessment. Letter grades are assigned according to the quality of performance described below; the instructor will determine the individual plus/minus grade within each band.

Grade descriptors:

Grades	Short description	Elaboration on subject grading description
A	Excellent	The student demonstrates deep understanding of the mathematical theory behind numerical algorithms and excellent ability to implement basic numerical methods.
B	Good	The student demonstrates good understanding of the mathematical theory behind numerical algorithms and is able to implement basic numerical methods.
C	Satisfactory	The student demonstrates reasonable understanding of the mathematical theory behind numerical algorithms and is able to implement basic numerical methods.
D	Marginal pass	The student knows some mathematical theory behind numerical algorithms and is roughly able to implement basic numerical methods.
F	Fail	The student lacks sufficient understanding of the mathematical theory behind numerical algorithms and the ability to implement basic numerical methods.

Academic integrity: Intellectual integrity is the foundation of the scientific enterprise. Students must do their own work and give proper credit to every source used in papers, programs, and oral or written presentations. Submitting another person's work, ideas, or wording as one's own constitutes plagiarism. Students are expected to uphold HKUST's Academic Honor Code and maintain the highest standards of academic integrity. Please refer to the Academic Integrity webpage of the HKUST Academic Registry.

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

- **In assignments and regular study:**

  Students are encouraged to use AI tools thoughtfully to enhance their learning. Any use of AI in homework, including computer projects, **must be explicitly disclosed**. Students remain responsible for understanding, checking, and clearly presenting all submitted work. Directly submitting AI-generated material as one's own work is not acceptable.

- **In the midterm or final exam:**

  Unless the instructor explicitly states otherwise, the use of AI tools and unauthorized electronic devices is prohibited during the midterm and final examinations. Detailed examination rules will be announced before each assessment.

8. Student learning resources

- **Main course materials:**

  Lecture notes, sample code, and reference solutions will be uploaded to Canvas under Files. The lecture notes are intended to be self-contained.

- **Textbook:**

  R. L. Burden and J. D. Faires, *Numerical Analysis*, 10th ed.

- **Other references:**

  D. E. Stewart, *Numerical Analysis: A Graduate Course*.
  J. R. Chasnov, *Numerical Methods for Engineers*.