MATH1013 Calculus I
L02, L10 (Fall 2025) 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

(T02A)	Mr. KWOK, Cheuk Yin Felix	mafelix@ust.hk
(T02B, T02C)	Mr. JIANG, Yueyan	yjiangdq@connect.ust.hk
(T10A, T10B)	Mr. LONG, Wenpei	wlongab@connect.ust.hk
(T10C)	Ms. XIE, Qing Katrina	maqxie@ust.hk

3. Meeting time and venue

Lectures:	(L02)	Tue & Thu 13:30 – 14:50	Lecture Theater E	
	(L10)	Tue & Thu 10:30 – 11:50	Lecture Theater E	
Tutorials:	(T02A)	Mon 18:00 – 18:50	1410 (L25–26)	(Starting on **Sep 8**)
	(T02B)	Mon 17:00 – 17:50	LG3009 (L10–12)	(Starting on **Sep 8**)
	(T02C)	Mon 16:00 – 16:50	1409 (L25–26)	(Starting on **Sep 8**)
	(T10A)	Mon 12:00 – 12:50	6555 (L27–30)	(Starting on **Sep 8**)
	(T10B)	Thu 12:00 – 12:50	6591 (L31–32)	(Starting on **Sep 11**)
	(T10C)	Mon 9:30 – 10:20	LG3009 (L10–12)	(Starting on **Sep 8**)

Course website: https://canvas.ust.hk/courses/66058

4. Course description

This is an introductory course in **one-variable calculus**, the first in the Calculus I and II sequence, designed for students who passed HKDSE Mathematics Extended Part M1 or M2. Major topics include: functions and their limits, continuity, derivatives and rules of differentiation, applications of derivatives, basic integral calculus.

Credit points:	3
Exclusions:	MATH1012/1014/1020/1023/1024
Prerequisite:	Official: None; Recommended: **Pre-calculus** (MATH1003/1005/1006) or (**Level 3 or above** in HKDSE Mathematics EP M1/M2)

5. Intended learning outcomes

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

1. compute limits, derivatives and simple integrals of functions in one variable;
2. express quantitative relationships using the language of functions; and
3. apply conceptual knowledge of differential calculus in modeling and problem solving for further studies in science, engineering or other mathematically related fields.

6. Assessment scheme

- **WeBWorK assignments (10%)**: Assessing ILOs 1, 2 and 3
  WeBWorK homework sets will be assigned from time to time and can be accessed via https://webwork.math.ust.hk/.

- **Extra problem sets (0%)**: Assessing ILOs 1, 2 and 3
  Although extra problem sets are not counted towards the final grade, you are highly encouraged to work out the solutions to the problems. WeBWorK assignments are often too easy compared with the mid-term test and the final exam, while the problem sets will provide sufficient practice exercise.

- **Midterm Test (35%)**: Assessing ILOs 1, 2 and 3
  The mid-term test will be scheduled on **Sunday, October 26 from 10:15 to 11:45**. It will tentatively cover all materials from Chapter 1 to Chapter 3.

- **Final Exam (55%)**: Assessing ILOs 1, 2 and 3
  The final exam will take three hours and will be scheduled by the Academic Registry in due course. It will cover everything that has been taught in the course.

The mid-term test and the final exam will normally be **closed-book written tests**, and **calculators will not be allowed** during the tests. The exact exam arrangements may be modified in the event of unexpected emergencies.

Use of generative AI tools:
The use of ChatGPT or other generative AI tools in assignments are not strictly prohibited, but are not encouraged either. While AI tools can be useful in exploring data sets, identifying patterns and improving flows and grammar in writing, **you are warned against solely relying on AI to analyze data and solve problems without truly grasping the underlying concepts**. The use of AI tools are prohibited in the mid-term test and the final exam.

Letter grades:

The assignment of letter grades is **criterion-referenced** according to the grade descriptors below. Although the exact "grade boundaries" vary due to the difficulty of the assessments, students should generally aim at getting a course total of about 85% or above for A-/A/A+, about 70% or above for B-/B/B+, and about 40% or above for a passing grade.

Grade descriptors:

Grades	Short description	Elaboration on subject grading description
A	Excellent	The student has mastered almost all techniques of basic one-variable calculus taught in the course, and has excellent and thorough conceptual understanding on the subject content.
B	Good	The student has mastered most computational techniques of basic one-variable calculus 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 the subject, but some concepts were not clearly understood.
D	Marginal pass	The student is only able to recall some fragments of topics and is able to complete some of the most elementary computations.
F	Fail	The student does not have sufficient understanding of even some fragments of topics, and is not even able to complete elementary computations.

7. Student learning resources

- Lecture note by the instructor
  (Accessible via our course website https://canvas.ust.hk/courses/66058)

- Reference texts:
  J. Stewart, D. Clegg and S. Watson, *Calculus: Early Transcendentals* (Metric version, 9th edition), Cengage.
  J. Hu, W. Li and Y. Wu, *Calculus for scientists and engineers with Matlab*.

8. Tentative course schedule

Week	Lecture dates	Topics
1	Sep 2, Sep 4	Basic set theory, numbers and intervals
		Inequalities and absolute values
2	Sep 9, Sep 11	Functions and graphs
		Elementary functions
3	Sep 16, Sep 18	Limits of a function
		Rules of limits
4	Sep 23, Sep 25	Infinite limits and limit at infinity
		Continuity
5	Sep 30, Oct 2	Derivatives
		Rules of differentiation, chain rule
6	Oct 9	Techniques of differentiation
7	Oct 14, Oct 16	Rates of change
		Linear approximations, differentials
8	Oct 21, Oct 23	Newton's method
		Maximum and minimum of functions
9	Oct 28, Oct 30	Mean value theorem
		l'Hôpital's rule
10	Nov 4, Nov 6	Curve sketching
		Optimization
11	Nov 11, Nov 13	Areas and integrals
		Newton-Leibniz formula, antiderivatives
12	Nov 18, Nov 20	Substitution rule
		Integration by parts
13	Nov 25, Nov 27	Final review