Math1006-L1 Calculus, Vectors, and Matrices

Course Outline-Fall 2026

1. Instructor(s)

Name: LAM, Tsz Kin

Contact Details:

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2. Teaching Assistant

Name: Phyllis Liang

Contact Details:

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3. Meeting Time and Venue

Lectures:

Date/Time/Venue:

L1: TUTH 9:00-10:20, LTE

Tutorials:

Date/Time/Venue:

T1A: Fri 9:30-10:20, Rm 4504 T1A: Thu 13:30-14:20, Rm 4504

T1B: Mon 17:00-17:50, Rm 1410

4. Course Description

Credit Points: 4

Prerequisites: Level 2 or above in HKDSE MATH (Compulsory Part)

Exclusions: Level 3 or above in HKDSE Mathematics Extended Module M1 or M2.

Brief Information/synopsis:

The course covers basic applications and techniques of single-variable calculus, vectors and matrices. Key topics of calculus include differentiation and integration of elementary functions, graphing, optimizations, area under a curve, and volume of rotationally symmetric bodies. Key topics of vector and matrices include algebraic and geometric operations of vectors, matrix arithmetic, and determinants.

5. Intended Learning Outcomes

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

No.	ILOs
1	Apply computational techniques of single-variable calculus to solve engineering problems.
2	Apply basic concepts and operations of vector and matrices to solve engineering problems.
3	Develop computational skills of single-variable calculus to prepare for intermediate-level mathematics courses.

6. Assessment Scheme

a. Examination duration: Midterm exam 1.5 hrs; final exam 3 hrs

b. Percentage of coursework, examination, etc.:

Assessment	Assessing Course ILOs
10% by online WebWorK homework (https://webwork.math.ust.hk)	1, 2, 3
45% by midterm exam	1, 2, 3
45% by final exam	1, 2, 3

c. The grading is based on criterion-referencing performance on assessment tasks. The grade ranges essentially reflect the following: A (Excellent Performance: High level of conceptual understanding and computation skills), B (Good Performance: good conceptual understanding and computation skills), C (Satisfactory Performance: minimum understanding of the concepts with satisfactory computation skills), D (Marginal Pass: fragmented basic computation skills), F (Fail)

d. AI Policy: No restriction in using AI for self-studying, but students should be aware that AI tools are not permitted in the midterm and final exams of the course.

e. Academic Integrity: Students are expected to adhere to the HKUST academic integrity policy.

7. Student Learning Resources:

References: (Online access available through HKUST Library)

1. R. Sobot. Engineering Mathematics by Example, Vol 1: Algebra and Linear Algebra, 3rd edition, Springer.
2. R. Sobot. Engineering Mathematics by Example, Vol 2: Calculus, 2nd edition, Springer.

8. Teaching and Learning Activities

Scheduled activities: lecture (3 hrs/week) and tutorial (1 hrs/week)

9. Course Schedule

Week	Topics
1	Review of basic number systems, algebra and trigonometry
2	Functions and graphs
3	Slope of tangent line and limits, derivatives as rates of change,
4	Derivatives and differentiation rules: polynomial and rational functions
5	Trigonometric functions and their derivatives
6	Exponential and logarithmic functions
7	Applications of derivatives in graphing and optimization
8	Rate models and 1st order linear ODEs, indefinite integrals and basic integration techniques
9	Area and volume problems: definite integrals and the Fundamental Theorem of Calculus
10	2D and 3D vectors
11	Dot and cross products, 2x2 and 3x3 determinants
12	Systems of linear equations and matrices, basic matrix algebra
13	Higher dimensional vectors and determinants