MATH1013-L2 Calculus IB

Course Outline-Fall 2023

1. Instructor(s)

Name: Dr. LAM, Tsz Kin

Contact Details:

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2. Teaching Assistant(s)

Name: ZHA Mengyue (mzha@connect.ust.hk) , LAU Hing Sang (mahslau@ust.hk)

3. Meeting Time and Venue

Lectures:

Date/Time/Venue:

L2: Mon 4:30pm -5:50 pm, Fri 12:00-13:20, LTG

TA-Tutorials:

Date/Time/Venue:

T02A: Tue 18:00-18:50 Rm 2502 (Mengyue Zha)

T02B: Thu 11:30-12:20 Rm 6602 (Hing Sang Lau)

T02C: Fri 10:00-10:50 Rm LTH (Mengyue Zha)

4. Course Description

Credit Points: 3

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

Exclusion: AL Pure Mathematics, AL Applied Mathematics; Math1012, Math1014, Math1018, Math1020, Math1023, Math1024.

Brief Information/synopsis:

This is an introductory course in one-variable calculus. Topics include functions and graphs, limits of functions and continuity, derivatives and their applications, basic indefinite and definite integrals.

5. Intended Learning Outcomes

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

No.	ILOs
1	Develop basic computational skills in calculus.
2	Express quantitative relationships using the language of functions.
3	Apply the concepts and methods of calculus in modeling and problem solving.

6. Assessment Scheme

a. Examination duration: final exam 3 hrs

b. Percentage of coursework, examination, etc.:

Assessment	Assessing Course ILOs
10% by online homework	1, 2, 3
35% by midterm exam	1, 2, 3
55% by final exam	1, 2, 3

c. The grading is based on students' performance in assessment tasks.

7. Student Learning Resources

Recommended Reading:

References:

J. Hu, W-P. Li and Y. Wu, "Calculus for scientists and engineers with matlab".

J. Stewart. "Calculus Early Transcendentals", Metric Edition, 9th ed., CENGAGE.

8. Teaching and Learning Activities

Scheduled activities: 4 hrs (lecture + tutorial)

9. Course Schedule

Week	Topics
1	Number and intervals, inequalities and absolutes, functions and graphs, composite functions, exponential functions.
2	Trigonometric functions, inverse functions, logarithmic functions, inverse trigonometric functions.
3	Tangent and velocity, the limit of a function, limit laws.
4	Continuity, limits at infinity and horizontal asymptotes, derivatives and rates of change.
5	Basic derivatives, product and quotient rules, derivatives of trigonometric functions.
6	Chain rule, implicit differentiation, derivatives of inverse trigonometric functions and logarithmic functions.
7	Rates of change problems, related rates.
8	Linear approximations and differentials, maximum and minimum values.
9	Mean Value Theorem, derivatives and graphs, L'Hôpital's rule.
10	Curve sketching, optimization problems, Newton's Method.
11	Antiderivatives, areas and distances.
12	Definite integrals, the Fundamental Theorem of Calculus.
13	Applications of integrals, the substitution rule.