MATH 1024 – Honors Calculus II

Spring 2026 Course Outline

Lecture

Instructor:	**Prof. IP, Ivan Chi-Ho**
Office:	Room 3470 (Lift 25-26)
Office Hour:	By appointment
E-mail:	ivan.ip@ust.hk

Tutorials

TA:	**HU, Mingyun**	**ZONG, Shuai**	**KOH, James**
E-mail:	mhuae@connect.ust.hk	szong@connect.ust.hk	jkoh@connect.ust.hk
TA Session:	T1A	T1B	T1C

Time and Venue

Lecture:	Wednesday, Friday	13:30 – 14:50	Lecture Theatre E
Tutorial T1A:	Tuesday	17:00 – 17:50	Room 4504 (Lift 25–26)
Tutorial T1B:	Monday	16:30 – 17:20	Room 2302 (Lift 17–18)
Tutorial T1C:	Wednesday	19:00 – 19:50	Room 2302 (Lift 17–18)

Course Description

This is the second course in the sequence MATH 1023 – MATH 1024 of honors courses in one-variable calculus, with particular emphasis on rigorous mathematical reasoning.

This course will cover integrations and series.

Integration:	Riemann Integral, Numerical Methods, Fundamental Theorem of Calculus, Integration Techniques, Improper Integrals
Infinite Series:	Convergence Tests, Power series, Taylor Series, Fourier series

Prerequisite:	MATH 1023
Exclusion:	MATH 1014
Credits:	3

Intended Learning Outcomes

Upon completion of this course, students are expected:

1. Develop an understanding of the core ideas and concepts of Single Variable Calculus.
2. Be able to recognize the power of abstraction and generalization, and to carry out mathematical work with independent judgment.
3. Be able to apply rigorous, analytic, and numeric approach to analyze and solve problems.
4. Be able to explain clearly concepts and calculations from Single Variable Calculus.

Assessment Scheme

There will be about 10 Homework Sets, due on every Sunday night.

Thee will be one 3-hour Midterm Exam, and one 3-hour Final Exam.

The grade is computed by taking the maximum of the weights such that the total is 100%:

	Weight	Assessment ILOs
Homework	20%	1,2,3,4
Midterm Examination	10–40%	1,2,3,4
Final Examination	40–70%	1,2,3,4

Grading Scheme

Letter grades will be assigned depending on overall performance.

- Students who
  - are in the top 10%, or
  - beat DeepSeek (the latest version) in both the Midterm and Final Exam

  will be guaranteed an A+ grade.
- Obtaining a total point of 60% or above will be guaranteed an A-range.
- Obtaining a total point of 45% or above will be guaranteed an B-range.
- Obtaining a total point of 30% or above will be guaranteed a passing grade.

Grades	**Short Description**	**Elaboration on subject grading description**
A	Excellent Performance	Demonstrates a comprehensive grasp of advanced calculus, on both the conceptual understanding and computational aspects.
B	Good Performance	Shows good knowledge and understanding of advanced calculus, but did not master the subject completely.
C	Satisfactory Performance	Possesses adequate knowledge of advanced calculus, but may not perform well even in the normal calculus stream.
D	Marginal Pass	The student is only able to recall some fragments of topics and is able to complete some of the easiest computations.
F	Fail	The student does not have sufficient understanding of even some fragments of topics, and is not even able to complete some of the easiest 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.

Late submission Policy. To ensure fairness for students who submit assignments on time, a penalty for late submission is listed as follows, according to the timestamp of Canvas:

- Late submission between 0 to 24 hours, 50% penalty will be applied.
- Late submission for more than 24 hours will not be accepted.

Make-up Exam Policy. Make-up Midterm Exam will only be considered with at least a 4-hour notice and with proper support documents. Make-up Final will follow the make-up exam policy set by ARO.

Communication and Feedback. Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include comments and corrections. Students who have further questions about the feedback including marks should consult the instructor or TA within five working days after the feedback is received through email or discord.

Course AI Policy. The use of Generative AI is permitted, but students should be critical of the responses generated by the AI and do not blindly copy the generated responses to your homework.

Teaching and Learning Activities

Aside from lectures, to master this course students are required to do as many exercises as they can to get familiar with the subject. A lot of the exercises are available within the Lecture Notes.

- We will work through problems provided in Worksheet format during every lecture, part of them are Examples from the lecture notes.
- Tutorial Problem Sets will be discussed during the Tutorial Session. Solutions are available after each tutorial.

Student Learning Resources

Lecture Notes written by Prof. Yan Min (1023+1024).
Lecture Slides and **Lecture Videos** will also be available on canvas after class.

References:

1. *Introduction to Calculus and Analysis*, by Richard Courant, Fritz John
2. *Elementary Analysis: The Theory of Calculus*, by Kenneth A. Ross
3. Any former HKALE Pure Math (Calculus) textbook

Tentative Schedule

	Part III: Integration
Week 1	Newton–Leibniz Formula, Jordan Measure
Week 2	Darboux Sum, Riemann Sum
Week 3	Numerical Integration, Simpson's Rule, Newton's Method
Week 4	Fundamental Theorem of Calculus, Integration by Substitution
Week 5	Integration by Parts, Rational Functions
Week 6	Improper Integral
Week 7	Geometry (Arc Length, Surface Area, Volume, Polar Coordinates)
	Part IV: Infinite Series
Week 8	Infinite Series
Week 9	Comparison Test, Ratio Test
Week 10	Alternate Series Test
Week 11	Rearrangements, Power Series
Week 12	Fourier Series
Week 13	Fourier Series (cont'd)