

UFUG1102 (L03) - Calculus I

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Course Basics

Instructor: Grant Rao

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Time: Tue/Thur 9:00-10:20

Location: E1-102

Office: W4-519

Office Hours: Tue 13:00-15:00 (booking at <https://klms.hkust-gz.edu.cn/>  (<https://klms.hkust-gz.edu.cn/>))

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Course Description

This course is the initial part of a two-part series in introductory one-variable calculus, designed for first-year undergraduate students. The focus is on comprehending fundamental principles and developing practical abilities in utilizing calculus, which are vital for their future studies in diverse engineering disciplines, science, business, or social science fields. Covered topics encompass continuity, limit, differentiation, approximations, the Mean Value Theorem, applications in optimization, monotonicity and convexity, and a basic overview of integration.

The course involves in-class discussion, which should be viewed a substantial part of learning. Methods and applications will be discussed along the way, but the primary focus of the course is on theory.

Intended Learning Outcomes:

1. Analyse the basic concepts and properties of approximation, limit, and differentiation.
2. Calculate approximations and differentiations.
3. Apply approximations and differentiations to solve practical problems.

Pre-requisite: Nil

Required Textbook:

- [Thomas Calculus Early Transcendentals. George B. Thomas Jr. etc. 15th Edition, Person.](https://hkust-gz.primo.exlibrisgroup.com.cn/discovery/fulldisplay?context=PC&vid=86HKUSTGZ_INST:HKUSTGZ&search_scope=MyInst_and_CI&tab=Everything&docid) [↗](https://hkust-gz.primo.exlibrisgroup.com.cn/discovery/fulldisplay?context=PC&vid=86HKUSTGZ_INST:HKUSTGZ&search_scope=MyInst_and_CI&tab=Everything&docid) (https://hkust-gz.primo.exlibrisgroup.com.cn/discovery/fulldisplay?context=PC&vid=86HKUSTGZ_INST:HKUSTGZ&search_scope=MyInst_and_CI&tab=Everything&docid)

Reference Books:

- [Elementary Analysis the Theory of Calculus. Kenneth A. Ross. 2nd Edition, Springer.](https://discover.hkust-gz.edu.cn/bib/99101766207626) [↗](https://discover.hkust-gz.edu.cn/bib/99101766207626) (<https://discover.hkust-gz.edu.cn/bib/99101766207626>)
- [Understanding Analysis. Stephen Abbott. 2nd Edition, Springer.](https://discover.hkust-gz.edu.cn/bib/99111510307626) [↗](https://discover.hkust-gz.edu.cn/bib/99111510307626) (<https://discover.hkust-gz.edu.cn/bib/99111510307626>)
- [James Stewart etc., Cengage Learning.](https://discover.hkust-gz.edu.cn/bib/9973100907626) [↗](https://discover.hkust-gz.edu.cn/bib/9973100907626) (<https://discover.hkust-gz.edu.cn/bib/9973100907626>)
- [《微积分入门》，小平邦彦 著，裴东河 译，人民邮电出版社](https://discover.hkust-gz.edu.cn/bib/99302701607626) [↗](https://discover.hkust-gz.edu.cn/bib/99302701607626) (<https://discover.hkust-gz.edu.cn/bib/99302701607626>)
- [《微积分学导论》，陈祖墀等 著，中国科学技术大学出版社](https://discover.hkust-gz.edu.cn/bib/99336172307626) [↗](https://discover.hkust-gz.edu.cn/bib/99336172307626) (<https://discover.hkust-gz.edu.cn/bib/99336172307626>)

Weekly Schedule

Week	Topics	ILOs
1-2	Functions and Graphs (1.1-1.3, 7.1-7.3, 7.6)	ILO-1
3	Limits (2.2-2.5)	ILO-1
4	Continuity and Asymptotes (2.5, 2.6)	ILO-1
5	Differentiation-part 1 (2.1, 3.1-3.5, 3.9)	ILO-1,ILO-2,ILO-3
6	Differentiation-part 2 (3.6-3.7, 3.9, 7.1, 7.2)	ILO-1,ILO-2,ILO-3
7	Revision	ILO-1,ILO-2,ILO-3
8	Related Rates and Extreme Values (3.8, 4.1), Midterm Exam	ILO-1,ILO-2,ILO-3
9	Mean Value Theorem and Curve Sketching (4.2-4.4)	ILO-1,ILO-2,ILO-3
10	L'Hopital rule, Optimization, Newton's Method, Antiderivatives (4.5-4.7, 7.5)	ILO-1,ILO-2,ILO-3
11	Definite integrals (5.1-5.3)	ILO-1,ILO-2,ILO-3
12	Fundamental Theorem of Calculus, Substitution Method, Area between Curves (5.4-5.6)	ILO-1,ILO-2,ILO-3
13	Revision	ILO-1,ILO-2,ILO-3

Course Assessment Breakdown

- Assignments – 15%
- Midterm Exam – 35%
- Exams – 50%

Description:

- Assignments will be given on a weekly basis.
- Midterm exam: **Saturday, 1 Nov, 9:30 - 11:30, LHB**
- Final exam: **TBA**

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Mid-term exam	[ILO1, ILO2, ILO3]	This task assesses students' ability to explain and apply limit and differentiation concepts (ILO1), evaluate their calculations (ILO2).
Final exam	[ILO1, ILO2, ILO3]	This task evaluates students' comprehension and calculation abilities regarding limits and differentiation (ILO1, ILO2, ILO3), along with their progressive acquisition of foundational knowledge and calculation in basic integration.
Written assignments	[ILO1, ILO2, ILO3]	The presentation and reflection activities assess students' capacity to critically analyze their understanding of the concepts (ILO1) and computations (ILO2) of approximation, limit, differentiation, and basic integration, as well as their

		ability to apply these to solve practical, real-world issues (ILO3).
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Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within one week of submission. Students who have further questions about the feedback including marks should consult the instructor **within 3 working days after the feedback is received**.

Resubmission Policy

Each assignment can only be assessed once, emphasizing the importance of diligence and thoroughness in initial attempts. For students who seek clarification or have concerns regarding their exam scores, it is imperative to initiate communication with the instructor within a specified timeframe — **3 working days from the receipt of their grades**. This prompt action ensures that any discrepancies or misunderstandings can be addressed in a timely manner.

The decision to grant a reassessment opportunity for a student's exam performance rests solely with the instructor. This discretion allows instructors to consider the individual circumstances surrounding a student's request, such as the nature of any errors or misunderstandings in the initial assessment, the student's overall performance and engagement in the course, and the policies of the academic institution. It underscores the importance of the instructor's role not only in evaluating academic performance but also in fostering a fair and supportive learning environment where students feel their concerns are heard and addressed appropriately.

Final Grade

This course is not graded on a competitive basis, but solely on the total points you achieve.

final grade	A	B	C	D	F
total point range	[85,100]	[70,85)	[60,70)	[50,60)	[0,50)

Grades Short Description

Elaboration on subject grading description

A	Excellent Performance	Demonstrates a comprehensive grasp of limit, differentiation, and basic integration in problem-solving, and significant creativity in thinking. Exhibits a high
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capacity for scholarship going beyond core requirements to achieve learning goals.

B	Good Performance	Demonstrates good knowledge and understanding of the main subject in Calculus I, competence in problem-solving, and the ability to analyse and evaluate issues. Displays high motivation to learn this course.
C	Satisfactory Performance	Possesses adequate knowledge of limit, differentiation, and basic integration, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Indicates insufficient understanding of limit, differentiation, and basic integration and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Canvas Usage Policy

All vital course information and announcements will be posted here regularly throughout the semester. Students are expected to check this page 2-3 times per week in order to stay informed.

Course AI Policy

The direct use of generative artificial intelligence (AI) tools in examinations or assignments should be prohibited.

These tools can produce detailed responses and solutions without demonstrating user's own understanding or problem-solving process. The purpose of exams and assignments is to assess the individual's knowledge, comprehension, and ability to apply what they have learned. Using AI tools circumvents this process, undermining the educational objectives of developing critical thinking,

problem-solving skills, and deep understanding of Calculus. Students are allowed to use such AI tools only as supplementary aids, if permitted, for learning but not for assessment purposes.

Academic Integrity Policy





Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

Non-discriminatory Language & Conduct

This course encourages non-discriminatory language and conduct. Students should not use racist, sexist or other discriminatory language in class discussions or written work.

Course Summary:

Date	Details	Due
Sun Sep 14, 2025	 Assignment 1 (https://hkust-gz.instructure.com/courses/2479/assignments/14054)	due by 11:59pm
Sun Sep 21, 2025	 Assignment 2 (https://hkust-gz.instructure.com/courses/2479/assignments/14056)	due by 11:59pm
Sun Sep 28, 2025	 Assignment 3 (https://hkust-gz.instructure.com/courses/2479/assignments/14058)	due by 11:59pm
Sun Oct 12, 2025	 Assignment 4 (https://hkust-gz.instructure.com/courses/2479/assignments/14060)	due by 11:59pm
Fri Oct 24, 2025	 Assignment 5 (https://hkust-gz.instructure.com/courses/2479/assignments/14062)	due by 11:59pm
Wed Oct 29, 2025	 Assignment 6 (https://hkust-gz.instructure.com/courses/2479/assignments/14404)	due by 11:59pm
Sat Nov 1, 2025	 Midterm Exam (https://hkust-gz.instructure.com/courses/2479/assignments/14065)	due by 11:30am
Sun Nov 9, 2025	 Assignment 7 (https://hkust-gz.instructure.com/courses/2479/assignments/14405)	due by 11:59pm

Date	Details	Due
Sun Nov 16, 2025	 Assignment 8 (https://hkust-gz.instructure.com/courses/2479/assignments/14406)	due by 11:59pm
Sun Nov 23, 2025	 Assignment 9 (https://hkust-gz.instructure.com/courses/2479/assignments/14407)	due by 11:59pm
Fri Dec 5, 2025	 Assignment 10 (https://hkust-gz.instructure.com/courses/2479/assignments/14408)	due by 11:59pm
Tue Dec 16, 2025	 Final Exam (https://hkust-gz.instructure.com/courses/2479/assignments/14064)	due by 4pm