Course Syllabus

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UFUG 1105: Honors Calculus I

Title: Honors Calculus I

Code: UFUG 1105

Course Credits: 3

Prerequisites: None

Time and location (lectures)

- Tuesday and Thursday 3:00PM - 4:20PM (First lecture Sep. 2nd)
- W1 Rm 233

Instructor

- Name: Jishan HU
- Email: jishanhu@hkust-gz.edu.cn (mailto:gebai@hkust-gz.edu.cn)
- Office Hours: TBA

TAs

- TBA

Course Description

This course is the initial part of a two-part series in introductory one-variable calculus, designed for first-year undergraduate students with strong mathematical background, which is delivered by weekly lectures. Besides the understanding of foundational concepts and practical skills in applying calculus, the course put emphasis on rigorous reasoning of practical facts and the proof of certain mathematical theorems. This course is fundamental for students who wish to further study science, engineering, business, or social science fields. Covered topics encompass continuity, limit, differentiation, approximations, high order approximation and differentiation, and applications to optimization, monotonicity, and convexity.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Understand the core ideas and concepts of approximation, limit, and differentiation.

2. Calculate approximations and differentiations, and explain clearly and rigorously the concepts and reason in all the calculations.
3. Apply approximations and differentiations to solve problems, and explain the paradigm of the applications.
4. Develop the core mathematical skills such as rigorous argument and coherent writing.
5. Develop the appreciation of the special characteristic of mathematics, abstract and yet relevant to everyday life.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve.

Assessment Task	**Contribution to Overall Course grade (%)**	**Due date**
Mid-term exam	40%	TBA, uniform across sessions
Final exam	40%	TBA, uniform across sessions
Assignments	20%	TBA, may vary by sessions

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	**Mapped ILOs**	**Explanation**
Mid-term exam	Weekly ILO 1-6	The mid-term exam will be used to assess students' understanding and skills in limits, differentiations, and their applications.
Final exam	Weekly ILO 1-13	Same as the mid-exam, the final exam will be used to assess students' understanding and skills in limits, differentiations, and their applications.

Assignments	Will be announced at assignments	These tasks are designed to assess students' abilities, comprehension, and dedication in learning, understanding, and applying the concepts of limits, differentiations, and their applications.

Grading Rubrics

This course utilizes an absolute grading system as follows.

A: [100,85]; B: (85,70]; C: (70,55]; D: (55,35]; F: (35,0].

Subgrades (e.g., A-, B+, etc.) will be assigned for every 5 points within these ranges.

Grade adjustment will not be considered when more than 60% of students achieve a B- or higher.

Final Grade Descriptors:

Grades	**Short Description**	**Elaboration on subject grading description**
A	Excellent Performance	Demonstrates a comprehensive analysis and applications of limit, differentiation in problem-solving, mathematical proofs, and significant creativity in thinking. Exhibits a high capacity for scholarship going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject in Calculus I, competence in problem-solving, mathematical proofs, and the ability to analyze and evaluate issues. Displays high motivation to learn this course.
C	Satisfactory Performance	Possesses adequate knowledge of limit and differentiation, 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	Demonstrates insufficient understanding of limit and differentiation 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.

Tentative Schedule

Week #	**Topics**	**Weekly ILOs**
1	Basics of mathematical arguments, numbers, and functions	Recognize and construct basic mathematical arguments. Understand various fundamental mathematical objects.
2~4	Sequences and limits	Understand various types of sequences. Understand the rigorous definitions of limits. Analyze the convergence of sequences.
4~6	Limits of functions and continuity	Understand the concepts of limits of functions, continuity, uniform continuity. Comprehend properties of continuous functions.
7~9	Derivative, Differentiation rules, and linear approximation	Understand rigorous definitions of derivative. Calculate derivatives using differentiation rules. Construct linear approximation of smooth functions.
10~13	Applications of differentiation	Solve optimization problems using critical points and extrema. Apply the Mean Value Theorem and related results (l'Hôpital's

		Rule). Analyze function behavior (convexity, concavity) via differentiation.

Course AI Policy

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

This is because these tools can produce detailed responses and solutions without the user demonstrating their 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. It's allowed for students to use such AI tools only as supplementary aids, if permitted, for learning and not for assessment purposes.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include **the correct solutions**. Students who have further questions about the feedback including marks should **consult the instructor within five working days after the feedback is received**.

Resubmission Policy

Each assignment can only be submitted and 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—**five 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.

Required Texts and Materials

Lecture notes and reference materials will be provided by the instructor.

Academic Integrity

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.

Course Summary:

Date	Details	Due
	Final Exam (https://hkust-gz.instructure.com/courses/2116/assignments/19875)	
	Homework Assignments (https://hkust-gz.instructure.com/courses/2116/assignments/18482)	
	Midterm Exam (https://hkust-gz.instructure.com/courses/2116/assignments/18880)	
	Total Marks (https://hkust-gz.instructure.com/courses/2116/assignments/19879)	