Math 2033 Mathematical Analysis

Course Outline – Spring 2024

1. Instructor

Name: Dr. Ku, Yin Bon

Office: Room 3419 Email: maybku@ust.hk

Office hour: TBA

2. Teaching Assistants

T1A: Jiang, Yueyan	T1B: Huang, Yuntong	T2A: Lai, Yanming	T2B: Wu, Tong
Email: yjiangdq@connect.ust.hk	Email: yhuanggu@connect.ust.hk	Email: ylaiam@connect.ust.hk	Email: twubi@connect.ust.hk

3. Meeting Time and Venue

Lectures: L1: Tu/Thu 09:00-10:20 at Rm 1104, L2: Tu/Thu 13:30-14:50 at Rm 2306

Tutorials: T1A: Mon 18:00-18:50 at Rm 4580, T1B: Tue 16:30-17:20 at Rm LG426(LIB), T2A : Fri 11:30-12:20 at Rm 4504, T2B : Fri 14:30-15:20 at Rm 6602

4. Course Description

Credit Points: 3

Pre-requisite: (MATH 1014/ MATH 1018/ MATH 1020/ MATH 1024)

Exclusion: NIL

Brief Information/synopsis: This course will focus on the proofs of basic theorems of analysis, as appeared in one variable calculus. Along the way to establish the proofs, many new concepts will be introduced. Key topics include countability, supremum/infimum, limits, continuity, differentiability of functions and Riemann integral.

5. Intended Learning Outcomes

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

No.	ILOs
1	Understand logical deduction of important facts in mathematical analysis and apply differentiation and integration to solve mathematical problems.
2	Communicate math concepts and approaches effectively to a range of audiences using appropriate equipment and software.
2	Apply rigorous analytical techniques taught in class to solve problems in convergence frequently appeared in the mathematical profession.

6. Assessment Scheme

a. Examination duration: 1.5-hour Midterm Exam/ 3-hour Final Exam

b. Percentage of coursework, examination, etc.:

Assessment	Assessing Course ILOs
5% by Class Participation	1, 2, 3
10% by Homework	1, 2, 3
30% by midterm exam	1, 3
55% by final exam	1, 3

c. All records of grades will be put on Canvas as soon as they are available. This course is essentially graded by the absolute grading scheme (with discretions)

Grade	Thresholds (Guaranteed score to get the grade)
A+	95 % or above
A Range	85 % or above
B Range	65 % or above
C Range	50 % or above
Passing Grade	40 % or above

If your overall course percentage is more than the mentioned thresholds, you will be guaranteed to get the corresponding grade (or grade range). If you score below the threshold but hope to get a better grade, your case will be subjected to our discretion by considering your performance.

d. Students should submit homework to Canvas before deadline.

e. No make-up examinations. If you are absent from the midterm with a valid reason (such as sickness with valid medical certificate), the weight of your scores will be shifted to final, i.e. 5% Class Participation 10% Homework, 85% Final, 0% Midterm. Invalid reasons will make your midterm 0 marks.

f. Policy on generative AI for assessments – restrict all use of generative AI for assessment

7. Student Learning Resources

Major reference: lecture notes/lecture slides prepared by the instructor.

All course related materials will be available on Canvas.

8. Teaching and Learning Activities

Scheduled activities: Weekly 4 hours (lecture + tutorial)

Lectures: We teach course materials with emphasis on proofs. By understanding proofs and doing assignments, you will gradually attain the ability for ILO 1.

Tutorials: TAs provide more examples. You can discuss with your classmates and also work out part of your homework. This will train you for ILO 2. For ILO 3, there will be written assignments and exams.

9. Course Schedule (∼37.5 lecture hours)

Tentative schedule:

Week	Contents	Assessements
1	Logic, sets	
2	Equivalence relations, functions	
3	Countability	HW 1
4	Real numbers	
5	Limit of sequences and series	HW 2
6	Limit of functions	
7	Continuity of functions	
8	Differentiation rules, mean value theorem	Midterm
9	Generalized mean value theorem, L'Hôpital's rule	
10	Taylor's theorem, Riemann integral	HW 3
11	Integral criterion, uniform continuity, measure zero	
12	Lebesgues' theorem, properties of Riemann integral	HW 4
13	FTC, change of variable formula, improper Riemann integrals	
14	Cauchy principal value of integrals, exam review	

Midterm date: 23 Mar 2024 (Sat) 7:30 pm – 9:00 pm at LTC and LTD