

Math2033 Mathematical Analysis

Course Outline-Spring 2019

1. Instructor

Name: Prof. Hai Zhang

Contact Details:

Office: Room 3442 Email: haizhang@ust.hk

Office hour: Tue Thu 9AM-10AM or by appointment.

2. Teaching Assistants

T1A, T1B: Mr. Ping Liu

Email: pliuah@connect.ust.hk

T1C, T1D: Mr. Yipei Chen

Email: [ychendh@connect.ust.hk](mailto:ychedh@connect.ust.hk)

T1E, T1F, Mr. Yunfei Yang

Email: yyangdc@connet.ust.hk

3. Meeting Time and Venue

Lectures:

Date/Time/Venue:

Tue Thu 12:00PM-01:20PM, LTC

Tutorials:

Date/Time/Venue:

T1A: Mo 06:00PM - 06:50PM, Rm 5562

T1B: Mo 01:30PM - 02:20PM, Rm 5508

T1C: Mo 10:30AM-11:20AM, Rm 5560

T1D: Tu 09:30AM-10:20AM, Rm 5562

T1E: Mo 03:00PM-03:50PM, Rm 5560

T1F: Mo 09:30AM-10:20AM, Rm 5508

4. Course Description

Credit Points: 4

Pre-requisite: MATH 1014 or MATH 1018 or MATH 1020 or MATH 1024

Exclusions: MATH 2031, MATH 2043

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. Understanding them and their properties are important for the development of the present and further courses. Key topics include countability, supremum/infimum, limits of sequence of numbers and functions, Cauchy condition, continuity, differentiation, Riemann integrals.

5. Reference

Major reference: lecture notes written by Prof. Kin Y. Li (available on canvas)

Lecture slides will be posted on canvas after each class

Optional references:

Introduction to Analysis, by William R. Wade, Third Edition (available on canvas)

6. Intended Learning Outcomes

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

No.	ILOs
1	recognize the power of sequential or function limit in convergence problems, and apply logical reasoning to investigative mathematical work
2	communicate effectively calculus techniques in solving difficult problems to a range of audiences using available equipments or presentation softwares
3	apply the concept of limits to analyze and solve problems related to continuity and approximation in the math profession

7. Assessment Scheme

- Examination duration: Midterm exam 2 hrs; Final exam 2hrs
- Percentage of coursework, examination, etc.:

Assessment

10% by Homework type I
10% by Homework type II
30% by midterm exam
50% by final exam

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

8. Learning Activities

In mathematics, new concepts continually rely on the mastery of old ones; it is therefore essential that you thoroughly understand each new topic before moving on. Our classes are an important opportunity for you to ask questions; to make sure that you are understanding concepts correctly. Speak up!! It's your education at stake. Make every effort to resist the temptation to put off work, and to fall behind. Try to do mathematics every single day. (I do.) Class attendance is probably your best way to insure that you will keep up with the material, and make sure that you understand all of the concepts. I will not be taking attendance; I expect that you will simply see the wisdom of attending class, for yourselves.

9. Homework

There are two types of Homework: Homework type I and Homework type II.

Homework type I: reproducing all the proofs of theorems that are demonstrated in the lectures. The instructor believes the theorems are the best exercise for the students to understand the mathematical proofs. Before the mid-term exam and the final exam, each student is required to submit a well-written record of all the proofs taught in the lectures by the time.

Homework type II: regular problems. A list of problems will be posted on canvas and some problems will be selected as the homework. Each student is required to submit answer to certain selected problems. The TAs will grade the answers and marks will be assigned. There will be a total of about 6 such homeworks. Although some problems in the problem list are not required as a homework, students are strongly recommend to work on them to gain better understanding of the course. All the solutions will be posted on canvas in appropriate time.

10. Exam

The Midterm Exam will be given in around **Week 6-8** subject to availability of rooms. The Final Exam will take place at the end of the semester arranged by ARRO. In both exams, HKEAA approved calculators are allowed but they are not really needed. A list of formulae prepared by the instructor will be provided in each exam if necessary. Students are not allowed to bring their own formula sheets

11. Course Schedule (Tentative)

Key word Syllabus

- Simple Logic. Sets and Functions.
- Countability
- Real Numbers. Supremum and Infimum.
- Limit of Sequences. Cauchy Condition. Limit of Functions.
- Continuity.
- Differentiation.
- Riemann integral. Improper Integral