

**THE CHINESE UNIVERSITY OF HONG KONG**  
**Department of Mathematics**  
**MATH2055 (First term, 2017-18)**  
**Introduction to Analysis**

### Instructor

- Fong Wing-Chung (Office: Rm 218 LSB. Email: [wcfong@math.cuhk.edu.hk](mailto:wcfong@math.cuhk.edu.hk))

### Tutors

- Lau Chun-Ho (Office: Rm 222A LSB. Email: [dchlau@math.cuhk.edu.hk](mailto:dchlau@math.cuhk.edu.hk))

### Time and Venue

- Lectures and tutorials: Tuesdays 1630-1815hrs LSB C1, Thursdays 1630-1815hrs LSB C2.
- Supplementary lecture: Monday 04/12, 1630-1815hrs, *venue to be announced*.

### Assessment Scheme

- **Coursework:** 60%

**Assignments:** The main purpose of the assignments is to enhance learning for most students:

- \* Your work will be marked according to what you are expected to achieve in the written test and the examination. You will be given two scores for each answer, the ‘effort marks’ and the ‘standard marks’.
- \* You will be awarded most of the ‘effort marks’ in each assignment, out of a full score of 10, if you are deemed to have put in a reasonable effort to attempt the questions. Your total assignment score will be the sum of your ‘effort marks’.
- \* Together with the comments on your work, the ‘standard marks’ will give you an idea on how the written test and the examination will be graded. The ‘standard marks’ will not count in the assessment.

**Written Test:** There is one written test. The tentative date is 26/10 (in Week 8).

**Oral Test:** There is one oral test (*‘viva voce’*). The tentative date is Tuesday 5/12 (in Week 14).

Your coursework score  $C$  will be given by the formula

$$C = \min \left\{ \frac{A}{5}, 10 \right\} + \left[ \frac{A}{10} + \frac{W}{100} \left( 30 - \frac{A}{10} \right) \right] + V.$$

Here  $A$  is your total assignment score.  $W$  is your written test score out of the full score of 100.  $V$  is your oral test score out of the full score of 20.

- **Final Examination:** 40 %

### Course Material and Course Announcements

Course material (for example, supplementary notes, assignments) will be uploaded to the course homepage at

[http://www.math.cuhk.edu.hk/course\\_builder/1718/math2055/2055hp-mat.html](http://www.math.cuhk.edu.hk/course_builder/1718/math2055/2055hp-mat.html)

Course announcements made in class may be put onto the course homepage and communicated via the CWEM.

## References

1. M. Spivak, *Calculus* (Third Edition), Cambridge University Press.  
This book is available at <https://archive.org/details/SpivakM.Calculus3rdEd.1994>  
From now on **SC3** will stand for this book.
2. L. Alcock, *How to Think about Analysis*, Oxford University Press.
3. R. G. Bartle, D. R. Sherbert, *Introduction to Real Analysis* (Fourth Edition), Wiley.
4. Fitzpatrick, *Advanced Calculus* (Second Edition), American Mathematical Society.
5. W. Rudin, *Principles of Mathematical Analysis* (Third Edition), McGrawhill.

## Nature of the Course and Assumed Preparation

You have already been taught quite a lot of things in the *calculus of one real variable* in school mathematics and in MATH1010: you have learnt how to compute limits, perform differentiation and integration, and apply results concerned with these ‘operations’ to find extrema, compute areas *et cetera*.

However, you were rarely given any mathematical proof of the mathematical results which guaranteed the correctness of the computations and operations.

The central purpose of the course MATH2055 is to build a theoretical foundation for *calculus of one real variable*: we shall justify the major results in the *calculus of one real variable*. (This is what modern mathematicians call *mathematical analysis*.)

So in the first place, make sure you are familiar with the *calculus of one real variable* at least at the computational and operational level, which is what MATH1010 is about. Many exercises in **SC3** are at the MATH1010 level, and doing these exercises may help you recall what has been taught in MATH1010.

Besides, be prepared that you have to read and write mathematical proofs.

## Teaching Schedule and Suggested Readings

The schedule is provisional, and may be adjusted along the way.

- Week 1: Mean-Value Theorem and ‘Derivative Tests’.  
Suggested reading: **SC3** Chapter 11.
- Weeks 2-5: Limits, continuity and differentiability for functions.  
Suggested reading: **SC3** Chapters 5-6, 9-11.  
and rudiments of **SC3** Chapters 22-23.
- Weeks 6-7: Infinite sequences and infinite series.  
Suggested reading: **SC3** Rudiments of Chapters 22-23.
- Weeks 8-9: Completeness of the real line.  
Suggested reading: **SC3** Chapters 7-8, 22.
- Weeks 10-12: Integrability, and Fundamental Theorem of the Calculus.  
Suggested reading: **SC3** Chapters 12-14.
- Weeks 12-13: elementary functions and power series.  
Suggested reading: **SC3** Chapters 15, 18, 20, and rudiments of **SC3** Chapters 23-24