MATH3043 (L1) - Honors Real Analysis

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Instructor:

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Office Hour:	By appointment via Email

Teaching Assistant:

Teaching Assistant:	Du, Xusheng
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Class Hour and Venue:

L1	Mon Wed 12:00 - 13:20	G009B, CYT Bldg Zoom: 973 5307 8701 (pw: 20213043)	Ivan Ip

T1	Mon 19:00 - 19:50	Rm 1409, Lift 25-26 Zoom: 937 5214 0522 (pw: 344859)	Du, Xusheng

Discord Server: Ask me for link.

[Class Photo 1] (https://canvas.ust.hk/courses/39718/files/5438062?wrap=1) ↓ (https://canvas.ust.hk/courses/39718/files/5438062/download?download_frd=1) [Class Photo 2] (https://canvas.ust.hk/courses/39718/files/5438061?wrap=1) ↓ (https://canvas.ust.hk/courses/39718/files/5438061/download?download_frd=1)

Course Description:

This is the second part of a year-long honor course on real analysis targeted at mathematically mature undergraduate students. We will focus on the analysis of multivariable functions, and Lebesgue measure theory.

Prerequisite: A- or above in MATH2043, or instructor's approval.

Exclusion: MATH 3033

Credits: 4

Lectures:

- The course materials will be based on the following
  - **Multivariable Analysis:** **Lecture Notes (https://canvas.ust.hk/courses/39718/files/4939156?wrap=1)** (Chapter 6 & 8) written by Prof. Min Yan, and
  - **Lebesgue Measure Theory:** The **Textbook (https://press.princeton.edu/books/hardcover/9780691113869/real-analysis)** (Chapter 1-3) by Stein & Shakarchi.
- **Please print out or download the Unfilled Worksheet** (finalized version available on Monday each week in Modules) to every class. We will work through the problems during the lecture.
- **Lecture Slides** and **Lecture Videos will be available after class.**
- **Tutorial Problem Sets** will be discussed during the Tutorial Session. Please try them out before attending the tutorial. Solutions are available after each tutorial.

Tentative Schedule:

Week 1-4	Multivariable Analysis

Week 5-7	Lebesgue Measure Theory
Week 8-10	Lebesgue Integration
Week 11-14	Fundamental Theorem of Calculus (again!)

Problem Sets:

- There will be **4 homework sets** during the semester (one for each topic above), due date (on Sunday night) to be announced.
- Only submit your HW through Canvas. **See instructions here (https://canvas.ust.hk/courses/39718/pages/hw-instructions)** .

Grading Scheme:

Take the **supremum** of the weights such that the total is 100%:

Homework	**0-20%**
Midterm Examination	**20-50%**
Final Examination	**40-70%**

Letter grades will be assigned depending on overall performance.
Obtaining a total point of **90% or above, or top 10%, will guarantee an A+.**
Obtaining a total point of 70% or above, or top 50%, will guarantee an A-range.
Obtaining a total point of 30% or above will guarantee a passing grade.

References:

(1) ***Real Analysis: Measure Theory, Integration, and Hilbert Spaces* by E. Stein & R. Shakarchi (https://press.princeton.edu/books/hardcover/9780691113869/real-analysis)**
(2) ***Lebesgue Integration on Euclidean Space* by F. Jones (https://www.amazon.com/Lebesgue-Integration-Euclidean-Bartlett-Mathematics/dp/0763717088)**
(3) ***Real Analysis (4th ed.)* by H. Royden, P. Fitzpatrick (https://www.amazon.com/Real-Analysis-4th-Halsey-Royden/dp/013143747X) (https://www.amazon.com/Mathematical-Analysis-Second-Tom-Apostol/dp/0201002884) (https://www.amazon.com/Mathematical-Analysis-Second-Tom-Apostol/dp/0201002884)**
(4) ***Real and Complex Analysis* by W. Rudin (https://www.amazon.com/Real-Complex-Analysis-Higher-Mathematics/dp/0070542341)**

Previous Courses:

Previous MATH3043 Course (https://canvas.ust.hk/courses/25442) (Fall 2019 by Prof. Frederick Fong) **(https://www.amazon.com/Mathematical-Analysis-Second-Tom-Apostol/dp/0201002884)**

Previous MATH2043 Course (https://canvas.ust.hk/courses/35531) (Spring 2021)
Previous MATH1024 Course (https://canvas.ust.hk/courses/29767) (Spring 2020)
Previous MATH1023 Course (https://canvas.ust.hk/courses/27157) (Fall 2019)

Course Summary:

Date	Details	Due
Sun Oct 3, 2021	Homework 01 (https://canvas.ust.hk/courses/39718/assignments/175762)	due by 11:59pm
Sun Oct 24, 2021	Homework 02 (https://canvas.ust.hk/courses/39718/assignments/177931)	due by 11:59pm
Sat Oct 30, 2021	Midterm Examination (https://canvas.ust.hk/courses/39718/assignments/178956)	due by 10pm
Sun Nov 14, 2021	Homework 03 (https://canvas.ust.hk/courses/39718/assignments/180420)	due by 11:59pm
Sun Dec 5, 2021	Homework 04 (https://canvas.ust.hk/courses/39718/assignments/182553)	due by 11:59pm
Fri Dec 17, 2021	Final Examination (https://canvas.ust.hk/courses/39718/assignments/184491)	due by 7:30pm
Mon Dec 20, 2021	Final Exam Paper Checking (https://canvas.ust.hk/calendar?event_id=137432&include_contexts=course_39718)	2pm to 2:30pm