MATH 3043
Honors Real Analysis
2019-20 Fall

https://canvas.ust.hk/courses/25442

Lecture

Time	Wednesdays and Fridays 1:30pm-2:50pm
Venue	Room 4504
Instructor	**Prof. Frederick Tsz-Ho FONG**
E-mail	frederick.fong@ust.hk
Office	Room 3488, Department of Mathematics

Tutorial

Time	Fridays 6:00pm-6:50pm
Venue	Room 1409
Teaching Assistant	**CHEN Yanze**
E-mail	ychenen@connect.ust.hk
Office	Room 4381

Course Description

Course outline: It is the second part of a year-long honor course on real analysis targeted at mathematically mature undergraduate students. Two major topics: analysis of multivariable functions, Lebesuge measure.

Credits: 4

Prerequisites: A- or above in MATH 2043, or instructor's approval. Students are also recommended to have taken multivariable calculus, or to take it concurrently with this course.

Intended Learning Outcomes (ILOs)

Upon completion of this course, students are expected to:

(1) be familiar with the rigorous treatment of multi-variable and vector-valued functions;
(2) be familiar with the basic notions and theory of Lebesgue measure; and
(3) develop logical reasoning and critical thinking skills.

Course Website

Canvas will be used as the course website. The link can be found on top of the page. Lecture notes, homework, solutions, and sample exams will be posted there. Students should visit the course website regularly to check up new announcements and new materials.

Student Learning Resources

References:

(1) Lecture Notes written by Prof. YAN Min (Chapters 6 and 8-12)
(2) *Calculus on Manifolds* by Michael Spivak
(3) *Real Analysis* by H. L. Royden
(4) *Real Analysis: Measure Theory, Integration, and Hilbert Spaces* by E. Stein and R. Shakarchi
(5) *Lebesgue Integration on Euclidean Space* by Frank Jones

GRADING

Homework: There will be about 5 problem sets. Students should submit each homework in form of a clearly written and scanned or a LaTeX-typed PDF on the Canvas system before the deadline. The due time of Canvas is sharp. No late homework is accepted.

After each homework is collected, your homework will be randomly circulated to five classmates for peer review, and you will also receive the homework of five other classmates. You should read over their work, compare their solutions with yours, and ask for further explanations if you find their arguments are unclear. It is not mandatory to leave comment in each homework, but you should at least spend some time to read over others' work.

Homework scores will be awarded by the TA and the instructor, not by peer reviewers. Only some selected problems (at the choice of the TA and instructor) will be graded.

Examinations: There will be a 3-hour midterm exam during Week 6-8 (exact date to be confirmed), and a 3-hour final exam arranged by ARRO.

Score Formula:

$$\begin{aligned}&\text{Total score}\\&= \sup\{\lambda\,\text{homework} + \mu\,\text{midterm} + \nu\,\text{final} : \lambda \in [0, 0.2], \mu \in [0, 0.4], \nu \in [0.4, 0.7], \lambda + \mu + \nu = 1\}.\end{aligned}$$

Letter Grades: Try to aim at getting a total of 75% or above for A-/A/A+, and about 50% or above for B-/B/B+. The course will not be graded on a curve.

TENTATIVE SCHEDULE

The first 3 weeks will be about the analysis of multivariable functions (Chapters 6 and 8). The remaining weeks will be about Lebesgue measure and integration (Chapters 9-12).