

Course Description

Department of Mathematics

Nature of the course ☐ required ☒ elective		Area ☐ Algebra ☒ Analysis ☐ Geometry ☐ Statistics ☐ Applied Mathematics ☐ Discrete Mathematics ☐ Others			
Calculus ☐ Calculus A ☐ Calculus B					
Course number	221 U2870	Section number		Number of credits	
Course title	Real Analysis				
Instructor	Lin Tai-Chia [林太家]				

I. *Contents :

1. Lebesgue Measure
2. The Lebesgue Integral
3. Differentiation and Integration
4. L_p Spaces

II. Course prerequisite :

Advanced Calculus and Linear Algebra

III. *Reference material (textbook(s)) :

Textbooks:

1. H.L. Royden, Real Analysis (Chapter 1-6)
2. E. H. Lieb and M. Loss, Analysis (Chapter 1-2)

References:

1. A.Friedman, Foundations of Modern Analysis,
2. W. Rudin, Real and Complex Analysis,
3. R.L. Wheeden, A. Zygmund, Measure and Integral

IV. *Grading scheme : 請填寫各項計分之百分比，例如：期中 30% 期末 40% 作業 10% 報告 20%，總計 100%

Midterm I: 15% (3rd week of October)

Midterm II: 20% (3rd week of November, Group take home exam)

Midterm III: 25% (3rd week of December)

Final: 40%

V. Others : The Groups of Midterm II is determined by the scores of Midterm I.

VI. *Course Goal :

The goal of this course is to acquaint students with theory of functions of a real variable as a foundation of analysis. Students would be familiar with several theorems including bounded convergence theorem, Fatou's lemma and Fubini's theorem. Besides, Holder inequality, Jensen's inequality, weak convergence and convolutions of functions are very important topics in this course.

I propose to spend the first three weeks to introduce Lebesgue measure, and then give the 1st midterm exam in class. After the 1st exam, I'll take about three to four weeks to cover Lebesgue integral. Then the 2nd midterm exam which could be more difficult than the 1st exam will be provided. Students would be divided into several groups to accomplish the exam in one week, and then have oral presentation in class. The rest of this course is to teach L_p space. Jensen's inequality, Holder's inequality and the completeness of L_p space will be introduced in one month. Then the 3rd midterm exam will be given. After the 3rd exam, weak convergence and convolutions of functions will be taught and the final exam will be held near the end of this semester.

Homework will be assigned every week which may play important role in three midterm exams even though it is not required to hand in. Students must have ability to write down rigorous arguments for all exams and homework. Such ability is a basic requirement to take this course.

1. *號為必填欄位

2. 大綱內容字數英文最少 200 字以上