



## 教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	機率專論(一)		學年/學期 Academic Year/Semester	114/2	
課程名稱(英文) Course Name in English	Topics in Probability (I)				
科目代碼 Course Code	AM_73200	系級 Department & Year	博士	開課單位 Course-Offering Department	應用數學系
修別 Type	選修 Elective	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/謝思民				
先修課程 Prerequisite					
課程描述 Course Description					
Continuation of Advanced Probability. Cover discrete time martingales and then essential features of Brownian motion.					
課程目標 Course Objectives					
This course is an introduction to stochastic inequalities and comparison methods for establishing the inequality. My goal is to develop students' intuition, which, hopefully, will enable students to think inequality probabilistically.					
系專業能力 Basic Learning Outcomes				課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.'s Education Objectives	
A	具備專業知識及邏輯推理能力。Have well-founded expertise and be capable of logical reasoning.			●	
B	具備學習其它學科的能力，以期能邁向跨領域研究。 Be able to study other fields of science so as to conduct interdisciplinary research in the future.			●	
C	具備獨立思考與解決問題的能力。 Be capable of independent thinking and have the problem-solving skills.			●	
圖示說明 Illustration : ● 高度相關 Highly correlated ○ 中度相關 Moderately correlated					
授課進度表 Teaching Schedule & Content					
週次 Week	內容 Subject/Topics			備註 Remarks	
1	Definition of martingales and examples Martingale convergence theorem.				
2	$L^2$ bounded martingales.				
3	Doob's decomposition.				
4	Uniformly integrable martingales. Doob's $L^p$ inequality.				
5	Radon-Nikodym theorem, a martingale proof.				
6	Kolmogorov's consistency theorem.				
7	Definition and construction of Brownian motion.				

8	An existential proof; Holder's continuity	
9	Non-differentiability of Brownian's sample paths. Total and quadratic variation of BM paths.	
10	Markov Property, Blumenthal's 0-1 law. Stopping times.	
11	Strong Markov property, reflection principle.	
12	Markov processes derived from BM.	
13	Martingales associated with BM.	
14	Law of the iterated logarithm for BM.	
15	Skorohod's embedding.	
16	Donsker's invariance principle.	
17	Arcsin law for BM.	
18	期末考試週 Final Exam	

### 教學策略 Teaching Strategies

- 課堂講授 Lecture
  分組討論 Group Discussion
  參觀實習 Field Trip
- 其他 Miscellaneous:

### 教學創新自評 Teaching Self-Evaluation

#### 創新教學 (Innovative Teaching)

- 問題導向學習 (PBL)
  團體合作學習 (TBL)
  解決導向學習 (SBL)
- 翻轉教室 Flipped Classroom
  磨課師 Moocs

#### 社會責任 (Social Responsibility)

- 在地實踐 Community Practice
  產學合作 Industry-Academia Cooperation

#### 跨域合作 (Transdisciplinary Projects)

- 跨界教學 Transdisciplinary Teaching
  跨院系教學 Inter-collegiate Teaching

- 業師合授 Courses Co-taught with Industry Practitioners

其它 other:

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學期成績計算及多元評量方式 Grading & Assessments

配分項目 Items	配分比例 Percentage	多元評量方式 Assessments							
		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)									
期中考成績 Midterm Exam									
期末考成績 Final Exam									
作業成績 Homework and/or Assignments	100%								
其他 Miscellaneous (_____)									

評量方式補充說明

Grading & Assessments Supplemental instructions

教科書與參考書目 (書名、作者、書局、代理商、說明)

Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

Main references:

1. Probability with martingales, David Williams.
2. Brownian motion, Peter Morters, Yuval Peres.

課程教材網址(含線上教學資訊, 教師個人網址請列位於本校內之網址)

Teaching Aids & Teacher's Website(Including online teaching information.  
Personal website can be listed here.)

其他補充說明 (Supplemental instructions)