



教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	高等機率論AA		學年/學期 Academic Year/Semester	113/2	
課程名稱(英文) Course Name in English	Advanced Probability Theory				
科目代碼 Course Code	AM_5390AA	系級 Department & Year	碩士	開課單位 Course-Offering Department	應用數學系
修別 Type	必修 Required	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					
Measure theoretical foundation of probability theory. Integration theory. Basic convergence theorems. Properties and essential results. Limit theorems.					
課程目標 Course Objectives					
建立以測度論為基礎的機率學架構 並建立重要收斂定理 Measure theory based probability theory with major limit theorems.					
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	具備專業機率、統計知識與應用分析能力。Have well-founded expertise in probability and statistics, and good analytical ability in solving real problems.				●
B	具備程式設計與統計計算能力。Have the computer programming and statistical computing skills.				
C	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.				●
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	Measure spaces. Definitions of algebra and sigma algebra. Borel sigma algebra. Definition of measure space.				
2	Extension theorem. Uniqueness of extension. Lebesgue measure. Monotone convergence properties of measures.				
3	Random variables. Measurable functions. Basic properties. liminf and limsup of measurable functions.				
4	Distribution functions. Basic properties. Skorohod representation of random variable with specified distribution function				
5	Independence. The pi-system lemma. Borel-Cantelli lemmas.				
6	Tail sigma algebra. Kolmogorov zero-one law				
7	Integration theory. Integrals of nonnegative measurable functions. Monotone convergence theorem. Fatou lemma.				

8	Linearity. Integrable functions. Dominated convergence theorem.	
9	期中考試週 Midterm Exam	
10	Definition of expectation. Convergence theorems. Markov inequality. Jensen's inequality.	
11	Monotonicity of L_p norms. Schwarz inequality. L_2 theory. Orthogonal projection	
12	Modes of convergence.	
13	Modes of convergence.	
14	Modes of convergence.	
15	Law of large number.	
16	Central limit theorem.	
17	Central limit theorem.	
18	期末考試週 Final Exa	

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:

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 General Performance									
期中考成績 Midterm Exam	20%						✓		
期末考成績 Final Exam	20%						✓		
作業成績 Homework and/or Assignments	60%		✓				✓		
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.)

1. Probability essentials. Jacob and Protter.
2. Probability with martingales. D. Williams.
3. Probability: Theory and examples. Durrett.

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)