主導課程一：機率與統計 Probability and Statistics

課程基本資料

開設學校：台灣大學

開授教師：葉丙成

授課語言： 中文

課程概述

1. Experiments, Models, and Probabilities

1) Applying Set Theory to Probability

2) Conditional Probability

3) Independence

2. Basics of Random Variables

1) Definitions

2) Probability Mass Function (PMF)

3) Families of Discrete Random Variables

4) Cumulative Distribution Function (CDF)

5) Probability Density Function (PDF)

6) Families of Continuous Random Variables

3. Random Variables and Expected Value

1) Conditional Probability Mass/Density Function

2) Probability Models of Derived Random Variables

3) Variance and Standard Deviation

4) Expected Value of a Derived Random Variable

4. Multiple Random Variables

1) Joint Cumulative Distribution Function

2) Joint Probability Mass/Density Function

3) Marginal PMF/PDF

4) Functions of Two Random Variables

5) Conditioning by a Random Variable

6) Independent Random Variables

5. Sums of Random Variables

1) Expected Values of Sums

2) PDF of the Sum of Two Random Variables

3) Moment Generating Functions

4) MGF of the Sum of Independent Random Variables

5) Random Sums of Independent Random Variables

6) Central Limit Theorem

7) Law of Large Numbers

參考書目

Probability and Stochastic Processes - A Friendly Introduction for Electrical and Computer Engineers," Second Edition

課程內容大綱

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| **週次** | **日期** | **課程內容** | **備註** |
| **1** | 2/20 | 機率課程簡介 | 20:00-22:00線上同步遠距 |
| **2** | 2/27 | 機率概論、集合論與機率名詞 |  |
| **3** | 3/6 | 機率公理性質與條件機率 | 20:00-21:00 同步線上講題 |
| **4** | 3/13 | 機率的獨立性與數數算機率 |  |
| **5** | 3/20 | 隨機變數、累積分布函數（CDF）與機率質量函數（PMF）、離散機率分佈I | 20:00-21:00 同步線上講題 |
| **6** | 3/27 | 離散機率分佈II、機率密度函數PDF與連續機率分佈I |  |
| **7** | 4/3 | 連續機率分佈 II與期望值 I |  |
| **8** | 4/10 | 期望值 II、隨機變數之函數、條件機率分佈與失憶性 | 20:00-21:00 同步線上講題 |
| **9** | 4/17 14:30-17:30 | 期中評量 |  |
| **10** | 4/24 | 聯合機率分佈、邊際機率分佈 |  |
| **11** | 5/1 | 雙變數期望值 | 20:00-21:00 同步線上講題 |
| **12** | 5/8 | 給定某事件下之條件機率分佈與條件機率分佈(離散) |  |
| **13** | 5/15 | 隨機變數之和、動差母函數MGF、多個隨機變數和與中央極限定理 | 20:00-21:00 同步線上講題 |
| **14** | 5/22 | 機率不等式 |  |
| **15** | 5/29 | 信賴區間 |  |
| **16** | 6/5 | 二元假設檢定 | 20:00-21:00 同步線上講題 |
| **17** | 6/12 14:30-17:30 | 期末評量 | |

## 成績評量方式

課堂參與及作業(50%)、期中課程評量成績(25%)、期末課程評量成績(25%)