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②图玄束華大學

教學計劃表 Syllabus

| 課程名稱(中文) Course Name in Chinese | 實驗設計AB | | | 學年/學期 Academic Year/Semester | | 114/1 |
|------------------------------------|----------------|-------------------------------|--|---------------------------------------|-------|-------|
| 課程名稱(英文) Course Name in English | Design of Expe | eriments | | | | |
| 科目代碼 Course Code | AM4071AB | 系級 Department 學四 & Year | | 開課單位 Course-Offering Department | 應用數學系 | |
| 修別 Type | 學程 Program | 學分數/時間 Credit(s)/Hour(s) | | 3.0/3.0 | | |
| 授課教師 Instructor | /曾玉玲 | | | | | |
| 先修課程 Prerequisite | /#統計學 | | | | | |

課程描述 Course Description

各個領域裡,設計實驗的第一個目標,是要確定實驗可以顯示解釋變數對於反應變數的影響。要能如此,必須能就其他可能因子的影響先行排除或控制。本課程將介紹、探討實驗設計中最基本、重要的統計觀念及其相關分析方法。由 簡單概念出發,探討設計實驗時應注意的問題;進而介紹對應之統計模型及相關分析方法。模型的適切性的探討亦是 要強調的重點課題之一。透過概念探討、模型建立、加上實際資料的分析,希望建立統計模型及實際操作的連結。

課程目標 Course Objectives

Through the introduction and comparison of different design models, students are expected to learn how to design and perform experiments in the physical, chemical, financial, economic, and engineering sciences, as well as to analyze output data through the statistical methods that they will learn from the course.

藉由不同實驗設計模型之介紹與比較,讓學生了解如何規劃物理,化學,財務,經濟或工程科學之相關實驗,並引導其過程及如何透過課堂上所學之統計方法對其結果加以分析.

| | | 課程目標與系專業能 力相關性 |
|---|--|--|
| | 系專業能力 | Correlation between |
| | Basic Learning Outcomes | Course Objectives and Dept.'s Education Objectives |
| A | 具備基本數學知識及邏輯推理能力。Have well-founded background in mathematics and be capable of logical reasoning. | • |
| В | 具備學習數學相關領域的預備知識。Be knowledgeable about fields related to mathematics. | 0 |
| С | 具備軟體應用與科學計算能力。 Be able to use mathematics software and scientific computation skill in problem- solving. | 0 |

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 | Overview. The experiment, the design, and the analysis | |
| 2 | Single-factor experiments | Complete randomized design; |
| 3 | Single-factor experiments | Randomized block design; |
| 4 | Single-factor experiments | Latin square designs |

| 5 | Factorial experiments | Fixed, random, and mixed models. ANOVA rationale; EMS rules; Nested-factorial experiments; Contrasts |
|----|---|--|
| 6 | Factorial experiments | Fixed, random, and mixed models. ANOVA rationale; EMS rules; Nested-factorial experiments; Contrast |
| 7 | Factorial experiments | Fixed, random, and mixed models. ANOVA rationale; EMS rules; Nested-factorial experiments; Contrasts |
| 8 | Factorial experiments | Fixed, random, and mixed models. ANOVA rationale; EMS rules; Nested-factorial experiments; Contrasts |
| 9 | Factorial experiments | Fixed, random, and mixed models. ANOVA rationale; EMS rules; Nested-factorial experiments; Contrasts |
| 10 | Restrictions on randomization; Fractional factorial designs | Randomized block designs; Split-plot design; Confounding; Aliases; BIBD |
| 11 | Restrictions on randomization; Fractional factorial designs | Randomized block designs; Split-plot design; Confounding; Aliases; BIBD |
| 12 | Restrictions on randomization; Fractional factorial design | Randomized block designs; Split-plot design; Confounding; Aliases; BIBD |
| 13 | Restrictions on randomization; Fractional factorial designs | Randomized block designs; Split-plot design; Confounding; Aliases; BIBD |
| 14 | Restrictions on randomization; Fractional factorial designs | Randomized block designs; Split-plot design; Confounding; Aliases; BIBD |
| 15 | Selected topics | |
| 16 | Miscellaneous topics | Presentation |
| 17 | Miscellaneous topics | Presentation |
| 18 | 期末考試週 Final Exam | |

| 教學策略 Teaching Strategies | | | | | | | |
|---|--|--|--|--|--|--|--|
| ✓ 課堂講授 Lecture | | | | | | | |
| | | | | | | | |
| 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 Industy-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 | 草及多元 | 評量方式 | t Gradi | ng & As | sessmen | ts | | |
|--|------------|--------------------|----------|----------|----------|----------|----------|----------|-----------|
| 配分項目 | 配分比例 | 多元評量方式 Assessments | | | | | | | |
| Items | Percentage | 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 | 40% | > | | | | | | | |
| 作業成績 Homework and/or Assignments | 20% | | | ~ | | | | | 課堂討論方式作習題 |
| 其他 Miscellaneous (期末分組報告) | 40% | | | ~ | | | | | |

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. Applied Linear Statistical Models, 4th ed, Neter, Kutner, Nachtsheim and Wasserman, 1996, McGRAW-HILL International.
- 2. Experimental Designs, 2nd ed, Cochran and Cox, 1957, Wiley.
- 3. The Design of Experiments, Mead, 1988, Cambridge.
- 4. Statistical Designs Analysis of Experiments with Applications to Engineering and Science, Mason, Gunst and Hess, 1989, Wiley.
- 5. Fundamental Concepts in the Design of Experiments, 5th ed, Hicks and Turner, 1999, Oxford.
- 6. Design of experiments: Statitical principles of research design and analysis, 2nd ed, R. O. Kuehl
- 7. Design and Analysis of Experiments, 8/ed, Montgomery, 2013, Wiley. (課本)

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.)

http://faculty.ndhu.edu.tw/~yltseng/edu/design2025.html

| 其他補充說明 | (Supplemental | instructions) |) |
|--------|---------------|---------------|---|
|--------|---------------|---------------|---|