



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		113/1			
課程名稱(英文) Course Name in English	Design of Experiments							
科目代碼 Course Code	AM_4071AB	系級 Department & Year	學四	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。

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.	●
B	具備學習數學相關領域的預備知識。Be knowledgeable about fields related to mathematics.	○
C	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.	○

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

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
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: Statistical 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/~y1tseng/edu/design2024.html>

其他補充說明 (Supplemental instructions)