



教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	科學教育測驗與統計		學年/學期 Academic Year/Semester	115/1
課程名稱(英文) Course Name in English	Measurement And Statistics in Science Education			
科目代碼 Course Code	SCE_71850	系級 Department & Year	博士	開課單位 Course-Offering Department
修別 Type	選修 Elective	學分數/時間 Credit(s)/Hour(s)	3.0/3.0	
授課教師 Instructor	/陳世文			
先修課程 Prerequisite				
課程描述 Course Description				
<p>本課程旨在幫助初學者掌握基礎的統計分析技能，特別是針對科學教育研究的應用。課程涵蓋描述性統計、t考驗、迴歸分析、變異數分析（ANOVA、MANOVA）、因素分析（EFA & CFA）、單因子變異數分析（ANOVA）、共變數分析（ANCOVA、MANCOVA）、結構方程模型（SEM）的基礎理論與實作操作。學生將學習如何使用相關程式軟體進行數據分析。本課程採用理論與實作相結合的教學方式，逐步建立學生對統計方法的理解與應用能力，為後續進階量化研究打下堅實基礎。</p> <p>This course aims to help beginners develop fundamental skills in statistical analysis, with particular emphasis on applications in science education research. The course covers the basic theories and practical procedures of descriptive statistics, t-tests, regression analysis, analysis of variance (ANOVA and MANOVA), factor analysis (EFA and CFA), one-way ANOVA, analysis of covariance (ANCOVA and MANCOVA), and structural equation modeling (SEM). Students will learn how to conduct data analysis using relevant statistical software. By integrating theoretical instruction with hands-on practice, this course gradually builds students' understanding of statistical methods and their ability to apply them, thereby laying a solid foundation for advanced quantitative research.</p>				
課程目標 Course Objectives				
<ol style="list-style-type: none"> 1. 能夠明瞭統計學是什麼、統計分析在作什麼。 2. 了解如何進行正確統計決策。 3. 了解並能充分運用電腦及電腦軟體（主要是SPSS），進行統計分析。 4. 瞭解測驗編制的分析技術。 				
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	具備科學教育專業理論發展與實踐之素養。To possess the capacity to develop and practice theories in science education.			○
B	具備科學教育獨立研究素養。To possess the ability of independent study focusing on science education.			○
C	具備科學教育的創新與問題解決素養。To possess creativity in science education and the ability of problem solving.			●
D	具備國際學術交流之素養。To possess the ability of international academic exchanges.			
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	9/11: 課程介紹 (Course Introduction)			

2	9/18：資料型態、變項分類與描述性統計 (Data Types, Variable Classification, and Descriptive Statistics)	
3	9/25：中秋節 (放假1日) Mid-Autumn Festival Holiday	
4	10/2：平均數比較：t考驗 (Mean Comparison I: t-tests)	
5	10/9：國慶日 (補假1日) National Day Observed Holiday	
6	10/16：相關分析與迴歸分析 (Correlation and Introduction to Regression Analysis)	
7	10/23：單因子變異數分析與事後比較 (One-way ANOVA and Post Hoc Comparisons)	
8	10/30：多因子變異數分析與多變量變異數分析 (Factorial ANOVA and MANOVA)	
9	11/6：期中考試週 Midterm Exam	
10	11/13：共變數分析與多變量共變數分析 (ANCOVA and MANCOVA)	
11	11/20：探索性因素分析與信度分析 (Exploratory Factor Analysis and Reliability Analysis)	
12	11/27：驗證性因素分析與測量模式 (Confirmatory Factor Analysis and Measurement Models)	
13	12/4：參加第42屆科學教育國際學術研討會 (Participation in the 42nd International Conference on ASET)	
14	12/11：結構方程模型基礎理論 (Introduction to Structural Equation Modeling)	
15	12/18：結構方程模型實作與研究結果詮釋 (SEM Practice and Reporting Statistical Results)	
16	12/25：行憲紀念日(放假1日)	
17	1/1：開國紀念日(放假1日)	

彈性 教學 規劃 Flexible Teaching Plan	<p>請勾選(至少需勾選1 個項目)： Please tick the box(es). (At least one item is required.):</p> <p><input type="checkbox"/> 問題討論 Problem-based Discussion</p> <p><input type="checkbox"/> 翻轉教學 Flipped Classroom</p> <p><input type="checkbox"/> 展演實作 Performance / Practical Presentation</p> <p><input type="checkbox"/> 校外參訪 Off-campus Visit</p> <p><input type="checkbox"/> 講座活動 Lecture / Seminar</p> <p><input type="checkbox"/> 線上作業 Online Assignments</p> <p><input type="checkbox"/> 自主學習 Self-directed Learning</p> <p><input type="checkbox"/> 課業輔導 Academic Support</p> <p><input type="checkbox"/> 實驗操作 Experiment Operation</p> <p><input type="checkbox"/> 遠距教學(同步) Distance Learning (Synchronous)</p> <p><input type="checkbox"/> 遠距教學(非同步) Distance Learning (Asynchronous)</p> <p><input type="checkbox"/> 其他(請填寫) Others (Please specify.):</p> <p>備註：本校學期週數自115 學年度起調整為17 週，為符合1學分18 小時之原則，請教師規劃安排彈性教學。 Note: From the 115th academic year, the semester will be 17 weeks. Please include flexible teaching activities to meet the required 18 hours per credit.</p>
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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(含出缺席) General Performance (Attendance Record)	30%								
期中考成績 Midterm Exam	30%								
期末考成績 Final Exam	40%								
作業成績 Homework and/or Assignments	0%								
其他 Miscellaneous (_____)	0%								

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.)

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)