國立東華大學

教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	多變量分析			學年/學期 Academic Year/Semester	113/2
課程名稱(英文) Course Name in English	Multivariate Analysis				
科目代碼 Course Code	AM__51000	系級 Department & Year	碩士	開課單位 Course-Offering Department	應用數學系
修別 Type	選修 Elective	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/曹振海				
先修課程 Prerequisite					

課程描述 Course Description

Multivariate data is arguably the "natural" form of data. While General Linear Model (GLM) and Generalized Linear Model (GLIM) have supplied many powerful machinery for analyzing data, they are essentially univariate. In this course, we will focus on the presentation, the theories and the methods for handling the multivariate data.

Some possible topics/problems for group projects will be announced early in the class. These projects will be integrated with lectures, data analysis, class discussion and presentation. The statistical freeware R will be used for data analysis.

課程目標 Course Objectives

介紹多變量分析之理論研究及應用。
Introduction to basic theories and applications of multivariate analysis.

	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	Motivation and Introduction	
2	I. Descriptive Techniques	
3	II. Multivariate Random Variables: Matrix algebra revisited	
4	II. Multivariate Random Variables: Multivariate distributions	
5	II. Multivariate Random Variables: The multinormal theory	

6	II. Multivariate Random Variables: Estimation theory and hypothesis testing revisited	
7	III. Multivariate Techniques: Data matrices decomposition	
8	Presentation I	
9	期中考試週 Midterm Exam/ Presentation I	
10	III. Multivariate Techniques: PCA	
11	III. Multivariate Techniques: Multidimensional Scaling	
12	III. Multivariate Techniques: t-SNE	
13	Selected Topics: Text Mining	
14	Selected Topics	
15	Selected Topics	
16	Presentation and Summary	
17	Presentation and Summary	
18	期末考試週 Final Exam/ Presentation and Summary	

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 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%			✓	✓				Project and presentation
期中考成績 Midterm Exam	20%								
期末考成績 Final Exam	35%								
作業成績 Homework and/or Assignments	15%								
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.)

References

1. Johnson and Wichern (2007). Applied Multivariate Statistical Analysis, 6th Edition. Pearson Education International.
2. Hardle and Simar (2003). Applied Multivariate Statistical Analysis, Springer.(TextBook. Electronic copy legally available in NDHU IP domain)
3. Kutner, M.H., Nachtsheim, C.J., Neter, J. and Li, W. (2005). Applied Linear Statistical Models, 5th edition. McGraw-Hill.
4. Scheffe, H. (1959). The Analysis of Variance. Wiley.
5. R website: http://www.r-proje ct.org

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.)

https://chtsao.gitlab.io/amsa25/

其他補充說明 (Supplemental instructions)