國立東華大學

課　　綱　Course Outline

應用數學系統計碩士班

中文課程名稱 Course Name in Chinese	統計計算				
英文課程名稱 Course Name in English	Statistical Computing				
科目代碼 Course Code	AM__57000	班 別 Degree	碩士班 Master’s		
修別 Type	必修 Required	學分數 Credit(s)	3.0	時 數 Hour(s)	3.0
先修課程 Prerequisite	線性代數、數值方法、程式設計、統計(含迴歸分析)、機率論(含馬可夫鏈)、數理統計(或正在修高統)、或經授課教師同意 Linear Algebra, Numerical Methods, Computer Progamming, Statistics (including Regression Analysis), Probability Theory (including Markov chains), Mathematical Statistics (or Advanced Statistics), or consent of the instructor				

課程目標
Course Objectives

作為其他統計課程之基礎，本課程主要目標在介紹矩陣化表達與運算方法、與統計相關之計算演算法、以及在統計分析與研究上最常用的兩種程式語言。
As a foundation for other statistics courses, the objective of this course is to cover matrix algebra and computing algorithms that are most relevant to statistics as well as two commonly used programming languages for statistical analysis and research.

系教育目標
Dept.’s Education Objectives

1	訓練嚴謹思考與推理能力。 To provide a solid training in rigorous thinking and reasoning ability.
2	奠定理論與應用數學的基礎知識。 To establish well-founded background knowledge in pure and applied mathematics.
3	具備跨領域學習能力。 To prepare the students for interdisciplinary study in the future.

	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

課程大綱
Course Outline

1.Programming languages and vectorized computation
2.Matrix algebra, including special products, block multiplication
3.Canonical/LU/singular-value decomposition. Numerical Linear Algebra
4.Use of matrix algebra and relevant results in differential calculus and statistics
5.Introduction to simulation and various sampling methods
6.Resampling methods and their use in estimation
7.Selected iterative estimation methods, e.g. Newton’s algorithms, EM, MCMC

資源需求評估（師資專長之聘任、儀器設備的配合・・・等）
Resources Required (e.g. qualifications and expertise, instrument and equipment, etc.)

本系(所)專任教師, 計算工作站與具網路廣播之電腦教學教室,統計軟體如R/Splus, SAS, 電腦教學教室與計算工作站之管理人員
A full-time instructor, computing workstation and a computer lab with networked broadcast system, and statistical software such as R/Splus and SAS, a technician who administrates the computer lab and computing workstation.

課程要求和教學方式之建議
Course Requirements and Suggested Teaching Methods

課堂講授、討論、習題、及軟體實作
Lecture, discussion, exercise, and computer project

其他
Miscellaneous

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撰寫日：100年4月