國立東華大學

教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	統計計算AA			學年/學期 Academic Year/Semester	106/2
課程名稱(英文) Course Name in English	Statistical Computing				
科目代碼 Course Code	AM__5700AA	系級 Department & Year	碩士	開課單位 Course-Offering Department	應用數學系
修別 Type	必修 Required	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/吳韋瑩				
先修課程 Prerequisite					

課程描述 Course Description

In this course, we will review the brief mathematical and statistical knowledge through numerical methods. The students will be expected to know how to read, modify, write code, and assemble the required computational tools and information to solve their statistical problems.

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	Course introduction	
2	Introduction of R; Programming by R Review fundamental concepts in Statistics and Probability Numerical integration and Monte Carlo integration	
3	Monte Carlo integration; Simulation: Inverse cumulative distribution function method & Rejection Sampling (I)	
4	Simulation: Inverse cumulative distribution function method & Rejection Sampling (II)	

5	Concept of Root- finding; Optimization (I): Newton’s method & golden-section method	
6	Optimization (II)	
7	Midterm I	
8	Maximum Likelihood Estimation (MLE) (Theoretical Discussion) (I)	
9	Maximum Likelihood Estimation (MLE) (Numerical Discussion) & Expectation-Maximization Method (I)	
10	Expectation-Maximization Method (II)	
11	Expectation-Maximization Method for Mixture model	
12	Density estimation (1) Parametric estimation & Nonparametric Estimation	
13	Density estimation (2) Nonparametric Estimation(Kernel density estimation)	
14	Density estimation (3) Nonparametric Estimation (Bandwidth Discussion)	
15	Markov Chain Monte Carlo (1)	
16	Markov Chain Monte Carlo (2)	
17	Markov Chain Monte Carlo (3)	
18	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:

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 General Performance	10%								
期中考成績 Midterm Exam	15%								
期末考成績 Final Exam	20%								
作業成績 Homework and/or Assignments	40%								
其他 Miscellaneous (Quizzes)	15%								

評量方式補充說明
Grading & Assessments Supplemental instructions

Homework: It will be an individual job. Please note that the work you turn in must be your own. You shall hand in your work before the due date. Late homework will not be permitted. The deadline of assignments will be announced late.
Quizzes: Quiz will be given in every other week. It will be closed book/closed notes.
The exact schedule of quizzes and exams will be mentioned in the class. An unexcused, missed examination or quiz will be counted as a zero.

* The opportunity of make-up examination and quizzes will not be agreed without any legitimate reason. Please contact the instructor with excuses before the exam or quiz.
* Many extra credit chances will be provided in class.
* Attendance of TA's office hour will be very important; the chance of extra credits will be given by TAs, but 3 credits (in the final score) at most.

* Important course messages will be sent through email. Please check your email very often.
* Importance: The instructor reserves the right to make any changes he considers academically advisable. Changes will be announced in the class. It is your responsibility to keep up with any changed policies.

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（教師個人網址請列在本校內之網址）
Teaching Aids & Teacher's Website (Personal website can be listed here.)

其他補充說明 (Supplemental instructions)