

115學年度第1學期 課程教學大綱

中文名稱	統計學習與資料探勘			課號	MATH524
英文名稱	STATISTICAL LEARNING AND DATA MINING				
課程類別	講授類	必選修	選修	系所	應用數學系碩士班
授課教師	鍾思齊			學分	3

課程大綱 Course syllabus

1. Introduction and exploratory data analysis 2. Statistical Learning 3. Linear Regression 4. Classification 5. Resampling Methods 6. Linear Model Selection and Regularization 7. Moving Beyond Linearity 8. Tree-Based Methods 9. Support Vector Machines 10. Unsupervised Learning

課程目標 Objectives

Statistical learning is about using tools to understand complex datasets. It is a new area that combines statistics and computer science, including machine learning. In this course, we will learn how to use statistics and machine learning to draw conclusions from data. We will explore methods like exploratory data analysis, regression, classification, regression trees, boosting, support vector machines, clustering, and dimension reduction. In addition, we will focus on the basic ideas and intuitions behind each method and apply them to synthetic and real datasets.

授課方式 Teaching methods

課堂講授：投影片為主，板書為輔。修課注意事項：(1)成績計算可能會因課程進度做調整，如有更改將於課堂上公佈。(2)本課程作業及考試實作部分將要求以Python做實現。(3)本課程有建立臉書社團，請登入網路大學 <https://cu.nsysu.edu.tw/mooc/index.php> 查看網址。(4)課程網站網址 <https://phonchi.github.io/nsysu-math524/>

評分方式〔評分標準及比例〕Evaluation (Criteria and ratio)

- 1.Homework：35%
- 2.Midterm exam：35%
- 3.Final project：30%

參考書/教科書/閱讀文獻 Reference book/ textbook/ documents〔請遵守智慧財產權觀念，不可非法影印〕

序號	作者	書名	出版社	出版年	出版地	ISBN#
No.	Author	Title	Publisher	Year of publish	Publisher place	ISBN#
1	Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani	<i>An Introduction to Statistical Learning with Applications in Python</i>	Springer	2023		978-3031387463
2	Trevor Hastie, Robert Tibshirani and Jerome Friedman	<i>The Elements of Statistical Learning, Data Mining, Inference, and Prediction. Second Edition</i>	Springer	2009		978-0387848570
3	Peter Bruce, Andrew Bruce and Peter Gedeck	<i>Practical Statistics for Data Scientists 50+ Essential Concepts Using R and Python Second Edition</i>	O'Reilly	2020		978-1492072942

課程時數規劃 Course Hour Planning

本校自114學年度起實施學期16週，仍以1學分18小時為原則。教師課程時數安排得選擇「16週+自主學習規劃」或「16週+實體上課規劃」。
Starting from the 114th academic year, the university will implement a 16-week course schedule, while maintaining the standard of 18 hours of instruction per credit. Instructors can choose between “16-weeks + Alternative learning periods” or “16-weeks + In-person classes.”

☒ 本門課程為「16週+自主學習規劃」：教師需於「A.每週課程內容及預計進度」欄位填寫16週課程進度，並於「B.自主學習規劃」欄位填寫每1學分2小時學生自主學習內容。

16 weeks + alternative learning periods: The instructor will include a 16-week course plan in the weekly scheduled progress section (16 hours of instruction per credit) and provide details of the learning plan (two hours of activity per credit) in the alternative learning period section.

☐ 本門課程為「16週+實體上課規劃」：教師需於「A.每週課程內容及預計進度」欄位填寫16週課程進度，並於「C.實體上課規劃」填寫2次授課內容及主題。

16 weeks + in-person classes: The instructor will include a 16-week course plan in the weekly scheduled progress section (16 hours of instruction per credit) and specify the content and topics of the 2 in-person classes in the in-person class plan section.

A.每週課程內容及預計進度 Weekly scheduled progress

全英課程之授課內容及主題應以英文或雙語呈現

For courses taught entirely in English, the content and topics should be presented in English or bilingually.

週次	日期	授課內容及主題
Week	Date	Content and topic
1	2026/09/06~2026/09/12	Introduction and exploratory data analysis
2	2026/09/13~2026/09/19	Statistical Learning
3	2026/09/20~2026/09/26	Regression
4	2026/09/27~2026/10/03	Classification
5	2026/10/04~2026/10/10	Resampling Methods

[illegible]

1.各組專業領域(統計、科學計算或數學)之完整知識。 1. Professional knowledge in the major fields (statistics, scientific computing, mathematics).	V	V		V	V		V			
2.有從事研究工作之經驗。 2. Experience in doing research work.	V				V		V			
3.撰寫專題報告及解決實務問題之能力。 3. The ability to write special reports and solve practical problems.	V	V		V	V		V			
4.公開演講之能力。 4. The ability of public speaking.	V						V			
※全校學生基本素養與核心能力 Basic disciplines and core capabilities of the university										
1.表達與溝通能力。 1. Articulation and communication skills	V				V		V			
2.探究與批判思考能力。 2. Inquisitive and critical thinking abilities	V	V		V	V		V			
3.終身學習能力。 3. Lifelong learning	V	V		V	V		V			
4.倫理與社會責任。 4. Ethics and social responsibility										
5.美感品味。 5. Aesthetic appreciation										
6.創造力。 6. Creativity										
7.全球視野。 7. Global perspective										
8.合作與領導能力。 8. Team work and leadership										
9.山海胸襟與自然情懷。 9. Broad-mindedness and the embrace of nature										

☐	SDG1-消除貧窮(No Poverty)
☐	SDG2-消除飢餓 (Zero Hunger)
☐	SDG3-良好健康與福祉(Good Health and Well-being)
☐	SDG4-教育品質(Quality Education)
☐	SDG5-性別平等(Gender Equality)
☐	SDG6-乾淨水源與公共衛生(Clean Water and Sanitation)
☐	SDG7-可負擔乾淨能源(Affordable and Clean Energy)
☐	SDG8-優質工作與經濟成長(Decent Work and Economic Growth)
☐	SDG9-工業、創新和基礎建設(Industry,Innovation and Infrastructure)
☐	SDG10-減少不平等(Reduced Inequalities)
☐	SDG11-永續城市(Sustainable Cities and Communities)
☐	SDG12-責任消費與生產(Responsible Consumption and Production)
☐	SDG13-氣候行動(Climate Action)
☐	SDG14-海洋生態(Life Below Water)
☐	SDG15-陸域生態(Life on Land)
☐	SDG16-和平、正義和穩健的制度(Peace,Justice And Strong Institutions)
☐	SDG17-促進目標實現的全球夥伴關係(Partnership for the Goals)
☒	本課程和SDGs無關

本課程校外實習資訊:
This course is relevant to internship:

☐ 本課程包含校外實習（本選項僅供統計使用，無校外實習者，得免勾記）
The course includes internship.(For statistical use only. If the course without internship, please ignore this item.)

實習定義：規劃具有學分或時數之必修或選修課程，且安排學生進行實務與理論課程實習，於實習終了取得考核證明繳回學校後，始得獲得學分；或滿足畢業條件者。（一般校內實習請勿勾選此欄位）

Internship: The required or elective courses should include credits and learning hours. Students should participate in the corporative company or institution to practice and learn the real skills. An internship certification must be handed in at the end of internship to get the credits or to fulfil the graduation requirements.

回課程列表

