

Department of Statistics
H232000 Machine Learning (機器學習)
Spring 2021(109 學年度第 2 學期)

1. *The mission of the College* is to serve business and society in the global economy through developing professionally qualified and socially responsible business leaders as well as through advancing the frontiers of knowledge in business management.
2. *The strategic objective of Department of Statistics* is to cultivate quality professionals with enthusiasm and global perspectives.

Undergraduate Program Learning Goals (goals covered by this course are indicated with checks):

✓	1	Undergraduate students should be able to communicate effectively in speaking and in writing.
✓	2	Undergraduate students should be able to solve strategic problems with creative and innovative approaches.
	3	Undergraduate students should develop leadership skills required of a person in a leading position.
		Undergraduate students should demonstrate ethical awareness in learning and in social networking.
	4	Undergraduate students should possess a global perspective and an awareness of the effects of globalization.
✓	5	Undergraduate students should acquire the skills and values required of a true professional.

- **Instructor/開課教師:** Shuen-Lin Jeng / 鄭順林
- **Office Hours:** Tue. 10:00-12:00. Thur. 10:00-12:00
- **Email:** sljeng@mail.ncku.edu.tw
- **Phone:** (06)2757575#53640
- **Class Time & Location:** Mon. 9:10-11:00. Wed. 9:10-10. 統計系 62225 教室

➤ **Prerequisite/先修科目:**

Statistics, Regression Analysis
統計學, 迴歸分析

➤ **Course Description/課程描述:**

Machine learning (ML) is the scientific study of algorithms and statistical methods that computer systems use to progressively improve their performance on a specific task. With the explosion of “Big Data” problems, machine learning and statistical learning have become a very hot field in many scientific areas as well as Web behaviour, image analysis, marketing, finance, internet of things and other business disciplines. The main goal of this course is to introduce a set of tools of algorithms and statistical methods for modeling and understanding complex datasets.

機器學習是對演算法和統計方法的科學研究，使電腦系統可以逐步完成特定的工作。由於大數據時代的到來，機器學習和統計學習在許多領域日益重要，特別是應用在網路行為分析、影像分析、行銷分析、財務分析、智慧製造、以及物聯網的資料分析等等。本課程的主要目的是介紹多種機器學習和統計學習的方法，對於複雜的資料集進行建立模型和進行分析。

➤ **Course Objectives/課程目標:**

1. Students will learn different methods in Machine Learning.
2. Students are able to analyze massive and complicate data.
3. Students are capable to do programming for different algorithms.

➤ **Course Content/課程內容:**

Week 01 : Introduction of Statistical and Machine Learning

Week 02 : Linear Regression

Week 03 : Classical Classification

Week 04 : Resampling Methods and Project Report

Week 05 : Linear Model Selection and Regularization

Week 06 : Moving Beyond Linearity

- Week 07 : Tree-Based Methods
- Week 08 : Support Vector Machine and Project Report
- Week 09 : Neural Networks
- Week 10 : Deep Neural Networks I
- Week 11 : Deep Neural Networks II
- Week 12 : Convolutional Neural Networks and Project Report
- Week 13 : Recurrent Neural Networks
- Week 14 : Unsupervised Learning I
- Week 15 : Unsupervised Learning II
- Week 16 : Project Presentation I
- Week 17 : Optimization
- Week 18 : Project Presentation II

➤ **Teaching Approach(es)/教學方法**

序號	教學方法	分配(%)
1	Lecture	70%
2	Group report and discussion	20%
3	R programming	10%
總計		100%

➤ **Textbook/教科書:**

1. **An Introduction to Statistical Learning with Applications in R. By Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani, 2013. Springer.**
2. **Deep Learning with R, By Abhijit Ghatak, 2019 Springer.**

➤ **Grading Policy/評量方式:**

		HW 20%	Project Report 40%	Final Exam 40%
COMMU	<input type="checkbox"/> Oral Communication/ Speaking			
	<input checked="" type="checkbox"/> Written Communication/Writing	20	30	30
CPSI	<input type="checkbox"/> Creativity and Innovation			
	<input checked="" type="checkbox"/> Problem Solving	20	40	40
	<input checked="" type="checkbox"/> Analytical & Computational Skills	40		
LEAD	<input type="checkbox"/> Leadership			
	<input type="checkbox"/> Ethic & Social Responsibility			
GLOB	<input type="checkbox"/> Global Awareness			
VSP	<input type="checkbox"/> Values, Skills & Professionalism			
	<input checked="" type="checkbox"/> Technical Skills	20	30	30
	<input type="checkbox"/> Management Skills			