

## 課程五：深度學習 ( Deep Learning )

### 課程基本資料

開設學校：陽明交通大學

開授教師：彭文孝、陳永昇、謝秉均

開課級別：碩博課程，大四以上可選修

授課語言：英文

同步遠距上課時間：四 12:20-15:10

遠距上課位置：

課程網頁：

修課人數與助教比例：每\_15\_名學生需\_1\_名助教

### 課程概述

教師於課堂中引導式講授目前國際發展最先進之深度學習方法學及其應用，帶領學生原理介紹、數學推導實務應用，熟悉使用深度學習。

The instructor will guide students through the latest international developments in deep learning methodologies and applications. The course will cover theoretical principles, mathematical derivations, and practical applications. Students will gain hands-on experience with deep learning tools.

(1) 了解深度學習技術的數學基礎

(To understand the maths of deep learning techniques)

(2) 熟悉深度學習工具 ( 例如 PyTorch、TensorFlow 等 )

(To familiarize with deep learning tools, such as PyTorch, TensorFlow, etc.)

(3) 探討深度學習技術的最新發展及其應用

(To understand the latest developments and applications of deep learning techniques)

### 參考書目

1. I. Goodfellow, Y. Bengio, and A. Courville, Deep Learning, 1st Ed., MIT Press, Dec. 2016

2. R. S. Sutton and A. G. Barto, Reinforcement Learning: An Introduction, 2nd edition, Nov. 2018

### 課程內容大綱

週次	日期	課程內容	備註(當周二)
1	2025-02-20	介紹與機器學習基礎 (Introduction & Machine Learning Basics)	
2	2025-02-27	深度網路 (Deep Networks)	Lab 0 Warm up
3	2025-03-06	卷積神經網路 (Convolutional Networks)	
4	2025-03-13	Transformers	Lab 1 CNN
5	2025-03-20	Introduction to Reinforcement Learning	

6	2025-03-27	線性因子模型與自動編碼器 (Linear Factor Models & Autoencoders)	遞迴與循環神經網路 (Recurrent and Recursive Nets)
7	2025-04-03 (清明連假)		
8	2025-04-10	Valued Based Reinforcement Learning	生成對抗網路 (Generative Adversarial Networks)
9	2025-04-17	擴散模型 (Diffusion Models)	Lab 2 Discrete control (Games, e.g., Atari)
10	2025-04-24	規範化流程 (Normalizing Flows)	Lab 3 Diffusion (+GAN)
11	2025-05-01	Policy-based Reinforcement Learning	
12	2025-05-08	Offline RL	
13	2025-05-15	尚在確認中	
14	2025-05-22	尚在確認中	
15	2025-05-29	期末考試 (Final Exam)	
16	2025-06-05	尚在確認中	

## 成績評量方式

4 Labs (done individually) 80%

Final exam 20%

## 課程要求

- You must have access to GPU equipped with at least 6GB of memory