# 國立台灣科技大學 114學年 第2學期　課程大綱

## Spring 2026 NTUST Course Outline

授課教師：呂永和

Instructor:Yungho Leu

課程名稱：人工智慧與深度學習

Course Title：Artificial Intelligence and Deep Learning

2026/6/22

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| 課程代號： MI5126701<br>Course Code<br>學分數： 3<br>Credits | 必選修：選修/半學年<br>Required/Electve:Elective/Half Yr.<br>先修課程：<br>Prerequisites |
| 節次教室： W2(華夏恆毅樓D205) W3(華夏恆毅樓D205) W4(華夏恆毅樓D205)<br>Time/Location | |
| 專業核心能力： 培養學生從事資料科學相關工作及研究所需之核心競爭力<br>Core Professional Competencies | |
| 課程網址： Moodle<br>Course Website | |
| 課程宗旨：<br>Course Objectives | 人工智慧包含機器學習、深度學習、強化學習以及生成式AI，為目前最重要的電腦科技。而其中的深度學習與生成式AI，正在史無前例的翻轉人類的未來。本課程將著重介紹各種深度類神經模型的架構及應用，以理論與實作並重的方式，學習先進的深度類神經網路模型以及生成式AI，俾使同學能了解AI以及有效率地使用AI，為就業及研究奠定基礎。本課程將以Python程式語言開發環境為基礎，以TensorFlow, Keras, PyTorch等工具，建立、評估及優化針對不同大數據資料集的不同的類神經網路模型; 我們也會學習大語言模型(LLM)的原理及使用方式。<br>The Artificial Intelligence includes Machine Learning, Deep Learning, Reinforcement Learning, and Generative AI. It is the most important computer technology today. Among them, deep learning and generative AI are now changing our way of life at an unprecedented pace. This course will focus on learning the structures and applications of many deep neural network models. We will cover both the theory and practice of various deep neural network models. By constructing and training a deep neural network model using TensorFlow and PyTorch on large datasets, a student will learn the cutting-edge AI technology that is very useful for their jobs and research. In particular, students will learn the theory behind LLMs and how to use them effectively. |
| 課程大綱：<br>Outline of Lectures | 1. 簡介人工智慧、機器學習、深度學習及生成式模型的定義及關係。<br>2. Python程式語言開發環境介紹<br>3. Numpy, Pandas, Matplotlib,TensorFlow, Keras, PyTorch, Google Cloud 介紹<br>4. 深度類神經網路 (Deep Neural Networks—DNN)<br>5. 深度類神經網路的訓練、梯度下降法 (Training of Deep Neural Networks, Gradient Descent)<br>6. 卷積類神經網路 (Convolutional Neural Network—CNN)<br>7. 遞歸類神經網路 ( Recurrent Neural Networks —RNN, LSTM)<br>8. 殘差網路 (Residual Networks—ResNet)<br>9. 轉移學習 (Transfer Learning)<br>10. 序列學習 (Sequence Learning)<br>11. 文字編碼 (Word Embedding)<br>12. 注意力模型 (Attention Model)<br>13. 自然語言處理 (Natural Language Processing—NLP)<br>14. 生成對抗網路 (Generative Adversarial Networks —GAN)<br>15. 擴散生成模型(Stable Diffusion Model)<br>16. Self-attention 與 Transformer<br>17. 大語言模型(LLM) |

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| 授課方式：<br>Method of Instruction | 講授 Lecture：80%<br>分組討論 Group discussion：0%<br>案例研討 Case study：20%<br>操做練習 Practical exercises：0%<br>講授 Lecture：% |
| 教科書：<br>Textbooks | 1. Deep Learning with Keras: Implement neural networks with Keras on Theano and TensorFlow; Antonio Gulli, Sujit Pal<br>2. Python Deep Learning: Exploring deep learning techniques and neural network architectures with PyTorch, Keras, and TensorFlow; Ivan Vasiliev et al. Second Edition<br>3. Hands-On Large Language Models: Language Understanding and Generation; Jay Alammar & Maarten Grootendorst |
| 參考書目：<br>References | 1. tf.Keras 深度學習攻略手冊 (TensorFlow 2.x) 施威銘研究室<br>2. 跟NVIDIA學深度學習 (Learning Deep Learning: Theory and Practice of Neural Networks, Computer Vision, Natural Language Processing, and Transformers Using TensorFlow)<br>3. Python Machine Learning: Machine learning and Deep Learning with Python, Scikit-learn, and TensorFlow 2; Third Edition-Includes TensorFlow 2, GANs, and Reinforcement Learning, Sebastian Raschka & Vahid Mirjalil |
| 修課須知：<br>Notice | 歡迎相關系所選修 |
| 評量方式：<br>Grading | 期中考40%，期末考40%, 上課出席 20% |
| 備註說明：<br>Notes | 熟悉Python, 微積分中的微分鏈律(Chain Rule);懂得多變量微分會很有幫助。 |