國立東華大學

課　　綱　Course Outline

理工學院學士班

中文課程名稱 Course Name in Chinese	深度學習				
英文課程名稱 Course Name in English	Deep Learning				
科目代碼 Course Code	TCAI50040	班 別 Degree	學士班 Bachelor’s		
修別 Type	學程 Program	學分數 Credit(s)	3.0	時 數 Hour(s)	3.0
先修課程 Prerequisite					

課程目標
Course Objectives

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)

院教育目標
College.’s Education Objectives

1	培育專業知能，提升學習能力 Acquisition of professional competence and enhancement of learning abilities.

院基本素養與核心能力 College Basic Learning Outcomes		課程目標與院基本素養與核心能力 Correlation between Course Objectives and Basic Learning Outcomes
A	具備數理基本知識、邏輯推理、分析解決問題之能力。 Basic math knowledge, logical reasoning, analytical and problem-solving skills.	

B	具備中外語言表達溝通技巧，以養成團隊合作的能力。 Ability to express ideas and communicate in Chinese and foreign languages and teamwork skills.	
C	具備終身學習的能力。 Lifelong learning ability.	

圖示說明Illustration ：● 高度相關 Highly correlated ○中度相關 Moderately correlated

課程大綱
Course Outline

Introduction & Machine Learning Basics
Linear Algebra
Probability and Information Theory
Numerical Computation
Deep Networks?
Deep Feedforward Networks
Convolutional Networks
Convolutional Networks
Convolutional Networks & Transformers
Introduction to Reinforcement Learning
Linear Factor Models
Autoencoders
Valued Based Reinforcement Learning
Diffusion Models
Normalizing Flows
Policy-based Reinforcement Learning
Offline RL
Paper Presentation
Final Exam
Final Project Proposal

資源需求評估（師資專長之聘任、儀器設備的配合・・・等）
Resources Required (e.g. qualifications and expertise, instrument and equipment, etc.)

課程要求和教學方式之建議
Course Requirements and Suggested Teaching Methods

成績評量方式
4 Labs (done individually) 80%
Final exam 20%

其他
Miscellaneous