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：Loke Kar Seng

Instructor:Loke Kar Seng

課程名稱：柔性計算

Course Title：Soft Computing

2026/11/3

課程代號： IM5109701 Course Code 學分數： 3 Credits	必選修：選修/半學年 Required/Electve:Elective/Half Yr. 先修課程： Prerequisites
節次教室： Time/Location	M6(MA-215) M7(MA-215) M8(MA-215)
專業核心能力： Core Professional Competencies	
課程網址： Course Website	
課程宗旨： Course Objectives	This course explores the evolving landscape of soft computing, moving beyond traditional paradigms (neural networks, evolutionary algorithms, swarm intelligence) into modern gradient-based symbolic systems and hybrid neuro-symbolic approaches. Students will learn how non-gradient optimization methods (genetic algorithms, swarm intelligence, evolutionary strategies, differential evolution, CMA-ES, ant colony optimization) complement gradient-driven symbolic learning (differentiable inductive logic programming, differentiable symbolic regression, soft decision trees, neural cellular automata). The course emphasizes hands-on construction and experimentation: students will implement algorithms, compare paradigms, and build hybrid systems. Guided by Feynman's principle— "What I cannot build, I cannot understand" —the course prioritizes activity-based learning, coding practice, and iterative projects. By the end, students will be able to design, implement, and critically evaluate soft computing systems that integrate symbolic reasoning with neural learning.
課程大綱： Outline of Lectures	Proposed Course content A. Non-gradient based 1. Swarm Intelligence - PSO 2. Nature-Inspired Optimization - Bee, Firefly, Ants 3. Evolutionary based algorithms - GA, ES, Differential Evolution, CMA-ES B. Gradient-based Neuro-Symbolic approaches 1. Differential inductive logic program 2. Symbolic Regression 3. Soft Decision Trees 4. Neuro-symbolic approach 5. Neuro cellular automata
授課方式： Method of Instruction	講授 Lecture：0% 分組討論 Group discussion：0% 案例研討 Case study：0% 操做練習 Practical exercises：0% 講授 Lecture：%

教科書： Textbooks	None
參考書目： References	It will be given throughout the course
修課須知： Notice	
評量方式： Grading	1 Assignment and 3 Projects (Tentative)
備註說明： Notes	English language and proficiency in coding (python)