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：邱俊智

Instructor:Chun-Chih Chiu

課程名稱：數位雙生與模擬

Course Title：Digital Twin and Simulation

2026/11/3

課程代號：SI5201701 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：W6(華夏恆毅樓D402) W7(華夏恆毅樓D402) W8(華夏恆毅樓D402) Time/Location	
專業核心能力： Core Professional Competencies	■ 專業知識及技能 ■ 整合跨領域專業知識之能力 ■ 解決工程與管理問題之能力 ■ 研讀及撰寫專業論文之能力 ■ 設計規劃與執行專題及系統整合之能力
課程網址： Course Website	None.
課程宗旨： Course Objectives	This course introduces digital twin and simulation as a modeling-and-experimentation approach for decision-making in operations, logistics, and manufacturing systems. Students learn how to build discrete-event simulation (DES) models, connect models with data, and use what-if experiments to evaluate performance under alternative designs and operating policies. The course emphasizes hands-on model building using Plant Simulation, basic data integration, and clear communication of digital-twin-enabled simulation studies through structured reports and presentations.
課程大綱： Outline of Lectures	1 Introduction to Digital Twin and Simulation (concepts, use cases, course logistics) 2 System Dynamics and Modeling Foundations (deterministic example) 3 Plant Simulation Basics (object-oriented modeling) 4 Plant Simulation Modeling Patterns (queues, resources, controls) 5 Plant Simulation Advanced Logic I (rules, priorities) 6 Plant Simulation Advanced Logic II (rules, priorities) 7 Plant Simulation Material transportation 8 Midterm Exam (term project proposal) 9 Experimental Design for Simulation (scenario management, factor/level planning) 10 Digital Twin and Simulation Projects 11 Simulation Optimization I 12 Simulation Optimization II 13 Paper Presentation (I) 14 Paper Presentation (II) 15 Term project Discussion 16 Term Project Presentation + Final Report Due (digital twin & simulation study)
授課方式： Method of Instruction	講授 Lecture：40% 分組討論 Group discussion：10% 案例研討 Case study：20% 操做練習 Practical exercises：30%

	講授 Lecture：%
教科書： Textbooks	1. Bangsow, S. (2010). Manufacturing simulation with Plant Simulation and SimTalk: Usage and programming with examples and solutions. Springer Berlin Heidelberg. 2. Bangsow, S. (2020). Tecnomatix Plant Simulation: Modeling and programming by means of examples. Springer Cham.
參考書目： References	1. Lin, T. James. (2001). System simulation: Theory and applications [In Chinese]. Tsang Hai Publishing. 2. Supplementary articles and notes provided in class.
修課須知： Notice	None.
評量方式： Grading	In-class Questions & Assignments 40% Literature Presentation 25% Term Project (Final Report + Presentation) 35%
備註說明： Notes	None.