

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

2026/6/22

<p>課程代號： SI5201701 Course Code</p> <p>學分數： 3 Credits</p>	<p>必選修：選修/半學年 Required/Electve:Elective/Half Yr.</p> <p>先修課程： Prerequisites</p>
<p>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</p>	
<p>專業核心能力： Core Professional Competencies</p> <ul style="list-style-type: none"> ■ 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 	
<p>課程網址： None. Course Website</p>	
<p>課程宗旨： Course Objectives</p> <p>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.</p>	
<p>課程大綱： Outline of Lectures</p> <ol style="list-style-type: none"> 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) 	
<p>授課方式： Method of Instruction</p> <p>講授 Lecture：40%</p> <p>分組討論 Group discussion：10%</p> <p>案例研討 Case study：20%</p> <p>操做練習 Practical exercises：30%</p>	

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.