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：蕭偉文

Instructor:Wei-Wen Hsiao

課程名稱：輸送現象(二)

Course Title：Transport Phenomena (2)

2026/11/3

課程代號： CH5202702 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	T6(IB-409-2) T7(IB-409-2) T8(IB-409-2)
專業核心能力： Core Professional Competencies	
課程網址： Course Website	
課程宗旨： Course Objectives	The purpose of “Transport Phenomena II” is to develop a solid understanding of heat transfer and mass transfer within the broader framework of transport phenomena. Students will learn to interpret thermal and diffusion processes through rigorous mathematical formulations derived from conservation principles. Emphasis is placed on deriving governing equations for heat and mass transfer from conservation principles, applying the control-volume approach, and solving ordinary and partial differential equations (ODEs and PDEs) relevant to conduction, convection, radiation, and diffusion processes. The course strengthens mathematical skills, problem-solving ability, and engineering judgment for advanced study and practical applications in energy, materials, and sustainable technologies.
課程大綱： Outline of Lectures	1. Heat Transfer Foundations: Energy conversion, heat exchangers, efficiency, renewables, and energy storage. 2. Energy Balances & Governing Equations: Control-volume energy balances; formulating sources/sinks and solving the resulting equations. 3. Multivariable Temperature Fields: Steady conduction and non-isothermal laminar flow; boundary layers, PDE/series solutions, and Bessel functions. 4. Turbulence & Radiation: Turbulent heat-transfer analogies and radiation for solar-energy systems and climate-related applications. 5. Mass Transfer: Diffusivity in phases/porous media, flux conversions, transport in solids/laminar flow, multicomponent diffusion, and PDE solution methods.
授課方式： Method of Instruction	講授 Lecture：70% 分組討論 Group discussion：20% 案例研討 Case study：10% 操做練習 Practical exercises：0% 講授 Lecture：%
教科書： Textbooks	Bird, R.B., Stewart, W.E., Lightfoot, E.N., Transport Phenomena, 2nd ed., John Wiley & Sons, Inc (2007).

參考書目： References	
修課須知： Notice	
評量方式： Grading	1. Attendance: 10% 2. Assignments: 15% 3. Midterm Exam: 30% 4. Final Exam: 30% 5. PBL Presentation: 15%
備註說明： Notes	Lectured in Chinese In-class discussions PBL/Exam-based