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：黃彥瑞

Instructor:HUANG YEN-JUI

課程名稱：高溫腐蝕

Course Title：High Temperature Corrosion

2026/11/3

課程代號： ME6405701 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： W2(IB-304) W3(IB-304) W4(IB-304) Time/Location	
專業核心能力： Core Professional Competencies	
課程網址： Course Website	
課程宗旨： Course Objectives	This course introduces the principles and applications of electrochemistry. Lecture contents in the principal part would cover electrochemical systems, thermodynamics, potentials, electrodes, electrical double layer, mass transport and kinetics. Several commonly used electrochemical measuring techniques would be introduced. Lecture contents in the application part would cover the corrosion science and the principles of battery. In corrosion science section, contents would involve forms of corrosion, the passivity, the corrosion control and case studies in nuclear power plants. Students are expected to (1) Understand core concepts of electrochemistry, including thermodynamics, kinetics, and mass transport. (2) Familiar with electrochemical measurement techniques (cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS)) and data interpretation. (3) Able to identify and analyze different types of corrosion and corrosion mitigation strategies. 本課程介紹電化學原理與腐蝕工程基礎知識。課程內容分為兩部分，前半段內容涵蓋電化學系統、熱力學、電位、電極、雙電層、質傳和動力學，並介紹常用電化學測量技術如循環伏安法(CV)和電化學阻抗譜(EIS)。後半段內容聚焦於腐蝕工程，介紹各式腐蝕形式、鈍化以及腐蝕控制。預期學生可獲得下述能力：(1)了解電化學核心概念，包括熱力學、動力學和質傳、(2)熟悉電化學測量技術並如何解釋量測結果、(3)了解各種腐蝕形式和腐蝕控制方式。
課程大綱： Outline of Lectures	- Week 1-7: principles of electrochemistry: Electrochemical systems, thermodynamics, Nerst equation, half-cell, electrode, potential, Pourbaix diagram, electrical double layer. Mass transport, exchange current density, reaction current density, mixed potential theory, polarization - Week 8: Midterm Exam, covering materials from week 1-8 - Week 9-10: Measurements techniques: Instrumentals, polarization scan, cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) - Week 11-15: Corrosion: Forms of corrosion, passivity, corrosion control, cases in nuclear power plants - Week 16: Final Exam, covering materials from week 10 to 15 電化學系統、Nerst方程式、電位、電極、電位-pH圖、電雙層、質傳與動力學、交換電流密度、極化（7週）；循環伏安法（CV）和電化學阻抗譜（EIS)量測手法（1週）；腐蝕形式、鈍化、腐蝕防護以及核能電廠案例研究（6週）。

授課方式： Method of Instruction	講授 Lecture：100% 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	Principles of Electrochemistry, J. Koryta, J. Dvorak, and L. Kavan, 2nd Ed., John Wiley & Sons, 1993, West Sussex, England.
參考書目： References	1. Electrochemistry, P. H. Rieger, 2nd Ed., Chapman & Hall, 1994, New York, U.S.A. 2. Principles and Prevention of Corrosion, Denny A. Jones, 2nd Ed., Prentice-Hall, 1996, New Jersy, U.S.A.
修課須知： Notice	
評量方式： Grading	出席20%、期中40%、期末40%
備註說明： Notes	-先修課程：材料科學與工程導論 -出席：學生進入教室時須在簽到表上簽名，不得代他人簽到。上課期間，請將手機及其他電子設備調至靜音模式，以免干擾其他同學 -誠信政策：考試中請勿作弊。學生有義務在所有學術作業和軟體/應用程式使用中保持誠實。期中和期末考為手寫閉卷考試，請攜帶工程計算器或已安裝在任何電子設備中的相關應用程式，考試時間預計為100分鐘，具體時長視學生程度而定。除疾病、受傷或家庭緊急狀況等特殊情況外，不安排補考。