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：KINJAL JAINIKKUMAR SHAH

Instructor:KINJAL JAINIKKUMAR SHAH

課程名稱：綠色化學於汙染控管

Course Title：Green Chemistry for Pollution Control

2026/11/3

課程代號： EN6002701 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	W5(TR-614) W6(TR-614) W7(TR-614)
專業核心能力： Core Professional Competencies	□ 具備自我求知能力 □ 具備專業知識 □ 具備跨領域整合 □ 具備外語能力
課程網址： Course Website	
課程宗旨： Course Objectives	This course aims to address the critical environmental challenges posed by modern developments, emphasizing the role of chemistry and chemical engineering in pollution control and sustainable development. As the environment is an intricate system that affects every aspect of human life—air, water, land, and climate—it is essential to balance technological advancements with environmental responsibility. Guided by the United Nations' 17 Sustainable Development Goals, this course will explore the vital contributions of chemistry in monitoring, protecting, and improving the world's environment. The future product development must be considered from an environmental impact perspective, as over the last decade we have seen tremendous activity in industries that generated large amounts of industrial waste that polluted our environment. On the one hand, population growth and the simultaneous over-exploitation of resources and deforestation are leading to an intensification of global environmental concerns. This situation can only be brought under control if people from all disciplines place more emphasis on controlling environmental pollution. Green chemistry is one of the growing tools that can improve the quality of the environment by using principles in real-world applications in the development, manufacture and synthesis of chemical products, including fuels, plastics, polymers, pharmaceuticals, etc. This course is designed from the perspective of chem
課程大綱： Outline of Lectures	

課程描述：未來的產品開發必須考量其對環境的影響。過去十年中，工業活動產生了大量廢棄物，對環境造成了嚴重污染。同時，人口增長、資源過度開發及森林砍伐加劇了全球環境問題。要有效應對這些挑戰，各學科應將重點放在環境污染的控制上。綠色化學是改善環境品質的重要工具，其應用涵蓋化學產品（如燃料、塑膠、高分子及藥物等）的開發與製造。本課程適合化學、應用科學、材料科學、化工及環境科學與工程相關領域的學生，幫助他們在基礎學科領域中獲取寶貴經驗，並將綠色化學的概念整合至其專業傳統中。
課程概述：
傳統化學利用材料與化學概念解決基礎問題，而綠色化學是一門跨學科科學，致力於解決當前全球面臨的污染問題。本課程是一門進階綠色化學課程，涵蓋綠色化學的基本介紹及其十二項原則。課程以原子層級視角，預測化學行為，並探討如何應用綠色化學原則解決空氣、水、土壤、海洋及固體污染問題。課程的核心在於學習如何將綠色化學原則應用於污染控制中。
單元內容：
- 單元 1：綠色化學概要
- 單元 2 & 3：污染與事故預防
- 單元 4 & 5：安全與安定性綠色化學
- 單元 6 & 7：能源與資源永續
- 單元 8 & 9：綠色化學的基礎概念
- 單元 10 & 11：綠色化學於空氣污染控制
- 單元 12 & 13：綠色化學在水與廢水處理技術中的應用
- 單元 14：綠色化學於土壤污染控制
- 單元 15：綠色化學於海洋污染控制

海洋污染來源、微塑料污染及控制措施
- 單元 16：綠色化學在固體廢棄物污染控制

COURSE DESCRIPTION:
In fundamental chemistry, concepts of chemicals and materials were used to solve the fundamental problems. However, advances in green chemistry are an interdisciplinary science that seeks to solve current global pollution problems.
COURSE OVERVIEW:
Unit 1: Overview of Green Chemistry
Units 2 & 3: Pollution and Accident Prevention
Units 4 & 5: Green Chemistry for Safety and Stability
Units 6 & 7: Energy and Resource Sustainability
Units 8 & 9: Foundational Concepts of Green Chemistry
Units 10 & 11: Green Chemistry in Air Pollution Control
Units 12 & 13: Applications of Green Chemistry in Water and Wastewater Treatment Technologies
Unit 14: Green Chemistry in Soil Pollution Control
Unit 15: Green Chemistry in Marine Pollution Control (Sources of marine pollution, microplastic pollution, and control measures)
Unit 16: Green Chemistry in Solid Waste Pollution Control

授課方式： Method of Instruction	講授 Lecture：70% 分組討論 Group discussion：10% 案例研討 Case study：20% 操做練習 Practical exercises：0% 講授 Lecture：%
教科書： Textbooks	1. Ahluwalia, V., & Dhingra, S. (2024). Green chemistry in 21st century and beyond. https://doi.org/10.1201/9781003529163 2. Andraos, J., & Matlack, A. S. (2022). Introduction to green Chemistry. CRC Press. 3. Shah, K. J. (2023). Green Chemistry for Environmental Sustainability - Prevention-Assurance-Sustainability (P-A-S) approach. In IntechOpen eBooks. https://doi.org/10.5772/intechopen.111106 4. Business and Sustainable Development Commission. (2017). Better business, better world.
參考書目： References	
修課須知： Notice	

評量方式： Grading	COURSEWORK (50%) Assignment (30) Homework (5*5=25) Individual Presentation (5*1=5) Attendance (20) including Class, Quiz, Participation in Class Activity, Group discussion EXAMS (50%) Mid-Term (20) Final Exam (30)
備註說明： Notes	