國立勤益科技大學
National Chin-Yi University of Technology

115 學年度上學期課程大綱
2026 Year of Fall Syllabus

部別 Department	■日間部 □進修部 Office of Continuing and Extension Education	學制 School System	□博士 Doctoral Degree ■碩士 Master's Degree □四技 Bachelor's Degree (4-year College) □二技 Bachelor's Degree (2-year College) □二專 Associate Degree (2-year program)
授課教師 Instructor(s)	曹世昌 Shyh-Chang Tsaur	開課代碼 Course Code	G706
科目名稱 Course Name	新暨再生能源發電效益評估 Appraisal Criteria for New and Renewable Energy Power Generation	必/選修 Required/Elective□	□必修 Required ■選修 Elective
開課年級 Grade	碩士班一、二年級 Master's first and second year	開課學期 Semester	■上 Fall □下 Spring
開課單位 Course Department	電機工程系 Electrical Engineering Department	學分/學時數 Credit/Hours	3/3
全程外語授課 Foreign language Teaching entirely	■是 Yes □否 No	主要授課語言 Main language	英文 English
先修課程 Prerequisite course(s)	None		
優質課程類別 Course attributes (可複選)	■一般課程 General Courses、□智慧財產權 Intellectual Property、 □內涵式服務學習課程 Service Learning、□性別平等 Gender Equality、 ■綠色課程 Green Technology□創新創意課程 Innovation、□工作（職場）倫理課程 Career Ethics、 □工具機技術研發 Tool Machine Technology Development 創新、創意課程定義：課程目標為「激發學生獨特的想像與創意思考，透過企劃與執行以創新模式解決實際問題。		
課程與校核心能力關聯 Core competence (可複選)	□表達溝通能力 Communication and Presentation Skill ■創意創新能力 Innovation Skill □關懷服務能力 Community Care and Service Skill □思考推理能力 Thinking and Reasoning Skill ■專業實務能力 Professional Practice Skill ■宏觀視野能力 Macro Skill		
教科書 Textbook	自編教材 Self-compiled textbook		
參考書目 Other References	Energy Storage Technologies & Their Role in Renewable Integration by GENI U.S. ENVIRONMENTAL PROTECTION AGENCY		
課程目標 Course objectives	本課程使學生了解儲能技術，如抽水蓄能，壓縮空氣儲能，各類電池，飛輪，電化學電容器等，提供了多種應用：能源管理，備用電源，負載均衡，頻率調節，電壓支持，以及電網穩定。重要的是，不是所有類型的存儲的是適合每一個類型的應用，激勵的需要組合策略儲能技術。 This course enables students to understand energy storage technologies such as pumped storage, compressed air storage, various types of batteries, flywheels, electrochemical capacitors, etc. and provides a variety of applications: energy management, backup power, load balancing, frequency regulation, voltage support, And grid stability. It is important that not all types of storage are suitable for every type of application, and the need for incentives combines strategic energy storage technologies.		
評量方式 Evaluation	課堂討論報告 60% 期末報告 40% Class Attendance and Discussion Report 60%, Final Report 40%		

內容綱要 Course Outline	1、 儲能技術具有很大的潛力，以提高電力電網，以使增長可再生能源發電，並提供替代石油衍生燃料在全國的交通運輸部門。在電力系統中，這項技術的前景在於其潛力，增加電網的效率和可靠性，優化電力潮流和支持可變電源供應來自風能和太陽能發電。 2、 清潔能源行動能產生顯著節省燃料和電力成本，以及其它到電系統的好處，該 環境和公眾健康，經濟。如何評估它的發電效益評估顯得是個重要議題。在交通運輸，車輛搭載電池或其他電子技術有置換車輛燃燒汽油和柴油燃料的潛力，減少相關排放和對石油的需求。 3、 本課程使學生了解儲能技術，如抽水蓄能，壓縮空氣儲能，各類電池，飛輪，電化學電容器等，提供了多種應用：能源管理，備用電源，負載均衡，頻率調節，電壓支持，以及電網穩定。重要的是，不是所有類型的存儲的是適合每一個類型的應用，激勵的需要組合策略儲能技術。 1. Energy storage technology has great potential to improve electric power grids, to enable growth in renewable electricity generation, and to provide alternatives to oil-derived fuels in the nation's transportation sector. In the electric power system, the promise of this technology lies in its potential to increase grid efficiency and reliability—optimizing power flows and supporting variable power supplies from wind and solar generation. 2. In transportation, vehicles powered by batteries or other electric technologies have the potential to displace vehicles burning gasoline and diesel fuel, reducing associated emissions and demand for oil. 3. Energy storage technologies—such as pumped hydro, compressed air energy storage, various types of batteries, flywheels, electrochemical capacitors, etc., provide for multiple applications: energy management, backup power, load leveling, frequency regulation, voltage support, and grid stabilization. Importantly, not every type of storage is suitable for every type of application, motivating the need for a portfolio strategy for energy storage technology.
自編教材 Self-compiled textbook (非自編教材請填寫原因)	■是 Yes □否 No,原因 cause:
符合智財規範 Compliance with Intellectual property (不符合智財規範請填寫原因)	■是 Yes □否 No,原因 cause:
備註 Note	None

教學進度 Course schedule		
週次 Week	教學與作業進度 Teaching Schedule/Assignments	備註 Note
1	摘要 Executive Summary	
2	背景和適用範圍 Background and Scope	
3	為存儲技術的應用和優勢概述 Overview of Storage Technology Applications and Benefits	

4	電池並網應用及效益評估 Batteries for Grid Applications and Benefit Assessment	
5	電動運輸電池及效益評估 Batteries for Electric Transportation and Benefit Assessment	
6	氫 Hydrogen	
7	壓縮空氣蓄能及效益評估 Compressed Air Energy Storage and Benefit Assessment	
8	期中報告(Mid-Term Report)	
9	電化學電容器及效益評估 Electrochemical Capacitors and Benefit Assessment	
10	抽水蓄能及效益評估 Pumped Hydro Storage and Benefit Assessment	
11	飛輪儲能及效益評估 Flywheel Storage and Benefit Assessment	
12	在建築物熱能儲存及效益評估 Thermal Energy Storage in Buildings and Benefit Assessment	
13	熱儲能的聚光太陽能發電及效益評估 Thermal Energy Storage for Concentrating Solar Power and Benefit Assessment	
14	超導磁儲能 Superconducting Magnetic Energy Storage and Benefit Assessment	
15	期末報告(Final Report)	
16	期末報告(Final Report)	
17	期末報告(Final Report)	
18	期末報告(Final Report)	

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