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：溫照華

Instructor:Chao-Hua Wen

課程名稱：電子影像傳輸與互動

Course Title：Electronic Image Communication and Interaction

2026/11/3

課程代號： CI5233701 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	M2(TR-610) M3(TR-610) M4(TR-610)
專業核心能力： Core Professional Competencies	(1) 搜尋與分析相關研究領域專業知識之能力 (2) 終身自我學習成長之能力
課程網址： Course Website	
課程宗旨： Course Objectives	Students will have a thorough knowledge and understanding of how to investigate the problem of Imaging Communications and Interactions, including color space and quantization, image compression, image security, image quality, pixel rendering, and dynamic display resolution. This module brings together the broad array of Arduino color imaging platforms, colorimetry, human vision and image processing for students buildup in practical skills of this field.
課程大綱： Outline of Lectures	(1)成像基礎理論：顯示硬體、超媒體和通訊技術；(2)色彩空間：設備依賴性、伽瑪校正和 RGB 標準；(3)Arduino彩色成像處理平台；(4)色彩量化演算法；(5)色彩科學的Python語言; (6)數位半色調；(7)人機互動介面：空間與時間視覺、影像品質模型；(8)影像安全：密碼學、數位簽章、浮水印和隱寫術；(9)數位典藏及通訊系統；(10)生成式AI的自然語言處理；(11)顯示訊號處理：靜態/動態顯示解析度(子像素渲染、動畫殘影減少) (1) Electronin imaging infrastructure: display hardware, Meta-media and communications technology; (2) Color spaces: device dependency, gamma correction and RGB standards; (3) Arduino color imaging platforms; (4) Color quantization: uniform, popularity and median-cut algorithms; performance evaluation; error diffusion; (5) Colour Science for Python; (6) Digital halftoning: comparison with conventional halftoning, e.g., clustered-dot, dispersed-dot, screen angles etc.; (7) Human-Computer Interactions: spatial and temporal vision, image quality model; (8) Image security: cryptography, digital signatures, watermarks and steganography; (9) Digital archive and communication system; (10) Natual Language Processing in Generative AI; (11) Display signal processing: Static/dynamic display resolution (sub-pixel rendering; motion artifact reduction).
授課方式： Method of Instruction	講授 Lecture：70% 分組討論 Group discussion：10% 案例研討 Case study：0% 操做練習 Practical exercises：20%

	講授 Lecture：%
教科書： Textbooks	[1] Multimedia foundations : core concepts for digital design, Vic Costello, 3 rd ed, Focal Press, 2024. [2] Machine Learning in Multimedia: Unlocking the Power of Visual and Auditory Intelligence, edited by Suman Kumar Swarnkar, Annu Sharma, J. Somasekar, and Bharat Bhushan, CRC Press, 2025
參考書目： References	[1] Computer Graphics: Principles and Practice, Foley, van Dam, Feiner and Hughes, 2nd ed, Addison-Wesley, 1995. [2] Digital Image Processing, R.C.Gonzalez and R.E Woods, 2nd, Prentice Hall, 2002. [3] Digital Halftoning, R. Ulichney, MIT Press, 1987. [4] Hands-on ESP32 with Arduino IDE: Unleash the power of IoT with ESP32 and build exciting projects with this practical guide, Asim Zulfiqar, Packt Publishing, 2024.
修課須知： Notice	Finding a Volunteer TA from within the course.
評量方式： Grading	1. Assignment (40 %) (1) Two practical experiments, require a computer with Google colab and Arduino IDE (2) One paper study 2. Term project, Individually or in groups(60 %) (1) Project approval required before middle-term (2) Oral presentation of projects
備註說明： Notes	It is recommended that student has the background knowledge of Physics and the basic skills for computer language programming.