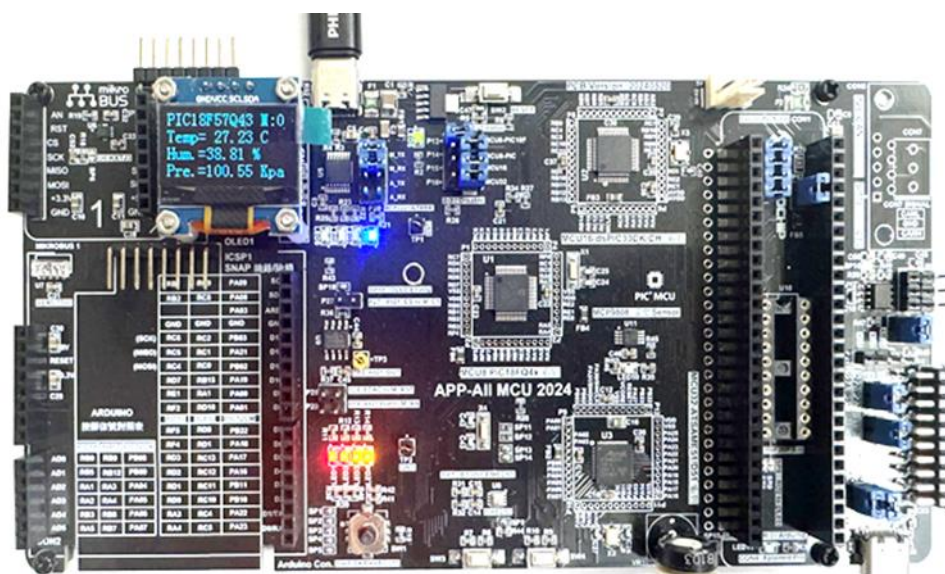




## Microchip 2025 程式設計養成訓練班

### 課程安排

- 本課程是為期 3 天的程式訓練課程，分為 Part-0 至 Part-3 等 4 個階段進行，其中 Part-0 為預習課程，同學可以自行由線上教學影片獲得 Microchip MCU 及開發環境的基礎知識。
- 凡報名參加本課程並完成所需的訓練，即可獲頒 Microchip 程式設計養成班結訓證書一份
- 凡報名參加本課程，即表示你以及你的組員會參加 2026 年在南台科技大學舉辦的數位訊號處理創思設計競賽或是其他公開舉辦的設計競賽、或是希望製作一個專題並且製作至少 20 分鐘的專案發影片並公開發布於 Youtube 。
- 本課程使用的實驗板為 APP-AII MCU 2024，結訓的同學可以獲贈此實驗板，以便做持續的練習並參加比賽



## Part-0 課前基礎知識自習

### ● Microchip Development Environment 簡介

- 參考 MU 課程的複習 (<https://mu.microchip.com/>)

<https://mu.microchip.com/page/development-tools>

- MPLAB X IDE
- MPLAB XC Compiler
- MCC

The image displays five course cards from the MPLAB X IDE development tools section. Each card features a title, a brief description, and a duration. The cards are:

- Introduction To MPLAB® X IDE**: This class covers the basics of the MPLAB X IDE. (Dec 2020) [English and Spanish subtitles available]. Duration: 33 分.
- Introduction to Breakpoints with MPLAB® IDE**: This class covers hardware and software breakpoints which are the most useful of all tools when debugging your code. Duration: 42 分.
- Basics of Developing Microcontroller Applications - Microchip Try**: The Microchip Try platform provides online users the chance to learn the basics of microcontrollers without any hardware. Through a series of interactive applications, you will learn how microcontrollers work and how to create simple applications from start to finish. Duration: 42 分.
- Getting Started with PIC16F1xxx MCUs using MCC and State Machines**: When you complete this class you will be able to create a PIC16F1xxx application from scratch using State Machines, MPLAB® X and MPLAB Code Configurator (MCC). You will be able to configure GPIO, Timer, USART and ADC using MCC. (Nov 2021). Duration: 103 分.
- MPLAB® X Tips & Tricks**: This is a collection of extremely useful tips and tricks that will help you get the most out of MPLAB® X. (Updated Jan 2021). Duration: 95 分.

### ● 針對不同 MCU 的架構介紹及開發課程

<https://mu.microchip.com/page/embedded-system-design>

The image displays five course cards from the embedded system design section. Each card features a title, a brief description, and a duration. The cards are:

- Getting Started with PIC16F1xxx MCUs using MCC and State Machines**: When you complete this class you will be able to create a PIC16F1xxx application from scratch using State Machines, MPLAB® X and MPLAB Code Configurator (MCC). You will be able to configure GPIO, Timer, USART and ADC using MCC. (Nov 2021). Duration: 103 分.
- Creating Unique Digital and Analog Functionality by Interconnecting Core Independent Peripherals (CIPs)**: This class will cover in detail a number of applications that utilize multiple Core Independent Peripherals (CIPs) to simplify the design of different circuits. (Updated Nov 2021). Duration: 123 分.
- 8-bit PIC® MCU Peripheral Deep Dive**: This class presents deep-dive information on the architecture, setup, demonstration and pitfalls of the most common PIC16 and PIC18 peripherals. New chapters will be added as they become available. (Updated Jan 2025). Duration: 322 分.
- AVR Peripheral Deep Dive**: This class presents deep-dive information on the architecture, setup, demonstration and pitfalls of the most common AVR peripherals. More chapters will be added as they become available. (Updated June 2023). Duration: 64 分.
- dsPIC33C Peripheral Deep Dive**: This class presents deep-dive information on the architecture, setup, demonstration and pitfalls of the most common dsPIC33C peripherals. (Updated August 2024). Duration: 133 分.

## Part-1 : MCU 基礎專案訓練 – PIC® MCU and AVR® MCU

- App-All MCU 2024 實驗板介紹及使用方法解說及分享
  - 8-bit MCU : PIC18F57Q43
  - 16-bit MCU : dsPIC33CK256MP505
  - 32-bit MCU : ATSAME51G19A
- PIC18F 系列架構介紹及入門專案分享 (使用 PIC18F57Q43)
  - 在 MPLAB XIDE 下建立專案並利用 MCC Melody 來對使用的 MCU 及各項周邊進行規劃
  - Basic I/O, Timer, 以及 ADC 讀取並使用 UART 將資料由 USB to UART converter MCP2221A 傳至電腦顯示
  - I<sup>2</sup>C : 以 I<sup>2</sup>C 控制 OLED Display , 讀取 MCP9808 溫度 Sensor
  - IoT 應用的暖身 : 藍芽 BLE 應用
    - ◆ 使用 APP Inventor 讓手機透過 BLE module 與你的專案互動
- AVR® MCU 的開發 : 使用 MCC Melody , 利用其 Driver 可共用的特性 , 將 PIC18F57Q43 的 Project 快速轉移至 AVR MCU 正常地執行 ( 選擇性課程內容 )

## Part-2 : Microchip Cortex® M4 系列 MCU 架構及開發練習

- MCC Harmony 專案建立與開發的要點說明
- Harmony PLIB 的應用
  - ◆ Basic IO, Timer (TC/TCC), PWM 的應用
  - ◆ UART, I<sup>2</sup>C, SPI 的規劃練習及應用
- 以 ATSAME51G19A 建立一個小型的應用 (智慧穿戴裝置)
  - ◆ OLED 的顯示練習
  - ◆ KXTJ3 3 軸加速度計
  - ◆ BME280 環境 Sensor – 溫度、濕度、大氣壓力
  - ◆ RNBD451 or RNBD451 藍芽模組
  - ◆ 利用上述主要周邊以及外接模組，完成一個可以顯示時間，溫度並偵測是否跌倒並且主動通知的穿戴式裝置之專案原型

### Part-3：成果驗收專案競賽

- 如果時間允許，將進行以團隊為單位的設計競賽。
- 競賽的平台為 Microchip 與龍華科大合作的自走車平台
- 每一場次取前兩名，將另外提供獎狀及 Microchip 開發工具作為獎項

■ 第二名：MPLAB PICKit-5

■ 第一名：MPLAB ICD5

