European Conference Event Guide

www.microchip.com/eumasters

MICROCHIP'S MASTERs CONFERENCE

24 years of technical training

Welcome to the 5th European MASTERs Conference! Our goal is that after this week you will be equipped to go out and use Microchip products to their full advantage, while in turn helping to make your business even more successful. Learn, network and enjoy your week at MASTERs.

What's Included in the Conference Fee?

- Conference meals, conference classes & digital class material
- Certificate upon completion
- Discounted development tools
- Meals (Dinner, Monday, September 16th through lunch Wednesday, September 18th)

Cost

€470 (+VAT)
Early Registration
June 3rd - July 1st

€520 (+VAT)
Standard Registration
June 2nd - September 9th

*See website for Cancellation, Refund and Transfer Policy

Available Discount Pricing

Early Bird - €470 (+VAT)
Register by July 1st

Group - Cost Varies
Must be from the same company.

Special Requirements

If you have any special dietary requirements or access requirements then please let us know when you register on this website, or as soon as possible thereafter with an email to eumasters.conference@microchip.com. We will do our best to accommodate your needs.

Microchip On-site Office

Have questions about registration, schedules, evening events or classroom locations? Whatever you can't find on our website can be answered by our friendly staff located around the conference or in our on-site Microchip office. Our staff is waiting to help you make the most of your MASTERs Conference experience.

MicrochipDirect

Microchip offers a wide selection of the most popular development tools at discounted prices for MASTERs attendees during the Conference.

Microchip University

We will ensure that class materials, including laboratory manuals, are made accessible in a restricted MASTERs catalog prior to the conference to facilitate your preparation for attendance. It is recommended that you carry a printed copy of the lab manual for the courses you intend to register for.

Waiver

Microchip reserves the right to refuse registration or entry to anyone for any reason. Microchip is dedicated to providing a friendly and educational conference experience for everyone.

Photography Waiver

Microchip may elect to take photographs or video of people and events during the MASTERs Conference. By attending this MASTERs Conference, you agree to permit Microchip to use your likeness in these photos and videos in furtherance of its business. This Release indicates that you agree that Microchip shall be the copyright owner of the photographs and video and may use and publish these photographs/videos. Microchip is released from any and all claims and causes of action that you may have now or in the future based upon or in connection with the photographs/videos and Microchip's use of the photographs/videos in any manner. All rights granted to Microchip by you in this Release are irrevocable and perpetual. You waive all rights to any equitable relief in connection with this Release and the subject matter of this Release.

CONFERENCE AGENDA

Monday, September 16th, 2024

Registration	11:00 - 13:00
Class Session 1	13:00 - 14:45
Break	14:45 - 15:00
Class Session 2	15:00 - 16:45
BBQ & Chat with Experts	17:00 - 20:00

Tuesday, September 17th, 2024

Class Session 3	08:00 - 09:45
Break	09:45 - 10:00
Class Session 4	10:00 - 11:45
Lunch	12:00 - 13:00
Class Session 5	13:00 - 14:45
Break	14:45 - 15:00
Class Session 6	15:00 - 16:45
Boat to Spreespeicher	17:00 - 18:00
Experts Evening at Spreespeicher	18:00 - 21:00

Wednesday, September 18th, 2024

Class Session 7	08:00 - 09:45
Break	09:45 - 10:00
Class Session 8	10:00 - 11:45
Lunch	12:00 - 13:00
Class Session 9	13:00 - 14:45
Break	14:45 - 15:00
Class Session 10	15:00 - 16:45
End of Conference	17:00

2½ DAYS OF TRAINING

September 16th- 18th, 2024

Check-in

For attendees participating in MASTERs, registration will take place on:

Monday, September 16th, 11:00 - 13:00
(Registration Desk in the HTW Lobby)

Classes

Begin on Monday, September 16th at 13:00

Conference Meals

All attendee meals for Monday-Wednesday are included in the cost. Meals include dinner on Monday, September 16th through lunch on Wednesday, September18th.

EVENING EVENTS

BBQ & Chat with Experts

Please join us for a barbecue on Monday evening, which will be held in a casual setting at the HTW Building G, adjacent to the River Spree. This will be an excellent opportunity to engage with our team of experts who will be available for discussions.

Experts Evening at the Spreespeicher

Join us for an exclusive Experts Evening at the prestigious Spreespeicher Event Location, situated near the Oberbaumbrücke in Berlin, on Tuesday from 18:00 to 21:00. We cordially invite all our registered MASTERs participants and presenters to embark on a brief boat jouney to the venue, where you can enjoy an evening of networking and camaraderie.

This is the key evening event during the conference, a senior Microchip executive will provide a keynote speech.

This event presents an unparalleled opportunity to engage with conference attendees in person, Microchip and selected partners will showcase products and technologies and provide live demonstrations.

LOCATION

HTW - University of Applied Sciences - Berlin, Germany

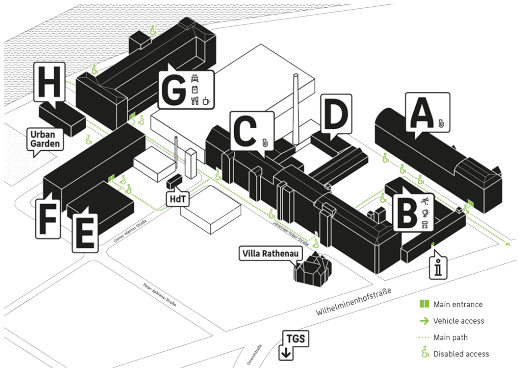
Location

This event will be held at HTW Berlin, University of Applied Sciences at their Wilhelminenhof Campus.

With a student body of more than 13,000, the Hochschule für Technik und Wirtschaft (HTW) Berlin is the largest University of Applied Sciences in the City. With around 70 Bachelor's and Master's courses in Engineering, Economics, Information Technology, Culture and Design the study programme offers a wide range. The compact studies of applied sciences leads towards professional practice. Degree courses can be supplemented by instruction in foreign languages and key skills. University rankings have consistently established HTW as one of the leading providers of a modern and professional education.

http://www.htw-berlin/de/en

Microchip MASTERs will be located in buildings F, G & H



About HTW Berlin

The Hochschule für Technik und Wirtschaft HTW is located in one of the most important industrial quarters of Berlin.

This district was one of Berlin's first industrial centers, the site of the former cable factory of the Kabelwerk Oberspree. There, the workers manufactured cables, assembled cars and designed transmitters. They were decisive in giving the city its reputation as an electric city.

At the end of the 19th century AEG, the Allgemeine Elektricitäts Gesellschaft or literally the General Electricity Company, one of the first companies in the electrical industry, took over the complex and within just a few decades would play a decisive role in advancing the electrification of society.

Every day, thousands of workers arrived by tram and flocked into the tightly packed factories that were clad in yellow clinker stone and lined Wilhelminenhofstrasse. Now in the 21st century this area has been through a period of regeneration and today, mostly you will find students disembarking from the trams, heading for the yellow-bricked buildings on the University Campus.

Spreespeicher Berlin

The noble oak flooring together with the existing old brickwork of the former granary creates an uniquely industrial charm. The beautiful loft windows lead to an exclusive sun deck and offer a magnificent view of the Spree. Several rooms will be connected through moving glass panels hosting our Experts Evening combining an Exhibition with a Dinner.

TRAVEL & ACCOMODATION

Accommodation

Overnight Accommodation is NOT INCLUDED in the Conference Fee.

You will find a wide range of hotels nearby if you use one of the common booking systems:
www.hrs.com
www.hotels.com
www.booking.com

Enter Berlin Köpenick or Koepenick as the travel destination.

Airport Information

BER Flughafen Berlin Brandenburg is about16km away.
https://ber.berlin-airport.de/en.html

Public Transportation

Tramway Stop Rathenaustr./ HTW
Lines 21, 27, 63, 67, M17
http://www.bvg.de/en

Taxi or Car

Wilhelminenhofstraße 75A, 12459 Berlin
Navigation: Ernst Ziesel Straße, Berlin

2024 MASTERs CONFERENCE CLASS LIST

Class	Title	Abstract	Slots	Tech Level	Type	Prerequisites
Products And Peripherals						
24001 PNP1 LECTURE	Microchip Is... Microcontroller, Microprocessor, Memory and FPGA products	Curious about the advanced features and applications of our latest MCUs and MPUs? Interested in a brief overview of our cutting-edge memory products and their role in various applications? Eager to gain insight into the flexibility and scalability offered by our FPGA innovations? This session will provide a high-level understanding of our latest and upcoming products. We'll cover everything from advanced PIC® and AVR® MCUs to sophisticated dsPIC® Digital Signal Controllers (DSCs), SAM MCUs, and MPUs and also delve into Memory Products and FPGAs. Attendees will receive a broad understanding of our latest products across multiple technology domains and a high-level insight into potential integration opportunities and applications in their projects. It's an opportunity to broaden your understanding and explore the possibilities these innovations bring.	1	1	New	None
24002 PNP2 & PNP3 LECTURE	Microchip Is… Analog, Power, Silicon Carbide, Discrete, Timing and Power over Ethernet Products, Security, Wireless, Wired and Touch Products	This class provides an overview of Microchip's latest Analog, Power, Silicon Carbide, Discrete, Timing and Power over Ethernet products. Attendees will receive a broad understanding of our latest products across multiple technology domains and a high-level insight into potential integration opportunities and applications in their projects. Also provided is an overview of Microchip's latest security, touch and connectivity products, both wireless and wired. Attendees will receive an introduction to new features, new technologies and new products from Microchip.	1	1	New	None
24004 PNP4 LECTURE	Introduction to dsPIC33A Architecture	This class introduces the features and architecture of the dsPIC33A family of devices. Content includes core features and use of select peripherals including 40 MPSP ADC, floating point unit, and high resolution PWM. Differences and advantages from earlier dsPIC33 devices are presented along with application examples. Attendees will gain understanding of the dsPIC33A family of devices and their capabilities.	1	1	New	None
24005 PNP5 DEMO	Signal Acquisition and Processing using the new dsPIC33A Floating Point Digital Signal Controller (DSC)	In this class you will see and experience the latest innovations in a new 200 MHz DSC including double precision floating point unit, 32-bit instruction and data paths with dual 72-bit accumulators together with a suite of fast peripherals designed to accelerate your real-time applications. This class will explore fast signal acquisition and related signal processing in a new and robust manner with Microchip's latest dsPIC® DSC family of devices. Material included will utilize this device for a rudimentary digital storage oscilloscope and then process these input into the frequency domain using FFTs using this processor core.	1	2	New	Introduction to the dsPCI33A recommended

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2 Basic knowledge of the topic is necessary
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24006 PNP6 **Hands-On**	Unlocking the Power of the SAM M0+, M23, and M4 Arm Microcontroller Architecture and Peripherals	Do you want to be able to quickly write code for an Arm-based 32-bit microcontroller to get your proof-of-concept designs running in less than one day, even if you have not previously used an ARM based device? This course offers a quick-start guide to coding for Microchip Arm® Cortex® 32-bit microcontrollers, including M0+, M23, and M4 microcontrollers. It is designed to expedite the development process of embedded Arm-based projects, even for those unfamiliar with Arm-based devices. The course covers a wide range of topics, including SAM system architecture, communication buses, clock synchronization, compiler register access, port and pin control, and interrupts. Practical application is provided through hands-on labs using the Microchip MPLAB® Code Configurator (MCC) and MPLAB Harmony, ATSAME54 M4 microcontroller, and MPLAB X Integrated Development Environment (IDE). Attendees should have some experience with C programming for embedded microcontrollers. This is not a detailed course on Arm Cortex hardware architecture, but it does cover the basics.	1	2	New	The clients should have a basic understanding of MCC and MPLAB Harmony. They should also have a working knowledge of C programming.
24008 PNP8 **Hands-On**	Meet the Configurable Logic Block - Microcontroller With Programmable Logic Combining the Best of Both Worlds	Do you want to implement a logic circuit in your application without adding extra parts? Are you curious about the flexibility provided by the Configurable Logic Block (CLB) on creating custom peripherals and protocols? This class will teach how to enhance applications with complex logic designs using the new PIC peripheral – Configurable Logic Block. This will include a quick run through the advantages of the CLB environment by deep-diving into some typical use-cases. Hands on labs will provide opportunities to practice:	1	2	New	Basic knowledge of combinational and sequential logic Basic knowledge of C programming language Familiarity with MPLAB X IDE and MPLAB Code Configurator (MCC) Melody.
24009 PNP9 DEMO	Introducing PolarFire® SoC FPGAs - the First System-on-Chip FPGA With a Deterministic, Coherent RISC-V CPU Cluster	This class will introduce the low power, robust security and thermal efficient PolarFire SoC FPGAs with integrated coherent and deterministic 64-bit RISC-V CPU cluster, peripherals and deterministic L2 memory subsystem for creating Linux® and real-time (RTOS) applications. The instructor led demo will demonstrate the FPGA Libero® SoC tools design flow, PolarFire SoC features, and running applications on the PolarFire SoC Icicle kit.	1	2	New	Attendees registering for this course should be familiar with Microchip's PolarFire FPGA family or review the Microchip University "Hello FPGA" or "Using Microchip PolarFire FPGAs in Low Power Applications" courses on the Microchip University site.
24010 PNP10 DEMO	Understand the Importance of Clock Precision and Stability, and How to Achieve It Using a Mems-Based Clock Generator	The importance of clock precision and stability in various applications is emphasized, with a focus on the use of StarLite™ (DSC50x), a MEMS-based clock generator, as a replacement for multiple crystal oscillators. The benefits of using StarLite, which can output multiple clock signals, are highlighted through a side-by-side comparison with six different crystal oscillators. The discussion also covers the use of the multi-output, multi-format, and multi-frequency MEMS-based generator in a subsystem. The concept of clock stability is introduced, with an understanding of phase noise and ADEV. The use of Microchip Technology's 53100A Phase Noise Analyzer to measure and interpret these metrics is discussed, along with their relevance to various applications like radar and communications. The session concludes with a comparison of the stability metrics of various DSC50x outputs.	1	2	New	None

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Dev Tools						
24011 DEV1 **Hands-On**	Next Generation MPLAB IDE	The next generation MPLAB IDE is based on Visual Studio Code® and Eclipse Theia™, providing existing VS Code users with a familiar development environment. This class will provide a hands-on experience on how to use the VSLABX (MPLABX Extension) for VS Code to create, build and debug embedded applications.	1	2	New	Attendees registering for this class should have basic embedded application development skills. C programming skills are necessary, as we will be using C code projects.
24012 DEV2 **Hands-On**	Run Time debugging, verification and application tuning using the Data Visualizer Run Time (DVRT)	Does your application seem to work, when debugging with breakpoints, but something is just not quite right when it runs? Wouldn't you like the ability to look at, plot or update application variables at run time? The Data Visualizer Run Time (DVRT) solves this problem and is a highly effective tool for application debugging, verification and tuning. In this class you will examine various practical use cases where the DVRT is particularly effective. Compare functionality between Data Streamer protocol and the DVRT protocol. Learn how to view, visualize and update variables and MCU special function registers at run-time, including tips and tricks when using different MCU architectures. Explore support for both MCC Melody and MPLAB Harmony, and take a deep dive into using DVRT with MCC Melody.	1	1	New	The Visual Debugging with MPLAB Data Visualizer course on MU will give attendees an overview of the MPLAB Data Visualizer and its capabilities, which would beneficial.
24013 DEV3 DEMO	Advanced Debugging Techniques Using MPLAB X IDE and MPLAB XC Compilers	Have you ever been frustrated with debugging your embedded code? Have you ever spent days or weeks trying to track down an intermittent bug in your project? Would you like to learn more about the free useful debug tools that Microchip has to offer, which can save you time and frustration when going through the debug phase of your embedded code design? This class will go over many of the advanced features of our compilers and tools. Through Instructor lead labs, we will cover: MPLAB XC Compiler tips and tricks, such as the C Startup, placing a function/variable at a given memory location, and using traps.c to debug code which has caused a trap interrupt Tools such as the Call Graph, Stack Guidance, Call Stack, Compiler Advisor, and Code Coverage The latest tool enhancements such as Live Connect, SWO (Single Wire Output) ITM (Instrumentation Trace Macrocell) support for the Arm Cortex-M7 and Cortex-M4 families, and console debug support using sprintf.	1	2	New	Familiarity with MPLAB X IDE
24014 DEV4 DEMO	Automated Build and Test System with MPLAB X IDE and MPLAB XC Compilers	How to set up an automated build and test system using MPLAB X IDE and MPLAB XC Compilers and Git source repository. The CICD wizard in MPLAB X IDE will be used to generate tailored scripts for automation. This will help you improve your code quality by continuously validating code changes to get fast feedback and catch bugs earlier. In this course we will create a Jenkins build and test pipeline setup. We will use Docker containers to get consistency, scalability and portability in the build and test setup. We will show how HW-in-the-loop testing can be done when using Docker containers.	1	1	New	None

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Firmware Design and Compilers						
24015 FRM1 Hands-On	Using Object Oriented C Principles to Make Your C Code Efficient and Portable	Have you ever wanted to make your code more portable and easier to maintain? Have you ever wanted to make your code easier to modify when new features are requested? If so, this class will show you how to move from procedural coding to object-oriented programming (OOP) using embedded C. You will see how encapsulation, inheritance, and polymorphism can take your embedded code to new levels. Object-oriented constructs that you see in languages like C++ and Python are created in C to give your projects the best of both procedural programming and OOP constructs. Many object-oriented principles will be covered, including virtual pointer tables, data abstraction, void pointers, opaque pointers, class and object constructors, and dynamic vs. static memory allocation. Your overall thinking about embedded firmware will be challenged with the topics discussed in this class. You will run instructor-led labs using MPLAB X IDE that clearly demonstrate these OOP principles. A sensor class will be demonstrated using external sensors to show an actual application. This class is an advanced C class, and you should have a thorough understanding of C programming and function pointers.	2	4	New	Attendees registering for this class should have a thorough knowledge of embedded C programming, including advanced structures and function pointers.
24016 FRM2 Hands-On	Advanced Embedded C Programming Tricks and Cautions to Keep Your Code from Crashing	Are you tired of trying to find firmware bugs, and then find that you were not writing correct C code? This course aims to enhance your C programming skills by addressing common issues such as firmware bugs, unexpected large memory usage, and incorrect compiler operation assumptions. It will provide insights into common mistakes made by programmers, such as confusion in variable comparisons, neglect of implicit conversions and sequence points, misuse of variable type mixing and macros, and ignoring code side effects. The course will also introduce concepts to reduce code size and improve readability, including using floating point math without hardware floating point units or firmware libraries. Instructor-led labs will use MPLAB X IDE to demonstrate many of these topics. The material assumes familiarity with fundamental embedded C programming concepts.	1	2	New	The attendee must have a good understanding of embedded C programming.
24017 FRM3 DEMO	Build better prototypes in less time with MCC Melody	Have you struggled to use example snippets to build up application functionality, but can't find an easy way to make them work together? Do you just want a simple blocking implementation to show that something works, but all the examples are too integrated and complex? Or the opposite, you have a basic structure of your application in place, so can't use any blocking code. This class covers how to quickly build up application functionality, using MCC Melody example building blocks. An overview is given of the MCC Melody Design Patterns for Control Flow. Then an example application is put together, showing how various example building blocks, of a given implementation, can be used together, to build up more interesting functionality.	1	2	New	Recommend going through (at least part of) either one of the following MU classes: - MCC Melody API Reference for AVR MCUs - MCC Melody API Reference for PIC MCUs

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24018 FRM4 Hands-On	Creating Bare Metal and RTOS based Applications for 32-bit MCUs/MPUs with few easy steps using MPLAB Harmony	MPLAB Harmony v3 provides graphical tools and easy to understand peripheral libraries that simplify the use of Microchip's 32-bit microcontrollers and microprocessors. In this hands-on class, you will learn to navigate and manage project settings with MPLAB Code Configurator (MCC), set up and configure peripherals, and generate optimized code tailored to your requirements, which is automatically integrated into new or existing embedded projects. MPLAB Harmony is a modular framework that provides inter-operable firmware libraries for 32-bit microcontroller and microprocessor application development. This class shows how you can develop RTOS based applications using the MPLAB Harmony drivers, system services and middleware in a few easy steps. Learn how to leverage the MPLAB Harmony power to quickly develop an embedded application and get your project off the ground in minimal time!	2	2	Updated	Attendees registering for this class should have a basic understanding of C language programming for SAM/PIC32 systems using Microchip's MPLAB X IDE, debugger, and GCC language tools.
24019 FRM5 DEMO	Microchip Device Firmware Update Ecosystem / Bootloader Client	Many embedded system designs require a mechanism for updating processor firmware using standard communications busses (i.e., UART, I2C, SPI, …). Microchip has developed a device firmware update protocol and host ecosystem which uses a file transfer approach to update firmware. This class will provide an overview of the Microchip Device Firmware Update ecosystem and protocol. Instructor led labs will demonstrate how to update a client processor's firmware and execute that client firmware using a client bootloader.	1	2	New	Attendees registering for this class should have a basic understanding of firmware updates and bootloaders.
24020 FRM6 DEMO	Getting Started with Zephyr® OS and Microchip devices	Zephyr OS is an open source RTOS targeted towards embedded systems that includes community support for many Microchip development boards. This class will introduce an engineer to the coding environment, SDK, and debug tools available within the Zephyr OS Ecosystem. Using hands-on examples, the engineer will gain experience with useful OS primitives and tasks, explore the hardware's Device Tree, build and deploy to target hardware (as well as QEMU emulated hardware), and use twister to create a unit test suite to catch potential code defects.	1	2	New	Attendees registering for this class should have previous knowledge of RTOS fundamentals in embedded systems.
Linux						
24024 LNX4 Hands-On	Securing Over the Air Updates in Linux	Are you concerned about regulations requiring deploying updates safely and securely? Do you feel like you don't know where to start? In this class you will learn the concepts of how OTA updates with SWUpdate work from both a client and server perspective. You will see how important security is to the OTA update ecosystem and learn how to implement a solution using secure TLS authentication with a secure element protected key. You will deploy a full image OTA update and a delta update to an embedded Linux target running on a Microchip development board using the Eclipse hawkBit™ management console.	2	2	New	Working knowledge of Linux
Application Design						
24025 APD1 DEMO	Low Power Microcontroller Design	Techniques / Application Example	1	2	New	None

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24026 APD2 **Hands-On**	Analog MCU cookbook: Design Examples exploiting Advanced Integrated Analog MCU features	Low power microcontrollers offer a number of operating modes, power management systems, and techniques for reducing system power consumption including: -Microcontroller sleep modes -Automatic clock request systems -Power domains / regulator selection -Core independent peripheral operation -Inter peripheral communication / triggering The class starts with an active mode light sensor application example (no low power techniques utilized) and progressively applies microcontroller sleep modes, power management systems, and peripheral automation of tasks to reduce the power consumption. Attendees will observe the reduction in power consumption obtained from utilizing low power techniques in the instructor led labs.	1	2	New	None
24027 APD3 **Hands-On**	Microchip Graphics Suite (MGS) Remastered	This two-hour course covers the Microchip Graphics Suite, focusing on the MGS Harmony Desktop Emulator, and MGS Harmony Web Simulator. The first part provides a hands-on guide to the MGS Composer, exploring its redesigned interface and features for creating professional embedded GUIs. Students will learn to create widgets like images, text, and buttons. The second part introduces the MGS Harmony Desktop Emulator and Web Simulator tools, detailing their use in graphics creation and their role in enhancing the GUI development process. By the end, attendees will understand how to use the MGS tools to create industry-standard embedded GUIs.	1	3	New	Attendees registering for this class should have viewed Getting Started with a New Harmony Graphics Application (https://mu.microchip.com/getting-started-with-a-new-harmony-graphics-application) and should have familiarized themselves with the MPLAB Harmony Graphics Suite (MHGS) (https://www.microchip.com/en-us/tools-resources/configure/mplab-harmony/graphics-suite).
24028 APD4 **Hands-On**	Shining a light on Artificial Intelligence/Machine Learning (AIML)	Are you intrigued or concerned by the possibilities of artificial intelligence? Whilst we are not going to attempt to build the next Terminator, this class will take a journey through artificial intelligence and machine learning and how you can use it in a simple classification application. We will begin by looking at the perceived benefits of AIML and apply it to a simple case study where we teach the microcontroller to detect what sort of light is shining on a sensor. We will cover techniques for capturing and processing the sampled signals on a typical microcontroller and the factors that you should consider in your design. Having captured the data, attendees will have the opportunity to use the Microchip MPLAB Machine Learning Development Suite to process it and build a ML model able to discriminate between the various modes of a light source. You will then get the opportunity to test your model on hardware and evaluate its performance under real conditions. Once completed, attendees will be able to add artificial intelligence to their own designs, "I'll be back"……..	2	2	New	None

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24029 APD5 DEMO	Smart Embedded Vision AI, with real-time object detection using Microchip's FPGAs VectorBlox™ Accelerator Software Development Kit (SDK)	Are you interested in higher performance and low power inference of Artificial Intelligence (AI) models such as classification, object detection, pose estimation, or multiple model tasks such as facial recognition, and license plate recognition? The class will show the fundamentals of the SDK that target the most power-efficient FPGA-based Convolutional Neural Network (CNN)-based Artificial Intelligence/ Machine Learning inference accelerator with PolarFire SoC FPGAs and PolarFire. The instructor will lead demos showcasing: • The fundamentals of the SDK and solution. • Show download, configure, and steps to use the SDK. • Show the import of models, optimize, compile, and run networks runtime objects generated in the SDK on a PolarFire SoC Video Kit	1	2	New	Basic Knowledge of Artificial Intelligence/ Machine learning is recommended
24030 APD6 & APD 7 DEMO	Intelligent embedded video capturing, processing and streaming using H.264 Video Compression pipeline on PolarFire SoC FPGA Implementing Multiple Embedded Applications on a Single CPU Cluster using PolarFire SoC FPGA in Asymmetric Multi Processing (AMP) Mode	This class will explain the basics of MIPI® CSI-2® image sensor interface, image processing, H.264 compression, and streaming encoded video over Ethernet. An intelligent Ethernet camera implementation with H.264 compression will be demonstrated using embedded vision application. An instructor-led demo along with a live video streaming demo that will show: • A typical video pipeline is implemented on FPGA • Demonstration of a real-world implementation of H.264 compression • Explanation of the H.264 Software Stack showing WebUI flow utilizing Linux Software on PolarFire SoC FPGA The second portion of this class will explain and demonstrate the setup and implementation of independent embedded applications on Microchip PolarFire SoC FPGA 64-bit RISC-V CPU cluster. One deterministic bare metal / Real Time Operating System (RTOS) running as one context and the Linux operating system running as the second context. Both systems run on the same CPU cluster but are completely independent. This class will also show the advantages of using Asymmetric Multi Processing (AMP) and how it can be used to potentially improve system performance, reliability, safety and security.	1	2	New	The attendees can attend the webcast Intro to Smart Embedded Vision (SEV) using a PolarFire FPGA available at https://event.on24.com/wcc/r/3141845/
24032 APD8 DEMO	From concept to prototype design expansion using mikroBUS™ Click boards™ with Microchip FPGAs as base	Want to find out how easy it is to expand your design and create a development environment to take your idea from concept to prototype using mikroBUS Click boards with a Microchip FPGA base board? This class will show Microchip based mikroBUS Click boards or Add-On boards along with a Microchip FPGA base board to utilize and expand your design. You will learn the basics of enabling / adding a peripheral controller to an FPGA fabric, connecting I/Os and writing embedded software to access registers on a device.	1	2	New	None

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2024 MASTERs CONFERENCE CLASS LIST

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Functional Safety						
24033 FS1 DEMO	Functional Safety Introduction and Architecture	Functional safety standards have been developed and adopted in many markets. From automotive to nuclear power, functional safety is changing the way we develop systems. This class provide a brief introduction to functional safety and focus on developing a system architecture that can meet functional safety requirements. Through hands-on safety analysis we will show that the architecture we develop can meet the required safety integrity level and provide a launch to the next level of hardware and software development.	1	1	New	None
24034 FS2 DEMO	Functional Safety Hardware and Software Development	Functional safety standards have been developed and adopted in many markets. From automotive to nuclear power, functional safety is changing the way we develop systems. This class builds on the Functional Safety Introduction and Architecture class and delves deeper into product development at the hardware and software level with a functional safety focus. We will ensure the hardware meets the architectural requirements and that required safety diagnostic are implemented in software. We will use Microchip's functional safety libraries to provide diagnostic coverage and ensure that we achieved the required safety integrity level with a final safety analysis.	1	2	New	Recommend FS1 class
Human Interface: Touch & Gesture						
24035 HIF1 DEMO	Innovations in Capacitive Touch: Buttons, Sliders, Touchpads, Touch Screens and Proximity Sensing.	What is possible with capacitive touch these days? Will I be able to sense a full keypad with low power? How speedy can my small touch pads become? What are my options for integrating a touchscreen into my system? Can I easily accommodate safety certification requirements? Can I easily add a capacitive touch interface into my existing system design? Which tools will I need and where do I find guidance/help to use them? Microchip's portfolio of touch solutions can address more challenging applications than ever before. In this lecture and live demo class, we will provide answers to all these questions and more as we guide you through creating a stellar user experience with Microchip capacitive touch solutions.	1	1	New	While no prerequisites are technically required, it would be helpful to have a working knowledge of capacitive touch interfaces.
24036 HIF2 DEMO	Creating and Tuning a Capacitive Touch Project for Reliable Operation Using Data Visualizer	Today's electronic gadgets are expected to provide users with the same touch experience they have with the average cell phone. To this end, Microchip has developed highly functional MCUs with integrated peripherals that provide that experience. The Microchip Touch Library demonstrates the highest configurability, sensitivity, and noise immunity required for these applications. In this laboratory class, the student will create a touch project using MPLAB X IDE and MCC Harmony Code Configurator. The student will then experience the touch tuning process using MPLAB Data Visualizer and its two-way communication capabilities, the student will learn how to interactively characterize and tune the touch system for sensitivity and application tuning. Additionally, the student will use a noise generator to see the impact of noise countermeasure tuning in real-time on the MPLAB Data Visualizer. Join us in learning how easy it really is.	1	2	Updated	Guide to Tuning Touch Sensors - Developer Help (microchipdeveloper.com) https://microchipdeveloper.com/xwiki/bin/view/applications/touch-gesture/start-qtouch-capacitive-sensing-library/design-guides/sensor-tuning-guide/

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Networking						
24037 NET1 **Hands-On**	Unlocking the Potential of 10BASE-T1S: A Comprehensive Guide to Understanding, Developing and Evaluating Single Pair Ethernet with MCC Harmony for Automotive and Industrial Networking	Time to put your hands-on the new 10BASE-T1S technology! Do you need to add 10BASE-T1S connectivity to your industrial or automotive application? Do you want to learn more about 10BASE-T1S and the brand-new media access method PLCA (physical layer collision avoidance) offering maximum bandwidth utilization? After attending this class you will understand the important features of the 10Base-T1S standard and how it compares to other legacy and wired Ethernet interfaces, as well as the key design considerations for replacing legacy field bus solutions in order to realize the benefits of migrating legacy Information and Operation Technology buses to 10BASE-T1S. Learn that the 10Base-T1S standard offers support for Precision Time Protocol, Time Sensitive Networks, Wake and Sleep, Network Discovery…and in the future Remote Control and Layer-2 Security that are still being standardized. This class will teach you how to configure PLCA network parameters, and how to setup a physical 10BASE-T1S network using MPLAB X IDE and MCC Harmony microcontroller boards, and the latest LAN867x/5x PHYs and MAC-PHYs for 10BASE-T1S. Examine and explain the effects of different network configurations on the available bandwidth and communication.	2	2	New	None
24038 NET2 DEMO	Developing your first managed Ethernet switch. A hands-on introduction to Linux Switchdev and an overview of switch operating systems.	Developing a managed Ethernet switch can be achieved either by bare metal programming, using Linux Switchdev or a commercial off-the-shelf operating system. Switchdev is a suite of Linux tools which allows offloading the task of data forwarding from the host CPU to the switch ASIC itself. This class will introduce the concepts of adding IP addresses to devices, bridging and an introduction to VLANs and implementing them with Switchdev. This part of the class will be hands-on using the LAN9662 evaluation tools. The class will also demonstrate the implementation of the PTP4L Precision Time Protocol stack on the LAN9662 and introduce bringing up a device as an IEEE1588 synchronized device and demonstrate timing accuracy between networked devices. Additional freely available software libraries will also be introduced to further expand the use of Switchdev, time and Linux to build the feature set of a switch. Finally the class will give an overview of a switch operating system (IStaX) and a pragmatic overview of where each of the solutions may offer the most technically and commercially viable solution based on the requirements of the switch design.	1	1	New	None
24039 NET3 DEMO	Harnessing the Power of PCI Express® (PCIe®) in Embedded Systems	Within embedded systems there is a growing trend to streamline processors by reducing the different I/O available. Throughout this, PCIe, a high-speed, adaptable, and scalable interface for linking peripheral devices, remains a constant. This interface can extend an embedded host's I/O capabilities. This course will guide you on the fundamentals of PCIe and then dive into more detail on adjusting the runtime parameters of a connected PCIe device, such as link speed/width and power management, hot-swapping PCIe devices in an embedded system, and utilizing PCIe bridges to expand the I/O capabilities of an embedded system.	1	1	New	None

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24064 NET4 DEMO	Time-Sensitive Networking supporting the IT and OT convergeance by extending existing Ethernet standards.	TSN (Time-Sensitive Networking) is a set of Ethernet sub-standards that aim to converge IT and OT by extending existing Ethernet standards. It provides guaranteed latency times for real-time critical data, allows for the transmission of critical and non-critical data over a converged network, and eliminates vendor dependence. TSN is implemented through core elements such as time synchronization and traffic shaping mechanisms. It can be integrated using a TSN IP Core on an FPGA basis, offering flexibility and programmability. TSN networks achieve their full potential when all components are TSN compatible.	1	2	New	None
Security/Encription						
24040 SEC1 DEMO	Crypto Primer: Everything you ever wanted to know about Cryptography; the Why and How.	Curious about the secrets of cryptographic security in the digital realm? Our "Crypto Primer" class is just the adventure you need. Imagine delving into the world of digital security, starting with the crucial role of security and the significance of microchips in protecting our digital treasures. Picture yourself uncovering the mysteries of private keys and navigating through the labyrinth of cryptographic principles, algorithms, and technologies. Demos will bring to life the concepts of data integrity, confidentiality, and authentication, along with a certificate-based TLS connection. This journey concludes with advanced explorations and demos in secure boot processes and firmware upgrades, equipping you to safeguard your digital realm. So, are you ready to unlock the secrets of cryptography?	1	1	Updated	None
24042 SEC3 DEMO	IoT device in-field provisioning and dynamic remote management of your PKI with keySTREAM™ Software as a Service (SaaS)from Kudelski IoT and ECC608	Embark on a journey into IoT security with our class on in-field provisioning and dynamic remote management using keySTREAM SaaS and ECC608. This course tackles the challenges of setting up and managing a cost-effective, production-grade PKI, and updating cryptographic credentials in a vast IoT fleet. Learn to effortlessly establish robust PKI policies and integrate keySTREAM key management into embedded systems. The class splits into two parts: theoretical concepts with transaction diagrams between keySTREAM SaaS and ECC608, followed by a hands-on session utilizing keySTREAM SaaS for PKI provisioning, certificate management, and key lifecycle events using the latest IoT tools. This course is your guide to mastering scalable and secure IoT device management.	1	2	New	https://mu.microchip.com/cryptography-primer https://mu.microchip.com/trust-platform-design-suite-v2-introduction https://mu.microchip.com/securely-connecting-to-aws-iot-core-with-the-atecc608b-course-in-development
24043 SEC4 Hands-On	Authenticate and securely start your application (Secure Boot) on Microchip's 32-bit MCUs	By the end of this hands-on class the attendee will understand the process of creating a Public/Private key pair using Microchip's security tools, Provisioning the public key to the device and using the Private key to sign an application and enable the secure boot functionality of the device.This class will demonstrate how to perform secure boot on different 32-bit architectures.	2	2	New	Attendees registering for this class should have basic knowledge of how to use MPLAB development ecosystem (IDE, Compiler and Debugger)

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24044 SEC5 LECTURE	Are you ready for the Cyber Regulatory freight train? – Designing for Global CyberSecurity Regulations.	Cyber security is now a critical part of product design. This is driven by market need and will be enforced by product legislation across the world. Designing a product to meet these requirements can be a daunting task as it requires many changes to how we think, what we deliver and how we maintain a product over it's lifecycle. It is imperative that security is considered from the outset of product design but it is key to understand that security is a whole of business risk rather than 'just' a problem for engineering and IS to solve. It affects everyone in the business and all have a role to play. If you want to understand the tangled web of global cyber regulations, understand about different attack and defence scenarios, learn about threat modelling, software bill of materials (SBOM), product security incident response team (PSIRT), Software Composition Analysis, Key management and bunch of other terms you may never have heard of. Plus, how Microchip can help you gain compliance, reduce your development burden and company risk then this class is for you.This is an interactive lecture and hands-on group exercise based class with demos and (hopefully) discussion.	1	1	New	Attendees registering for this class should have... an open mind.
Internet of Things (IoT)						
24045 IoT1 DEMO	Multi-Protocol Sensor Network using Bluetooth® Low Energy and 802.15.4	Ever wonder how to connect a wireless sensor to your phone via BLE? How about multiple sensor nodes in a wireless network? In this class, we will build a complete plant health sensor monitoring system that interfaces with a smart phone over BLE and to a wireless data gateway. The class will make use of Microchips multiprotocol wireless solutions to create a data link from the sensors to the connected smartphone app and a data gateway. Students will have opportunities to practice: • Developing an application using wireless building blocks in code • Reading and transmitting key sensor values • Adding a second protocol to the wireless system • Reading and transmitting key sensor values to a wireless gateway over a separate protocol. • Further Development if you also are interested in extending this functionality using a cloud service, consider coming by the wireless booth at ask the experts to see more demos	1	1	New	None

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24046 IoT2 DEMO	WiFi IOT made simple with new Revised Native Wi-Fi (RNWF)	Are you overwhelmed at the complexity required to connect a sensor to your cloud application? Simplify the task by eliminating the complicated stack development process. Connect your application to a Microchip network controller and accelerate your design using our AT command solution.In this class we will use the new RNWF modules and their cloud-friendly AT command set. Using just five simple AT+CMD to connect to a Secure Access Point (AP), six AT+CMD to securely connect over TLS to an MQTT Cloud broker (Amazon Web Services (AWS) IoT, Microsoft Azure, or Eclipse Mosquitto™), and just a couple more commands to exchange data with MQTT brokers.The beginning of the class will show easy techniques to explore the features of RNWF modules. After we cover the basics, we will show how to connect an 8-bit embedded device to AWS IoT and exchange data using MQTT.	1	1	New	None
24047 IoT3 DEMO	Rapid Prototyping of IoT Solutions using MicroPython	Have you considered MicroPython for your next wireless design? In this class we demonstrate how to integrate the MicroPython (by Python) MPLAB Harmony middleware component in a Microchip 32 bit MCU. A full wireless IOT cloud application will be developed using MicroPython. By the end of the class you will be able to build and see your data on a cloud system. The hands on labs will provide opportunities to practice setting up the micro python, hardware and software development environment, reading and transmitting a simple sensor value to a cloud as well as receiving control commands via the cloud. If you are interested in extending this functionality, come by the wireless table in the Ask-the-Experts area to see some more advanced demos.	1	1	New	None
Analog and Mixed Signal						
24048 AMS1 DEMO	Mitigate signal noise and improve analog system precision using simulation techniques	Got noise in your signal? Having a hard time choosing the correct signal conditioning topology? Do you want to increase the accuracy and precision in your system? Then this hands-on class is for you. Together, we will use the MPLAB Mindi™ analog simulator tool for making design decisions.	1	2	New	Working knowledge of MPLAB Mindi analog simulator (or similar tools) and familiarity with its analysis tools. The following Microchip University classes are extremely helpful in preparing for this class 1. Mindi Analog Simulator Applications 2. Mastering Analog Simulations Using the MPLAB Mindi Analog Simulator

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24049 AMS2 DEMO	Small signal processing for medical and consumer (VR/gaming) applications, an experimental approach.	Are you interested in learning how myoelectric control for smart prosthetics or VR/gaming works? Do you want to assemble and experiment with the analog / digital circuits involved? Then you must attend the Lab sessions of "An experimental approach to myoelectric sensing for medical and consumer (VR/gaming) applications". We will build together better and better signal processing chains, we will make mistakes, will discuss and understand what the issues are and correct them until we will be able to use the sensor channel to control an Atom Limbs VR model with our own myoelectric signals.	1	2	New	Attendees registering for this class should have previous exposure to design with OPAMPs and ADC and should understand SNR, differential / common mode. Links to general available materials content will be available from your instructor.
24050 AMS3 DEMO	High accuracy sensors for linear and rotary position measurement	Accurate, safe, robust linear or rotary position measurement technologies are vital to industrial, electric vehicles, appliance and factory automation products. Leading edge sensors are critical to first class products. However, it is time consuming and expensive for product design engineers to learn the intricacies of a new position sensing technology.Get a hands on experience with a linear sensor that you can calibrate with in person guidance and support, that only requires a metal target and a printed circuit board. This experience will give an application space overview, sensor technology comparisons, and demonstrate how easy it really is to jump start your next position sensor design with inductive position sensors.	1	1	New	Microchip.com Account. - If you are using your own computer you will need the latest IPCE software downloaded - Suggested Prerequisite- ""Designing Your First Inductive Position Sensor"" MU class at https://mu.microchip.com/sensors-i-designing-your-first-inductive-position-sensor.
Motor Control						
24052 MC2 DEMO	Brushless Motor Control Workshop from forced commutation to sensorless field oriented control including Microchips dedicated tools.	Upon completion of this course, you will be proficient in utilizing the specialized Motor Control Peripherals, understanding the basics of a Brushless BLDC motor, and implementing various methods to control a Brushless BLDC Motor. You will also be able to employ the high-speed X2CScope Virtual Oscilloscope interface for real-time debugging and successfully operate a BLDC motor within your application. Additionally, this course will familiarize you with our QSpin MPLAB Harmony3-based tool designed for configuring motor control algorithms.	2	2	Updated	Attendees registering for this class should have basic knowledge in using MPLAB X IDE and debuggingAttendees registering for this class should have basic knowledge in using interface toolsAttendees registering for this class should have basic knowledge in "C" programming

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24053 MC3 DEMO	Enter Complexity with Ease: Model-Based Field-Oriented Motor Control	Microchip's model-based solutions simplify the complexities of field-oriented motor control, making it accessible to individuals regardless of their programming or motor control expertise. These solutions allow for easy customization and integration of advanced motor control algorithms into embedded applications. The training class offers a hands-on approach, starting with an introduction to supported modeling solutions like Matlab® and Scilab, followed by practical implementation on a demo board. The course further explores advanced motor control models, including hardware implementation and run-time signal measurements, with a focus on fine-tuning the current control loop. The class concludes with a demonstration of Microchip's most advanced algorithm, the Zero-Speed/Maximum-Torque (ZS/MT), showcasing the potential of cutting-edge motor control applications.	2	2	Updated	Attendees registering for this class should have:Basic knowledge of embedded C programming. Familiarity with PWM, ADC, Timer, and interrupt peripherals.A recommended but optional prerequisite is completion of the "dsPIC® Digital Signal Controllers (DSCs) Motor Control Workshop" (Class ID: 16).
24055 MC5 DEMO	Introduction to Zero-Speed/Maximum-Torque (ZS/MT) algorithm using Microchips dedicated tools motorBench® Development Suite or QSpin.	Introduction to Zero Speed Maximum Torque (ZS/MT) algorithm over motorBench Development Suite and Qspin. This algorithm allows you to start your PMSM motor from zero speed with maximum torque in closed loop. Use cases, requirements and limitations will be discussed. motorBench Development Suite and QSpin will be used to showcase different demos.	1	5	New	None
Power Supplies and Power Conversion						
24056 PC1 Hands-On	Power Design with the Microchip Analog Tools Ecosystem	This course will demonstrate how the Microchip Analog Tools Ecosystem can make power design, and other analog functions, more efficient and less error prone. The instructor will demonstrate and provide opportunities for hands-on investigation by the attendee for each step of the tool chain: • Find It, Design It - Use MAD to find a power solution and customize it for their application • Simulate It - Export/download a schematic from MAD to simulate in the Mindi analog simulator • Build It - Instructor will demonstrate how to find and use CAD/CAE models for the components • Check It - Instructor will demonstrate how to submit a design to have Microchip engineers review it	1	1	New	None
24057 PC2 DEMO	Analog Control of DC-DC Converters	The Buck DC-DC converter (step-down converter) is a popular solution for today's point-of-load (POL) applications. The main control architectures are Voltage Mode, Current Mode, and Constant On-Time (COT) control modes. This course delves into these converter control schemes through a data-driven lens, focusing on stability, performance, and an analysis of component variations. The primary objective is to empower designers with the knowledge and skills necessary to make informed decisions in selecting the optimal control system for DC-DC converters tailored to specific application needs.	1	2	Updated	None

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24058 PC3 DEMO	Fundamentals of Digital Power Supply Control	This class is aimed at hardware as well as firmware engineers and embedded systems programmers who need to learn the fundamental principles of designing and implementing stable, high-performance digital switch-mode power supply control loops using DSC. After reviewing fundamental principles of discrete time domain control systems, and how to create custom compensation filters and derive their respective linear difference equation coefficients, this session will guide attendees through the typical design process in consecutive live demos, starting with utilizing dedicated switch-mode power supply peripherals, such as high-speed ADCs and high-resolution PWM logic, deriving the plant transfer function of the power supply in bench measurements and closing and tuning the feedback loop using available design tools such as the MPLAB® PowerSmart Development Suite. The topics covered in this class will also be beneficial to follow contents of other digital power conversion related sessions at the conference.	2	2	Updated	Attendees registering for this class should have basic knowledge of common switch-mode power supply topologies and control theory or may attend class 24057 PC2 Analog Control of DC-DC Converters at the conference.
24059 PC4 DEMO	Advanced Digital Average Current Mode Control	Average Current Mode Control (ACMC) of switch-mode power supplies has substantial, practical advantages over common Voltage Mode Control (VMC) or Peak Current Mode Control (PCMC) implementations in terms of robustness, reliability, and flexibility. Especially in non-static applications, such as battery chargers, bidirectional converters, multiphase converters, power factor correction stages and inverters, ACMC solves key design challenges from low-level stability issues to high-level feature integration and therefore plays a major role in enabling and evolving modern power converter applications in fields such as renewable energies, automotive electrification as well as high-performance data center and telecommunication systems. In this class, we will review the complex nature of conventional, loosely coupled, non-serial cascaded feedback loops, which are prone to inner oscillations and hidden instability, before introducing a new type of average current mode control based on a tightly coupled, phase-locked, sequential cascaded control scheme. This session will walk attendees through the feedback loop design process of a phase-locked, cascaded feedback loop of a 2 kW interleaved, bidirectional DC/DC converter using bench measurements and design tools such as MPLAB PowerSmart Development Suite, showing how to tackle design challenges, how to avoid common pitfalls and how to tailor and extend control features to meet specific application requirements.	1	4	New	This class is intended for hardware as well as firmware engineers and embedded systems programmers who have experience in designing and implementing digital control feedback loops in switch-mode power supplies. Attendees registering for this class should have a good understanding of analog and digital power supply control theory and its practical application. Attendance of class 24058 PC3 Fundamentals of Digital Power Supply Control is recommended.

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Class	Title	Abstract	Slots	Tech Level	Type	Prerequisites
24060 PC5 DEMO	Enabling the Green Revolution with Bidirectional High-Efficiency Digital Power Factor Correction	The need for smart AC/DC and DC/AC power conversion is becoming increasingly vital as we move towards the electrification of everything. Efficient Power Factor Correction (PFC) is a critical part of this story. In this course, we first introduce the fundamentals of power delivery and power quality, before moving onto Power Factor Correction and why it is so important. We deep-dive into the bridgeless Totem Pole Topology. With its exceptional efficiency and capacity for bi-directional power transfer enabling Vehicle-to-Grid (V2G), Vehicle-to-Load (V2L) and Vehicle-to-Home (V2H), Totem Pole PFC is becoming increasingly popular. This course utilizes Microchip's latest dsPIC33C-based 11kW Totem Pole Demonstration Application as a tool to provide attendees with the necessary knowledge and skills to employ this topology effectively. We will review single phase and three-phase totem pole power factor correction circuits and the advantages of Silicon Carbide switches. Isolation and gate drive circuits will be discussed. Basic waveforms and power calculations will be reviewed. An on-line power simulator will be used to perform detailed analysis of the power dissipation and temperature rise for the discrete power devices in the circuit. Participants will learn how to implement both AC/DC (PFC) and DC/AC (Inverter) functions using this platform, with an emphasis on the practical hardware and firmware-based techniques required to achieve the highest power factor, lowest distortion, and highest efficiency possible.	2	2	New	None
24061 PC6 LECTURE	Why SiC? Why Now?	Are you curious about the sudden prevalence of SiC power devices in trade articles, papers and recent designs? This class will teach you the advantages of using SiC over Si based power devices. Actual high voltage switching loss testing will be performed. The class will give you the opportunity to utilize an online simulation tool to view relevant waveforms and calculate power dissipation and temperature rise of the power devices.	1	2	New	None
Signal Integrity and PCB Design						
24062 SIG1 DEMO	Noise Reduction and Robust Hardware Design	This class unravels the mystery noise reduction and its impact on embedded systems design, with particular emphasis on microcontroller based applications. Intuitive relationships, rules of thumb, and a minimum of math are used to guide the participant through the fundamentals of EMC from both an RF emission and immunity perspective. The effects of noise on microcontroller and circuit performance are presented and demonstrated through case studies and live demos. Various hardware and software techniques to help avoid and/or resolve real world EMC problems are discussed. After this class, participants will be able to design new products with noise reduction and robustness in mind. They will also be able to better understand and mitigate EMC and noise immunity problems in existing product designs. A series of progressively improved board designs will be presented to demonstrate the effects of noise reduction techniques.	1	2	Updated	EMC compatibility class in MU

Level	Description
1	No prior knowledge on the topic necessary
2	Basic knowledge of the topic is necessary
3	Previous hands-on working experience with the topic is necessary
4	Thorough knowledge and working experience with the topic is necessary
5	Advanced – attendees should already have expertise in the topic before attending

Class Types:
1. LECTURE- An interactive workshop starting with a comprehensive presentation, followed by an opportunity for participants to engage in dialogue and exchange ideas with the expert on the subject matter.
2. DEMO- An interactive workshop featuring live demonstrations with actual hardware to illustrate the concepts presented.
3. HANDS-ON- A hands-on workshop designed to enable participants to implement their acquired knowledge on actual hardware.

2024 MASTERs CONFERENCE CLASS LIST

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24063 SIG2 DEMO	What really is EMI and How do I Tackle it?	After attending this class, passing EMC testing won't seem impossible! We will explore the fundamental principles of EMI, and understand the impact of it on your final design. Learn the art of designing robust EMI filters by understanding the filter topologies that best fit your product. Finally, we will guide you through the crucial steps of pre-compliance testing, and equip you with the knowledge to evaluate the test results before you go to an accredited test laboratory.	2	2	New	None

Level	Description
1	No prior knowledge on the topic necessary
2	Basic knowledge of the topic is necessary
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