

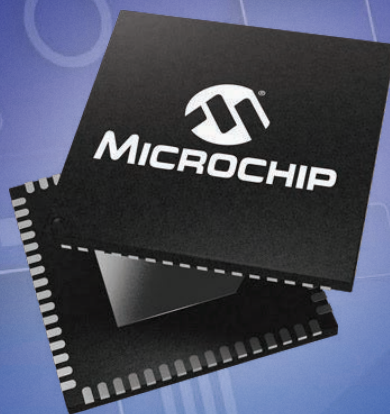


MICROCHIP'S PREMIER TECHNICAL CONFERENCE
EUROPEAN
MASTERS 2015

CONFERENCE GUIDE

15th - 17th September 2015

In cooperation with HTW - Berlin, Germany



www.microchip.com/eumasters

MICROCHIP'S EUROPEAN MASTERS CONFERENCE 2015

19 Years of Technical Training Worldwide

15th - 17th September 2015

over 50 classes for all skill levels

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INTRODUCING MICROCHIP'S EUROPEAN MASTERs CONFERENCE 2015 15TH-17TH SEPTEMBER - BERLIN, GERMANY

Microchip requests you to join us at the 2015 European MASTERs Conference and experience the premier technical training event for embedded control engineers. Now in our 19th consecutive year, the MASTERs Conference in the U.S. continues to give system design engineers at every level extensive product information and hands-on training to help you climb the learning curve and get your products to market faster. We now offer a condensed version of this event in Europe.

Classes

We offer a selection of more than 50 classes that cover a broad range of topics, taught by Microchip's application and design engineers as well as selected industry experts. Come learn from these experts and leave with everything you need to get up and running on your new design. We offer both lecture, hands-on classes and unique Open Experts Lab sessions that cover a wide range of embedded control topics including new products and peripherals, C programming, firmware design, connectivity sessions on TCP/IP, USB, CAN and Bluetooth, graphics and capacitive-touch interface development, intelligent power supplies, motor control, selecting op-amps for sensor applications using an RTOS and low-power system design.

Open Expert Lab

The Open Expert Lab will give you an opportunity to come with your own topics and problems and discuss this in small groups with our Industry Experts. There is no formal agenda. You might also use the timeslot to get familiar with our Evaluation Tools on the specified topics. If you have detailed questions you can let us know upfront and we will come prepared!

Conference Registration

Registration on Tuesday 15th September from 8:00am - 12:30pm.

At registration you will receive your badge, which must be worn throughout the Conference during classes, meals and events. The back of each badge will show your individual schedule for the week.

CONFERENCE AGENDA & DETAILS

MASTERS CONFERENCE AGENDA

Tuesday, 15th September, 2015

Registration	08:00-12:30
Optional Class Session	09:00-10:30
Break	10:30-11:00
Class Session / Open Lab	11:00-12:30
Lunch	12:30-14:00
Open Lab	12:30-14:00
Class Session / Open Lab	14:00-15:30
Break	15:30-16:00
Class Session / Open Lab	16:00-17:30
Keynote Address	17:30-19:00
Open Lab	19:00-20:30
Dinner	19:00-20:30
Evening Activities	19:00-22:00
Open Lab	20:30-22:00

Wednesday, 16th September, 2015

Open Lab	07:30-09:00
Class Session / Open Lab	09:00-10:30
Break	10:30-11:00
Class Session / Open Lab	11:00-12:30
Lunch	12:30-14:00
Open Lab	12:30-14:00
Class Session / Open Lab	14:00-15:30
Break	15:30-16:00
Class Session / Open Lab	16:00-17:30
Break	17:30-18:00
Class Session / Open Lab	18:00-19:30
Dinner Cruise	19:30-22:00

Thursday, 17th September, 2015

Open Lab	07:30-09:00
Class Session / Open Lab	09:00-10:30
Break	10:30-11:00
Class Session / Open Lab	11:00-12:30
Lunch	12:30-14:00
Open Lab	12:30-14:00
Open Lab	14:00-15:30

Exhibitor Lobby

We will show Microchip in the Automotive World with a broad spectrum of solutions, design and validation tools for CAN, LIN and MOST. The HTW will showcase their Student Racer Program and there will be the opportunity for customers to connect with the Academic staff. The Cafeteria is connected to the Lobby and both areas will be used for networking opportunities. The exhibit will be staffed during Conference check-in as well as during lunch breaks and at the end of the day after classes, giving you plenty of time to review their products.

Development Tools Store

Microchip offers a wide selection of the most popular development tools at discounted prices for MASTERS attendees during the Conference. Orders will be processed through our microchipDIRECT site at www.microchipdirect.com.

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 team in the Microchip on-site office. Our team is waiting to help you make the most of your MASTERS Conference experience. We're here to help!

Conference Certificates

Certificates will be available on Thursday, 17th September in the Microchip Office. If you leave the Conference without your certificate, a PDF certificate can be emailed to you to print on your own.

Internet Access

Conference Attendees will have the ability to check email on site with a free wireless access code. We will supply that code at registration on 15th September.

Meals Included in the Conference Fee

- Lunch on 15th, 16th, 17th September
- Barbeque Buffet Dinner on 15th September.
- Dinner Cruise on 16th September.

Dress Code

Dress code for all classes and events is business casual.

LOCATION

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

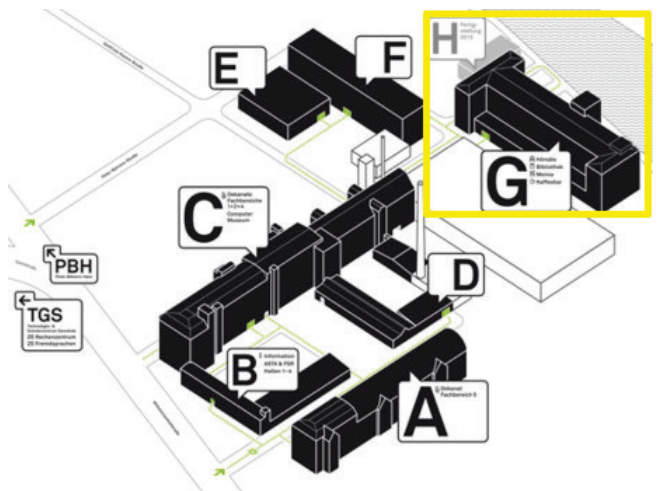
<http://www-en.htw-berlin.de/>



The Hochschule für Technik und Wirtschaft HTW; or the University of Applied Sciences campus is located in one of the most important industrial quarters of Berlin.

At the end of the 19th century AEG, the Allgemeine Elektrizitäts 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.

Microchip MASTERs will be located in buildings G & H



TRAVEL & ACCOMMODATION

Accommodation

Overnight Accommodation is NOT INCLUDED in the Conference Fee.

The following local hotels can be booked directly when quoting "Microchip" in the reservation:

Estrel Hotel

<https://www.estrel.com/en/hotel.html>

NH Berlin Treptow

<http://www.nh-hotels.de/hotel/nh-berlin-treptow>

Abacus Berlin

http://www.abacus-hotel.de/informationen_abacus_tierpark_hotel.aspx?lang=en

Alternatively:

You can search www.hotels.com for further nearby hotel options.

Airport Information

Berlin Tegel is 25km away from the Conference

<http://www.berlin-airport.de/en/travellers-txl/index.php>

Berlin Schoenefeld is 13km away from the Conference

<http://www.berlin-airport.de/en/travellers-sxf/index.php>

Public Transportation

Tramway Stop Rathenastr./ HTW

Lines 21, 27, 63, 67, M17

<http://www.bvg.de/en>



WHAT'S INCLUDED AT EUROPEAN MASTERS...

SPECIAL EVENTS

BBQ Dinner

A barbeque dinner will be held on the sandy beach in front of the cafeteria overlooking the river Spree. This is an excellent opportunity for Networking with others at the Conference.

Dinner Cruise

On Wednesday, enjoy your dinner on a boat sightseeing tour into the heart of Berlin cruising along the river Spree.



Photograph Disclaimer

Microchip may elect to take photographs 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 in furtherance of its business. This release indicates that you agree that Microchip shall be the copyright owner of the photographs and may use and publish these photographs. 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 and Microchip's use of the photographs 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.

What's Included

- Entry to the MASTERS Conference classes
- Open Expert Labs
- USB Flash Drive with all Class Material including Classes of the Worldwide MASTERS 2015 Conference that are not presented at the European Conference
- Computers and development tools as loaners during the hands-on classes
- FREE internet during conference hours
- Significant discounts on all Microchip development tools when ordered during the conference days
- 3 Buffet Lunches
- 1 Barbeque Buffet Dinner
- 1 Dinner Cruise
- All refreshments and snacks during the conference days

Conference Fees

Early Bird Special - Register 27th May - 27th June
EUR 349 (excluding VAT)

Regular Price- Register after 27th June
EUR 390 (excluding VAT)

Discounts Available

Early Bird Discount
Register 27th May - 27th June

10% off regular price
Final cost is EUR 349 (excluding VAT)

Additional Fees

There will be a EUR 25 (excluding VAT) charge for payment via Purchase Order

Design Partner Discount

Must be Authorized Design Partner within Microchip's Design Partner Program as of 31st December, 2014. For registration make sure that you have access to your Design Partner Program number (DP#). Minimum 20% off regular price. Final cost varies by status

Academic Discount

Must be a Professor in the Microchip Academia Program. For registration, make sure that you have access to your Academic Discount Number (AP#). 30% off regular price. Final cost is EUR 274 (excluding VAT)

Group Discount

Must be from the same company. Discount varies. Contact EUMASTERS@microchip.com

Waiver

Microchip reserves the right to refuse registration or entry to anyone for any reason.

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EUROPEAN MASTERs CONFERENCE 2015 CLASS LIST

Hands-on classes will utilize Microchip's MPLAB® X Integrated Development Environment (IDE). If you are unfamiliar with MPLAB X it is suggested that you download the current version of MPLAB X prior to coming to the conference and also sign up to take the class "19002 P16 - Getting Started with a PIC16 (8-bit) Project" and/or "19007 DEV- Getting Started with Microchip's Development Tools: MPLAB® X IDE, MPLAB SIM Simulator and MPLAB ICD 3". Both of these classes will introduce you to the basic functions and operation of MPLAB X. You can download the current version of MPLAB X here: www.microchip.com/pagehandler/en-us/family/mplabx/

Class	Title	Abstract	Hours	Tech Level	Prerequisites
Products and Peripherals					
19001 NEW	The Latest PIC® Microcontrollers, Connectivity, RF and Touch Products: 12 Months Ahead	This class provides an overview of Microchip's new PIC® microcontrollers, Connectivity, RF and Touch products, including the latest 8/16/32-bit microcontrollers, embedded wireless offerings and new peripheral capabilities. An introduction of selected key products and enhanced capabilities is provided so you can leave with many ideas for your new embedded designs.	1.5	1	
19002 P16 	Getting Started with a PIC16 (8-bit) Project	Starting a PIC16 project? Need to know where to begin? This class is for you. After completing this class, you will understand the basics of the PIC16 architecture and know how to use the hardware and software tools to develop your project. During the course of the class, we will cover 8-bit MCU basics and then introduce you to the basic functionality of MPLAB® X IDE. Next, we'll move on to C compiler basics and show you to how to use the new Microchip Code Configurator (MCC) to set up the code for your peripherals. Using standard demo hardware and software tools, we will start from scratch and go through an entire exercise of creating a new PIC16 project, writing some simple C code and then using some of the basic debugging tools within MPLAB X IDE.	3	1	No prior knowledge on topic is necessary
19003 CIP	Boosting Performance with Core Independent Peripherals (CIPs)	What you probably know is that our PIC® MCU family offers various Core Independent Peripherals (CIPs). But what you don't know is how much time and effort you can save by applying CIPs to your own applications. This class will not only show you how to boost the performance of existing applications by using CIPs, but will also inspire future CIP implementations in real-world designs. Newly developed CIPs for 8-bit enhanced mid-range devices such as Angular Timer, Math Accelerator, and Configurable Logic Cell (CLC) will be discussed in this class. Several CIP demos and examples will be shown. Theories and design tricks behind the demos and examples will be introduced.	1.5	2	
19004 PDA	Introduction to the Next-Generation High-Performance PIC32MZ Graphics (DA) Family	This course offers an introduction to the next-generation high-performance PIC32MZ Graphics (DA) Family. Featuring a 200 MHz/330 DMIPS microActive CPU with 32K I/D L1 cache and full MMU, this family supports accelerated graphics with an on-chip 2D GPU, LCD controller, and external DDR2 DRAM controller. Included in this family is a dedicated SD controller (compliant with SD 2.0 specification), which also supports SDIO and MMC. The hardware features new to PIC32 will be presented in detail, along with a discussion of software support for accelerated graphics.	1.5	4	Attendees registering for this class should have working knowledge of embedded graphics hardware and software, and some exposure to CPU architecture.

Tech Levels

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- 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

EUROPEAN MASTERS CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
Development Tools					
19006 IDE	MPLAB® X IDE and Development Tools: Today and Tomorrow	This introductory-level course offers an overview of Microchip Development Tool solutions and a quick review of new features in MPLAB® X IDE, MPLAB XC C Compilers, starter kits, programmers, debuggers, and other new products. Third party hardware and software tools will also be covered, along with information on Microchip's academic program. Presented by a team of Development Tools engineers and management, it is an interactive session, where attendee participation is crucial and mutually beneficial to both presenters and attendees.	1.5	1	
19007 DEV	Getting Started with Microchip Development Tools: MPLAB® X IDE, MPLAB SIM Simulator and MPLAB ICD 3	This lecture class covers the basics of getting started with Microchip development tools. Following an introduction to all Microchip tools, the instructor will go through a step-by-step creation of a project, editing and compiling a program, running a program and using the simulator. Basic debugging techniques are described, such as how to set a breakpoint, etc. Attendees will leave with a basic knowledge of Microchip tools which can be used to develop applications for all 8, 16, and 32-bit Microchip MCUs.	1.5	1	
19007 DEVL 	Optional lab session for 19007 DEV	Hands On Lab session supporting the class 19007 DEV	1.5	1	Must have attended 19007 DEV
19009 MCC 	MPLAB® Code Configurator (MCC) for Simplified Embedded Software Development	The MPLAB® Code Configurator (MCC) is a user-friendly plugin that seamlessly integrates with your existing MPLAB X Integrated Development Environment to provide an easy setup and configuration experience with a wide array of 8 and 16-bit PIC® microcontrollers. In the past year, MCC has undergone several updates to enhance functionality and support our latest Core Independent Peripherals. MCC can now configure over 190 PIC microcontrollers to your specific application without opening a product data sheet. This hands-on class will utilize MCC for MPLAB® X IDE to generate seamless, easy-to-understand drivers for PIC MCUs with Core Independent Peripherals. These drivers are optimized for each CPU and can be tailored to fit almost any application and function. Learn how to leverage the MCC's power to quickly develop an embedded application and get your project off the ground in minimal time. With just basic knowledge of the C programming language and some knowledge of Microchip's powerful MPLAB X IDE tool suite, you will be generating driver functions for an array of peripherals in minutes.	3	2	Attendees registering for this class should have a basic understanding of C, 8-bit PIC® MCU development, 16-bit PIC24 MCU development and the use of MPLAB® X IDE.
19010 IDT	Intermediate Debugging Techniques Using MPLAB® X IDE and Microchip Development Tools	This course will cover practical debugging techniques using MPLAB® X IDE and Microchip development tools. These techniques are proven time savers that exploit capabilities built into the tools as well as the Integrated Development Environment. It begins with a study of hardware and software breakpoints, along with hands-on examples. Additionally, use of watch windows, program memory, data memory and EEPROM memory in debugging an application will be covered, as well as single stepping operations and animations. Finally, usage of the stack overflow window and debugging exception conditions will be covered within a program that will be demonstrated. This is a lecture class but attendees can optionally attend the 19010 IDTL "Open Lab" session which will provide the opportunity to complete hands-on lab exercises that reinforce concepts learned in this class. The "Open Lab" sessions allow you to work at your own pace just drop by the lab during evening sessions. Exact times for evening sessions will be provided in class.	1.5	2	Attendees registering for this class should have familiarity navigating in MPLAB® X IDE, Microchip debugging/programming tools and C programming.

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- 5: Advanced – attendees should already have expertise in the topic before attending

EUROPEAN MASTERS CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
19011 ADT	Advanced Debugging Techniques: Using Special Features in Development Tools and PIC® MCU Devices	In this advanced course, you will go through practical debugging techniques that you can use again and again during your development. These techniques are tested and proven time savers that exploit capabilities built into the chips and tools that you are using right now. This class covers the second level of features that you can access using the system of the compiler, IDE, hardware tools and devices. This course starts with data capture, goes through trace, and finishes with techniques for traps/interrupts and intermittent problems. This is a lecture class but attendees can optionally attend the 19011 ADTL "Open Lab" session which will provide the opportunity to complete hands-on lab exercises that reinforce concepts learned in this class. The "Open Lab" sessions allow you to work at your own pace just drop by the lab during evening sessions. Exact times for evening sessions will be provided in class.	1.5	2	Attendees registering for this class should be comfortable using MPLAB® X IDE.
19012 AMT	Advanced MPLAB® X IDE Topics, Automated Testing, Scripting and Plug-Ins	MPLAB® X IDE provides a powerful and flexible development environment. There are many advanced features that can be used to enhance your development process. This class will first look at automating some of the common test tasks using MDB command line. It will then go on to look at more advanced control of the debugging process using scripting tools such as Groovy and Grails. Finally, to provide the greatest power over the environment, the class will examine the steps required to write a simple plug-in for MPLAB X IDE allowing attendees to develop sophisticated tools.	3	4	Attendees registering for this class should have an understanding of writing high-level applications for the PC world. They should be comfortable using the command-line interface. An appreciation of the JAVA language would be extremely useful.
19013 XC8	Developing Applications Using the MPLAB® XC8 Compiler	The C language is a powerful tool for all embedded applications. This class will teach you the use of the Common Compiler Interface (CCI) and its integration to the XC8 compiler. By learning the CCI, techniques for memory management and optimization of your C code will be even more efficient. These tools and techniques will improve your program performance, reduce program size and simplify your life without the need to reach for Assembly language to get there. This is a lecture class but attendees can optionally attend the 190913 XC8L "Open Lab" session which will provide the opportunity to complete hands-on lab exercises that reinforce concepts learned in this class. The "Open Lab" sessions allow you to work at your own pace just drop by the lab during evening sessions. Exact times for evening sessions will be provided in class.	3	2	Attendees registering for this class should have a basic understanding of C, a good understanding of Microchip 8-bit architecture and a desire to improve the efficiency of their code.
19015 HMN	Creating PIC32 Embedded Applications with the Help of MPLAB® Harmony, Middleware and Software Ecosystem from Microchip	MPLAB® Harmony is a modular framework that provides interoperable firmware libraries for PIC32 peripherals, drivers, services, and middleware. It uses a flexible architecture to enable development of a wide variety of embedded solutions whether they are based on a Real-Time Operating System (RTOS) or not. This class introduces attendees to MPLAB Harmony's key concepts and fundamentals, and demonstrates its benefits, including the ability to quickly develop complex embedded systems that utilize multiple middleware stacks.	3	2	Attendees registering for this class should have a basic understanding of C language programming for PIC32 systems using Microchip's MPLAB® X IDE, debugger, and XC32 language tools.

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Class	Title	Abstract	Hours	Tech Level	Prerequisites
19017 MCP	Making Motion and Position Applications Easy Using the MM7150 Motion Module	Developing applications such as robots, smart farms, wearables, etc., with 9-axis motion sensors can be difficult. The code required to process the position data can be daunting. Microchip can make these applications much easier to manage using the MM7150 Motion Module with the SSC7150 motion co-processor and accelerometer, magnetometer and gyro sensors. Both raw data and processed position and orientation data is sent to your MCU via I2C™. In this class we will demonstrate the MM7150 Motion Module using Microchip's MM7150 Motion PICTail™/PICTail Plus Evaluation Board with the Explorer 16 Development Board. This evaluation board combines 9-axis motion sensors (accelerometer, magnetometer and gyroscope) with the SSC7150 motion co-processor, which is pre-programmed with integrated calibration and sensor fusion algorithms to provide raw and calibrated motion-compensated 3D data. Attendees will learn how to speed their designs to market using motion and position for embedded and connected applications.	1.5	1	No prior knowledge of the topic is necessary.
RTOS					
19024 FRT	FreeRTOS™ – Operation, New Features, and Using with MPLAB® Harmony	FreeRTOS™ is one of the most popular real-time operating systems available. This class discusses specific features and how to most efficiently write your application to use them. It will explore how the RTOS integrates with components of an MPLAB® Harmony based system to create complex applications. Additionally, various debugging techniques will be explained giving attendees an understanding of the available tools and methods.	1.5	3	
Functional Safety					
19026 FS1	Introduction to Functional Safety and Diagnostic Techniques	Modern electronics have enabled incredible technology advances that have greatly improved the quality of our lives. Electronic controls enable higher efficiencies, additional functionality and an improved user experience. But what happens if something goes wrong? Functional Safety specifications, such as IEC 60335, IEC 61508 (SIL), IEC 60730 or ISO 26262 (ASIL), are used to ensure manufacturers design their electronic products to reduce the risk that people will be injured if they malfunction. The first half of this class will introduce Functional Safety topics as follows: what is it and why is it important, an introduction to design-relevant and development tool Functional Safety requirements, and fundamental reliability data used in determining system compliance with Functional Safety standards. The second half of the class will focus on firmware and hardware diagnostic techniques (outside of Class B routines) for confirming the valid operation of a microcontroller.	1.5	1	

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Class	Title	Abstract	Hours	Tech Level	Prerequisites
Bootloaders					
19030 BTL	Easy Bootloader for PIC24 and dsPIC33	This course introduces the Microchip Easy Bootloader (EZBL) for PIC24 and dsPIC33 software solutions library to address the ever growing needs of field firmware updates and reprogramming. EZBL raises the bar on bootloader functionality by providing effortless generation of device-specific bootloader images containing arbitrary communications interfaces, active invocation from a running application for a seamless end-user experience, trivial integration with any pre-existing application project, and advanced features of sharing common code, variables, and interrupts between the bootloader and application to minimize hardware resource requirements. In this course, attendees will see exactly how EZBL qualifies to have 'Easy' in the title. Through automated build time processing, creating a custom bootloader for an arbitrary 16-bit device target requires no knowledge or experience editing .gld linker scripts. Using the bootloader in any pre-existing application project can be as simple as adding three pre-generated files to the MPLAB® X IDE project. Demonstrations will be performed covering how developers can seamlessly reuse functions and variables declared in the bootloader, thus minimizing code size, and without sacrificing the ability to modify their implementation in the future.	1.5	1	Attendees registering for this class should have general knowledge or experience writing firmware for PIC® microcontrollers or dsPIC® Digital Signal Controllers.
File Systems					
19031 HFS	Accessing Multiple Storage Media with Multiple File Systems Using the MPLAB® Harmony File System	This class will teach attendees how to access and use files on a drive in their embedded system. The class covers the basics of the FAT16/32 file system, one of the most commonly used file systems. Using the MPLAB® Harmony File System (FS) Framework, attendees will learn about basic file system functions such as creating files, opening files, closing files, reading from/writing to files, perform directory-related operations and search for files in a directory. This class will cover how to mount and access multiple media (SD Card, USB thumb drive, flash memory, etc.) in an application with multiple file systems. This class will also demonstrate how to access drives that use file systems other than FAT. At the end of the class, attendees will be able to use the MPLAB Harmony File System Framework and the MPLAB Harmony Configurator (MHC) tool to quickly add and access various storage devices in their embedded applications.	3	2	
Touch and Gesture Sensing					
19032 CTS1	Introductory Course to Touch Sensing Design	This introductory class' main objective is capacitive sensing design demystification. It will provide attendees with a high level overview of design considerations in capacitive sensing applications including buttons, sliders, touch screens and pads, and 3D gesture sensing. This class will also discuss some of the critical choices to be made, which may impact cost, overall application efficiency, and other important factors.	1.5	1	
19035 CTS4	2D Projected Capacitive Touch Integration	This class will start with a general discussion of projected capacitive touch sensing techniques. It will then go more in depth into Microchip's offerings, focusing on the MTCH610X and MTCH630X touch controllers, and the MTCH65X high-voltage drive. The major steps to a successful projected capacitive design will be covered, including electronics, sensor design, sensor partners, and development tools. This is a lecture class but attendees can optionally attend the 19035 CTS4L "Open Lab" session which will provide the opportunity to complete hands-on lab exercises that reinforce concepts learned in this class. The "Open Lab" sessions allow you to work at your own pace just drop by the lab during evening sessions. Exact times for evening sessions will be provided in class.	1.5	1	Attendees registering for this class should have may find it helpful to attend the "Hardware Design for Robust Capacitive Sensing" class for further background knowledge.

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EUROPEAN MASTERs CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
19036 CTS5	Capacitive Touch Sensing: Real World Design Considerations	This class will guide you through system design considerations involved when integrating capacitive sensors into embedded systems. Through a combination of live demonstration, simulation, and exploration of lab-based EMI measurement results, we will explore how electrical noise impacts capacitive sensor performance. We will then use demonstrations to explore the trade-offs as we learn techniques to reduce the impact of that noise on various proof-of-concept PCBs. Details of PCB hardware design, capacitive sensor design guidelines for a variety of materials (including ITO, ATO, PeDot, Metal Mesh, and SilverInk), as well as system integration considerations for robust capacitive sensing, will be discussed at length during the course on a real world design example driving a high-power LED, LIN and touch on a single microcontroller. Eventually, you will find that capacitive sensor designs for real world systems is not as difficult as you might think. Just follow the guidelines you learn in this class. Questions and active discussions are highly encouraged.	3	2	
19039 GFX2	Creating Graphical Applications Using MPLAB® Harmony	Looking to add a Graphical User Interface (GUI) to your embedded system? Then this is the right class for you! Attendees will use lecture material and hands-on exercises to learn how to harness the power of the MPLAB® Harmony Graphics Library along with the new Harmony Configurator integrated graphics designer to create an embedded graphical user interface. For the hands-on exercises, attendees will use the PIC32MZ EC Starter Kit along with the PIC32 Multimedia Expansion Board II.	1.5	3	Attendees should have a strong working knowledge of the C programming language.
Communication -I2C					
19044 I2C	Practical I2C™: Introduction, Implementation and Troubleshooting	"Why am I not receiving an acknowledge from my slave device?" "Help! I cannot write to my I2C™ EEPROM." " I always read 0xFF. What is wrong?" These are some of the comments we hear and this class will provide useful insights about I2C. It will start with an I2C introduction and key concepts, continue with configuring the PIC® Microcontroller as an I2C Master or Slave, and end with demos showing common I2C communications failures and how to troubleshoot them. This class is recommended for anyone using I2C, planning to use I2C or who just wants to learn more about I2C.	1.5	1	
Communication - USB					
19048 USB3 	USB Communication Device Class (CDC) – Serial Port Emulation with MPLAB® Harmony USB Device Stack	Most PC systems and laptops no longer have a serial port, and USB is now the standard communication channel to connect embedded systems to PCs. A CDC USB peripheral is enumerated as a Virtual COM Port on PCs, making CDC a popular USB Device Class for upgrading a system to USB, while providing a legacy COM interface to existing PC software. This class will discuss the basics of the CDC class. Upon completion of the course, you will be able to create an enumerable CDC USB device, transfer data between a PIC® MCU and a PC, and create a USB peripheral that enumerates as two virtual COM ports on the PC using a PIC32 USB microcontroller and the MPLAB® Harmony USB Library.	3	4	Attendees should be familiar with the USB protocol, transfer types, device classes, endpoints and descriptors. MPLAB® X IDE, XC32 and C language are used in this class and attendees need to be familiar with them.

Tech Levels

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EUROPEAN MASTERS CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
19049 USB4 	USB Human Interface Device (HID) Class	This course will explore the USB HID class as a method of exchanging data between a USB device and a PC. It will focus on two use cases of the HID class: creating a standard HID device such as a keyboard, mouse, or joystick, and creating a custom, vendor-defined HID device for transferring arbitrary data to and from a host application. This course will also introduce HIDAPI, a free, cross-platform library for communicating with custom, vendor-defined HID devices from a PC. Labs will cover the creation of a HID report descriptor for making standard HID-class devices such as keyboards, mice, and joysticks. In addition, labs will cover the firmware and software involved in making a custom, vendor-defined USB HID device and host application, and will use the Microchip USB and HID libraries (part of the MLA) and HIDAPI.	3	4	Attendees registering for this class should have a working knowledge and familiarity with C and optionally C++. They should also be familiar with USB protocol level terminology (packets, transactions, transfers, endpoints, interfaces, etc.).
19051 USB6	Microchip USB Controller Hub Hands-On	The consumer market is no longer satisfied with a basic USB device. To have an edge on the competition, USB developers need to offer more than just one of the pre-defined device classes. The USB Controller Hub from Microchip enables developers to implement more features on their systems utilizing the USB Hub architecture. The Hub Controller embedded in the Hub chip contains bridging features that can be used to communicate and control the enhanced features a system designer would implement with a PIC® microcontroller. In this session, engineers will get to use the EVB-USB4604 and software development tools to communicate with UCS Port Power controllers, turn on and off GPIOs, and update UART displays. The ProTouch tool will be used to configure the operation of the latest generation of USB Controller Hubs.	1.5	1	
Communication - Bluetooth					
19053 BLT1	An Overview of Microchip's Bluetooth® Solutions	This class provides an introduction to various product options available from Microchip for your next Bluetooth® data or audio application. Attendees will be introduced to variety of module and silicon options available alongside an overview of the tools and resources needed to use these products in applications. This class is a prerequisite to all other Bluetooth classes being offered at MASTERS.	1.5	2	Attendees registering for this class should have "high level" knowledge of Bluetooth® profiles and standards.
19054 BLT2	Developing Data Applications Using Microchip's Bluetooth® Modules	In this class, you will learn the basics of classic Bluetooth®, Bluetooth Low Energy (BLE) and dual-mode modules. Technical details of Microchip Bluetooth modules suitable for data applications including classic, BLE and dual-mode modules will be presented. Simple Bluetooth applications will be demonstrated.	3	2	Attendees registering for this class should have prior Bluetooth® knowledge. BLT1 is recommended.
19057 BLT5	"Chip-Down" Design Considerations for Using Microchip's Bluetooth® Silicon Products	This lecture walks the attendee through various aspects of PCB development and testing that must be considered for end products designed using Microchip's Bluetooth® silicon/chip products. The class walks through the steps in the process of developing your final hardware design, and highlights critical factors affecting product quality, performance, cost and support. This class is a recommended introduction for RF design partners, module vendors and OEMs seeking to develop products using Microchip's Bluetooth silicon families. This class helps OEMs make the choice between pursuing chip-down designs versus sourcing a Bluetooth module for their next design.	1.5	5	Attendees registering for this class should have designed a Bluetooth® module into an end product and must have RF engineering expertise in their organization.

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EUROPEAN MASTERS CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
Networking					
19058 NET1	TCP/IP Networking Fundamentals	If you need to add network connectivity to your product, but you don't know how TCP/IP works, this class is for you. We will teach you the basics of TCP/IP including how IP addresses are assigned and used, and how the data packetization process works. We will then use this knowledge to demonstrate how an embedded device communicates on your local network or across the world using the Internet. We will teach you what ports and sockets are, and how applications use them to create TCP/IP connections. We will also describe how some common TCP/IP applications (DHCP, DNS, etc.) work. We will show you how the client-server model works and will discuss the trade-offs to consider when choosing to locate a server on a local network vs. the internet. Last, we will show you Microchip's solutions for embedded TCP/IP designs.	3	1	
19059 NET2	Double the Number of Ethernet Ports in Your Product with the LAN9303 Three Port Ethernet Switch	Many products incorporate an Ethernet jack for connection to the outside world or to other devices. The LAN9303 Three Port Ethernet Switch can take the place of an external Ethernet PHY and provide a second Ethernet port with little or no software modification. The advanced features of the LAN9303 can also be used to implement advanced network technologies such as Quality of Service (QoS) to deliver predictable network performance. This course will introduce the features of an Ethernet switch, and how these features can be implemented in end products. It will also present some basic Ethernet design requirements for a successful design. An example design using a PIC32 will be presented.	1.5	2	Attendees registering for this class should have a basic understanding of Ethernet and Linux.
19060 NET3	Introduction to the MPLAB® Harmony TCP/IP Stack	Welcome to the MPLAB® Harmony TCP/IP Stack! If you plan to use a PIC32 in an embedded TCP/IP application, you will need to know how to use the MPLAB Harmony TCP/IP stack. You will learn the parts of the stack fundamental to all TCP/IP applications, and will learn how to interface your application to the stack. This class will show you the supported protocols, example demo code, and support utilities provided by the stack. We will describe the architecture of the stack and how it works, and show some common stack APIs used to interface your application with the stack (socket programming). Note: This class is not relevant for Microchip's stand-alone RN TCP/IP modules.	1.5	2	Attendees registering for this class should have a basic understanding of TCP/IP or should attend the "19058 NET1 - TCP/IP Networking Fundamentals" class.
19061 NET4	EtherCAT: Creating a Simple Hardware Slave Device Using the LAN9252	EtherCAT is a rapidly growing industrial field bus that builds on Ethernet layer 1. It is its own protocol and requires dedicated slave controllers. The LAN9252 is an example of such a controller. This class familiarizes the attendee with a IEC61131-3 PLC master running on Raspberry Pi to control dedicated hardware slaves using the LAN9252.	1.5	1	
Internet of Things (IoT)					
19062 IoT1	Connecting to the Cloud with the Internet of Things (IoT) Family of Development Tools from Microchip	As embedded design engineers look to make that next great connected, or Internet of Things (IoT), product, knowing where to start can be a challenge. There are natural firewalls between a company's IT or cloud development department, and the engineering department that need to be overcome. The objectives of this class are to introduce the family of IoT development kits, discuss the Microchip Amazon Machine Image (AMI) that can be launched on Amazon Web Services (AWS), and to learn how to leverage the demo to understand how to connect to a cloud-based system. The skills acquired in this class will help the embedded engineer communicate effectively with their IT or cloud development department. This hands-on class will use these tools to develop this understanding.	3	3	Attendees registering for this class should be familiar with basic TCP/IP networking concepts (sockets, addressing) and working with Microchip's TCP/IP stack from MPLAB® Harmony. The following MASTERS classes are recommended as prerequisites: 19058 NET1 and 19060 NET3.

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EUROPEAN MASTERS CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
19063 IoT2	Using the RN1723 Wi-Fi® Modules to Develop Low-Power IoT and Embedded Web Applications	The number of embedded web connected devices has grown exponentially over the last few years. So much so that the wireless industry has now declared that we have finally reached the long anticipated realization of the Internet of Things – IoT. From a design standpoint, some of the key factors that are enabling the IoT in the embedded applications spaces include: 1) Low-power designs that minimize power consumption – think 'wearables' that must connect to the internet, but whose batteries may need to last for weeks; 2) High-security enabled embedded device – because more people are putting their personal information into portable embedded Wi-Fi® enabled devices, raising the security requirements to historic levels, and ; 3) The ability to continually upgrade and add new features to existing platforms. These factors will form the framework for the topics that will be discussed in this class. Specifically, the topics that will be covered in this lecture class include an in-depth discussion of how to maximize battery life by realizing ultra power operation modes in RN1723 Wi-Fi device. Also covered will be an overview of embedded IoT and a demonstration of one such potential real-life application. Lastly, the class will demonstrate how to integrate the industry standard TLS 1.2 networking security protocol into an RN1723 based IoT application.	1.5	4	Attendees registering for this class should have a working conceptual knowledge of Wi-Fi®, TCP/IP, wireless networking and microcontrollers.
19065 IoT4	Getting Up and Running with LoRaWAN™ Long-Range Networking	This class is developed for engineers at any level interested in designing long-range IoT solutions based on the LoRaWAN™ MAC Class A protocol. During the course the attendees will learn the basics of this long-range network structure, the modulation scheme, and the parameters that allow this extraordinary range. The theory will be discussed in enough depth to start development right away. In the second part we will get up and running with the RN2483 LoRaWAN™ module with a hands-on session, which includes working with the simple UART interface and connecting to a real LoRa™ network. After the class, attendees will be capable of starting their own development with this technology, enabling fast time to market.	1.5	3	Attendees registering for this class should have an understanding of 'C' and how to build code using MPLAB® X IDE.
19067 IoT6	Enabling Internet Security for PIC32 Applications with MPLAB® Harmony	Communications security is a vital part of the growing connected world. With the complexity of embedded devices growing, it is even more important that they provide a level of security to fend off malicious attacks. This course will teach the basics of Transport Layer Security (TLS), the most popular way of securing communications, and will introduce the CySSL library that can be integrated with an MPLAB® Harmony application to provide this type of security.	3	3	Attendees registering for this class should have knowledge of MPLAB® Harmony and how to build, deploy, and debug MPLAB Harmony applications.
19071 IoT10	Understanding the Fundamentals of Designing and Developing iOS and Android Apps for Embedded Engineers	Today's mobile apps require more than just a typical human machine interface, or HMI, to allow for information to be shared between parts of a connected system. The UX, or user experience, is crucial to the design of good apps. This class will provide an understanding of the process behind designing and developing iOS and Android apps. We will also discuss some of the considerations for connecting mobile devices and apps to Wireless IoT devices and Cloud services. If you are considering using a third party app developer we will also highlight some of the details you should discuss to ensure the developer understands the intricacies of interacting with IoT devices.	1.5	2	Attendees registering for this class should have a basic understanding of Java.

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EUROPEAN MASTERS CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
Analog and Mixed Signal					
19074 SEN	Sensing and Communicating with an Analog World	This class will teach attendees about connecting various sensors to PIC® MCUs. Attendees will learn about various types of analog and digital sensors. Attendees will also learn about the digital and analog modules within the PIC MCUs, and how they can be utilized to interact with the sensors. Communication protocols, sensor guidelines and terminology, and real-world examples will give attendees a better understanding of how to connect and communicate with the analog world with PIC MCUs.	1.5	2	
19077 OPA	High-Precision Analog Applications Using Op Amps	Are you interested in designing high-precision circuits? How can you take advantage of a PIC® MCU's capabilities? This class covers precision op amp fundamentals, their application to circuit design, and design tips and tricks. Circuits with traditional, reduced analog content and mixed signal architectures are illustrated. This is an analog class for users at Analog Technical Level 3 (some experience).	1.5	2	Attendees should have some analog design experience.
Audio and DSP					
19078 AUD1	USB Audio Solutions Using MPLAB® Harmony and PIC32	USB architecture offers a number of potential audio solutions. With MPLAB® Harmony and PIC32, we will explore several solutions from a USB headset to thumb drive MP3 playback. The applications include the capabilities of microphone capture and playback from a PC device. High-resolution audio using a USB 2.0 audio device class will be introduced during the session.	1.5	3	Attendees registering for this class should be familiar with MPLAB® Harmony.
Motor Control					
19082 MAT	Rapid Prototyping with MATLAB®/Simulink® in Motor Control Applications	This class presents the MPLAB® 16-Bit Device Blocks for Simulink® as well as Microchip's PMSM motor model and the optimized motor control Simulink library. This rapid prototyping tool allows compiling and flashing a Simulink model into a dsPIC® DSC in a single push button process. First, an introduction to MATLAB®/Simulink tools oriented toward the design of discrete time control algorithms will be provided. Blocks specific to dsPIC DSC peripherals will be presented as well as the real-time scheduler properties. Then, tools to log and plot data coming from the dsPIC DSC will be shown. Participants will learn how logged data could be re-used to improve and validate their algorithm by feeding their simulation with real data. Finally, there will be an advanced demo of a closed-loop sensorless field-oriented control of a permanent magnet synchronous motor showing simulation, code generation and verification out of the same model. Examples will be given throughout the presentation.	1.5	5	
19083 FOC	Advanced Motor Control: Sensorless FOC for PMSM	Here we will explore the control of PMSM (Permanent Magnet Synchronous Motors), which are similar in construction to BLDC (Brushless DC Motors) using Field-Oriented Control (FOC) instead of the traditional scalar 6-step control. The PMSM is receiving attention from designers who are concerned about optimal smooth torque control, low audible noise and extracting the best motor efficiency. It is a two-for-one class because the FOC method learned can also be applied to ACIM (AC Induction Motors). FOC is an advanced control technique used to operate a motor more smoothly over the full speed range. It is more responsive to load changes, offers fast acceleration/deceleration, and can generate full torque at zero RPM. In this class the attendee will be guided through the theory and application of FOC on a PMSM motor.	1.5	3	Attendees registering for this class should have a good understanding of motor control fundamentals (detailed in application note AN1078).

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EUROPEAN MASTERS CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
Power supplies and power conversion					
19086 PC3	Power Supply Compensator Design Part I - Analog	This class is aimed at firmware engineers and embedded systems programmers who need to learn the foundation principles of stable analog power supply control loops. This class assumes no prior knowledge of power supply design, although attendees new to power supply design should consider taking class PC1. Starting from first principles, it covers all the necessary foundations in a step-by-step manner to help the attendee design stable analog compensators. By the end of the class, all attendees should be comfortable with the concepts of control loop design, stability and other related topics, which are also the basic building blocks of many other power conversion classes in the conference. Note: The instructor for this class will be a representative from Biricha Digital.	1.5	2	None. Attendees new to power supply design will benefit from taking class PC1 - Fundamentals of Switch-Mode Power Converters.
19087 PC4	Power Supply Compensator Design Part II - Digital	This technical session is aimed at firmware engineers and embedded systems programmers who need to learn the foundation principles needed for fully digital compensator design and implementation. Building on the material delivered in PC3-Power Supply Compensator Design Part I (Analog), this session covers all topics necessary to design stable digital control loops on dsPIC® DSC devices. Topics such as discrete time control systems, Z transforms and linear difference equation coefficient calculations are presented in a step-by-step manner and with real-life design examples. The material covered will also be necessary for understanding many of the other technical sessions in the conference. The session concludes with real-life loop measurement of a fully digital power supply. Note: The instructor for this class will be a representative from Biricha Digital.	1.5	2	
19089 PC6	Introduction to Intelligent Power Converters Using DEPA Controllers	This class introduces intelligent power converters using Digitally-Enhanced Power Analog (DEPA) Controllers. The first part of the class covers the concepts related to intelligent power converters like advanced protection circuits, telemetry, sequencing and the Power Management Bus (PMBus). The second part introduces the new family of DEPA Controllers and presents some typical applications where intelligence is mandatory: Point Of Load converters (POLs), advanced battery chargers, LED drivers, and high-power USB converters. The attendees must be familiar with basic switch-mode power converter topologies like buck, boost and buck-boost, and with the basic control strategies of Switch-Mode Power Converters (Voltage Mode, Peak Current Mode, etc.).	1.5	2	Attendees registering for this class should have taken 19084 PC1 - Fundamentals of Switch-Mode Power Converters and 19085 PC2 - Fundamentals of Switch-Mode Power Converter Control
19091 PC8	Designing Intelligent Power Supplies Using Core Independent Peripherals	Intelligent Power Supply design is defined as the integration of a microcontroller's flexibility into a switch-mode power supply design. This combination allows a system to not only derive power from a supply, but to also exercise a high level of monitoring and control over its operation. It is therefore logical that the next step is the integration of a microcontroller and the basic building blocks of a switch-mode power supply onto a single die. This lecture class will discuss the design of intelligent power supplies using just such a family of devices: Microchip's new 8-bit microcontroller family with integrated Core Independent Peripherals (CIPs). It will explore example designs from three points of view: the level of control and monitoring possible with the new peripherals, the variety of topologies supported by the peripherals, and the variety of automated features and functions that can be implemented using the peripherals. Numerous design examples will be included to illustrate each point of view.	1.5	5	19084 PC1 - Fundamentals of Switch-Mode Power Converters 19085 PC2 - Fundamentals of Switch-Mode Power Converter Control 19086 PC3 - Power Supply Compensator Design Part I - Analog 19087 PC4 - Power Supply Compensator Design Part II - Digital

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Class	Title	Abstract	Hours	Tech Level	Prerequisites
19093 PC10	Power Conversion: Architectural Overview and Digital Power Implementation with the GS Series dsPIC® Digital Signal Controller	This class explores how the digital SMPS control techniques and digital compensators described in classes PC2 and PC4 are implemented in the dsPIC33 GS series Digital Signal Controller (DSC). The class provides a detailed understanding of the dsPIC33 GS series architecture and how it's optimized to handle both digital SMPS control loop execution and higher level management tasks such as communications and fault management. Attendees will learn how the dsPIC® DSC's highly configurable PWM, ADC and high speed comparator peripherals work together to enable efficient execution of popular control methods such as voltage and current mode control. The class concludes with a discussion of key improvements to the existing dsPIC DSC GS series core architecture and peripherals that enable the next generation GS series DSCs to provide even higher levels of performance. This is a lecture class but attendees can optionally attend an "Open Lab" class which will provide the opportunity to complete hands-on lab exercises that reinforce concepts learned in this class as well as PC2, PC4 and PC11. "Open Lab" sessions allow you to work at your own pace and include necessary test equipment. Attendees can register for 19093 PC10L for afternoon lab sessions or just drop by the lab during evening sessions. Exact times for evening sessions will be provided in class.	1.5	2	Attendees registering for this class should have a basic understanding of switch-mode power supply design. Although not a requirement, classes PC2 and PC4 are recommended and provide a more in-depth analysis of digital power supply control loop design.
19094 PC11	Digital Power Conversion Using dsPIC® DSCs: Non-Linear Control Methods for Power Converter Optimizations	Digital control loops in power conversion applications offer design flexibility, improved performance and reliability, and are one of the keystones to increasing efficiency and power density to meet future top level standards. The SMPS dsPIC® DSC family offers a wide range of hardware and software-based features that can be used to implement an application-specific, multi-level control system by adding adaptive algorithms to the basic control loop. The two major subjects introduced and discussed in this class are the Adaptive Gain Control (AGC) and the Adaptive Software Slope Compensation (ASSC). Both are used to find and maintain the optimum performance vs. stability ratio over all operating conditions of voltage, as well as current mode controlled converters while bypassing/solving some of the most significant trade-offs in common analog power supply designs. Essential mathematics, software implementation and performance comparisons will be discussed in detail and will be supported by live demos. After attending this class, attendees will understand the characteristics of multi-level control systems and how they can be utilized to improve overall system performance, stability, and reliability. This is a lecture class but attendees can optionally attend the 19094 PC11L "Open Lab" class which will provide the opportunity to complete hands-on lab exercises that reinforce concepts learned in this class as well as PC2, PC4 and PC10. "Open Lab" sessions allow you to work at your own pace and include necessary test equipment. Attendees can register for 19093 PC11L for afternoon lab sessions or just drop by the lab during evening sessions. Exact times for evening sessions will be provided in class.	3	5	Attendees registering for this class should have basic knowledge of the dsPIC® DSC architecture and the specific SMPS peripherals of the GS family as well as a basic understanding of commonly used power conversion topologies and their control requirements or should have visited class "19093 PC10 Architectural Overview and Digital Power Implementation with the GS Series dsPIC® Digital Signal Controller".
19098 PC15	Introduction to LEDs and LED Driver Topologies	This course will discuss the basics of the electrical and thermal properties of LEDs, and driving the LEDs to maximize their reliability. The course will also discuss the different ways to drive LEDs: linear and switch-mode. The various switch-mode converters that can be used to drive LEDs will be presented. Typical applications and the pros and cons of each topology will be described.	1.5	1	

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Class	Title	Abstract	Hours	Tech Level	Prerequisites
19099 PC16	DC/DC Power Supply Designs for Automotive Multi String and Single String LED Headlights	Ever wondered about the amazing shape and brightness of the latest car headlights? Thanks to new LED technology, darkness does not stand a chance and a new array of styling opportunities has opened up. But all this remains useless without the right power technology to control multiple individual LED strings. This class is designed to introduce DC/DC converters for LED lighting control, some topologies for multi and single LED strings, and their implementation on demo designs. The multistring demo designs use an interleaved boost converter and 8 buck converters to control 8 individual LED strings, or a main buck for the rail voltage to control 16 single LEDs with linear stages. The single string demo designs use a SEPIC buck/boost converter driven by PIC16 analog peripherals. Attendees will learn about controlling multiple converters with one dsPIC® Digital Signal Controller, including multiple control loops. In practice, the monitoring and parameter settings are shown through interfaces like CAN, UART and PMBus. This class will also discuss the implementation of a single LED string in a demo in comparison with the multi string headlight. This design is based on a SEPIC topology and features an 8-Bit PIC® microcontroller with dedicated power supply peripherals.	1.5	2	Attendees registering for this class should have basic knowledge in Digital Power Conversion topologies and the control techniques based on previous classes. Attendees registered for this class should have prior knowledge in PIC® MCU and dsPIC® DSC architecture and peripherals. Attendees registered for this class should have basic knowledge in PIC16F architecture and peripherals.
Low Power Design Techniques					
19101 XLP	eXtreme Low Power Design – XLP Tools, Design Techniques, and Implementation	This class introduces concepts for eXtreme Low Power design using Microchip's XLP MCUs, development tools, and hardware and software design techniques. The class takes the attendee from start to finish of an XLP design, starting with the XLP concept, MCU selection, battery selection, hardware design, software implementation and ending with the tweaking of code while viewing the current profile to achieve XLP improvements. This is a lecture class but attendees can optionally attend the 19101 XLPL "Open Lab" session which will provide the opportunity to complete hands-on lab exercises that reinforce concepts learned in this class. The "Open Lab" sessions allow you to work at your own pace just drop by the lab during evening sessions. Exact times for evening sessions will be provided in class.	1.5	2	The attendee should have an understanding of C programming, PIC® MCUs, and MPLAB® X IDE.
OPEN EXPERT LABS BELOW: The Open Expert Lab will give you an opportunity to come with your own questions, topics and problems and discuss this in small groups with our Industry Experts. There is no formal agenda. You might also use the timeslot to get familiar with our Evaluation Tools on the specified topics.					
19108 LAB1	meet with our Power Converter Experts	Come and see different power supply topologies, measure and learn how to debug real world power supply designs. Topologies will range from pure analog over hybrid to full digital controlled power supplies. In addition we measure the stability of all of the control loops using a Bode 100 network analyzer. Experts from both Microchip and Birichia will be available to discuss your detailed questions.			
19109 LAB2	meet with our Motor Control Experts	See a demonstration of scalable motor control solutions from simple block commutation up to high end field oriented sensorless control of PMSM motors using commercial and open source rapid prototyping tools like matlab simulink and scilab / x2c. Bring your own design ideas for a discussion with our experts. We will have a wide variety of demoboard and a full lab setup available to cover the full tool chain necessary for a successful design.			
19110 LAB3	meet with our LED Experts	Meet us to learn different ways on how to effectively drive modern power LEDs. Covering different topologies and the full voltage range up to 230 V AC. Starting with simple analog controlled up to full microcontroller based solutions. We show intelligent controls including DALI and wireless. We will be prepared to also discuss your design ideas!			

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19111 LAB4	meet with our Experts on Touch Solutions	We invite you to understand the secrets of a successful capacitive touch design from simple buttons, sliders, 2D touch pads up to full 3D gesture recognition. Learn about applications beyond HMI using this technology for modern sensors. Our experts will guide you through the full design process of bringing an idea to a full stable and robust end product. Make this a brainstorming session for your own application.			
19113 LAB6	meet with our Experts on LORA	LoRa™ Alliance is an open, non-profit association of members that believe the internet of things era is now. Our mission to standardize Low Power Wide Area Networks (LPWAN) being deployed around the world to enable Internet of Things (IoT), machine-to-machine (M2M), and smart city, and industrial applications. We will demonstrate a fast and easy way to participate in this technology. You will see modems and the entire infrastructure simulated with existing development tools.			
19114 LAB7	meet with our Experts on Bluetooth, WIFI, Ethernet, TCP/IP, Cloud and IoT technologies	"Bluetooth, Wi-Fi, Ethernet, TCP/IP and Cloud are key technologies in modern IoT systems. Come and talk to our Experts about your application and get help choosing the right technology for your needs. These sessions will also allow you to get hands-on time with our range of development tools and solutions aimed at Connectivity and IoT. If you simply want try out the functionality of a development board with experts available to support, we can help you achieve this. There will be a mix of fixed hands on labs you can work through or, if you have a more specific need, please book your session and advise us of any particular requirements and we will try to accommodate."			
19115 LAB8	meet with our Experts on analog Signal Chain	The real world will always be analog! Extremely low power consumption, accuracy, speed and power conversion efficiency are still the domain for analog solutions. Get familiar with our implementation for power metering and discover how digitally enhanced analog products can bring new flexibility to your design. Discuss how to implement 200 megasamples high resolution converters, offset voltages in the microvolt range, sub microamps power consumption and lowest possible noise levels.			
19116 LAB9	Microchip MCU's & Development Tools	Microchip FAE's will be available for this session. Come with your questions on MPLABX, MPLAB Harmony, XC Compilers, Code Libraries, our Evaluation tools and related MCU's. Specific questions should be entered during registration.			
19117 LAB10	meet with our Graphics Experts	Learn how a complete toolchain can simplify your next graphics design. This includes GDD X Microchip Graphics Display Designer X, a design tool within MPLABx. The MHC Microchip Harmony Configurator enables seamless integration of the different Software Stacks and adds a powerful Graphics Library. Our Experts will help you to navigate you to an adequate solution for your design.			

Tech Levels

- 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.
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EUROPEAN MASTERs CONFERENCE 2015 CLASS LIST

Class	Title	Abstract	Hours	Tech Level	Prerequisites
19118 LAB11	meet with Experts from MATRIX to learn about their flowcode solution	Flowcode 6 allows you to quickly and easily develop complex electronic and electromechanical systems. The graphical programming tool allows even those with little experience to develop complex electronic systems in minutes. Engineers use Flowcode to reduce need for understanding of coding languages such as C, and to speed up their development time. What's more, users can also use their own C code within Flowcode. Flowcode allows users to develop systems for control and measurement based on microcontrollers, rugged industrial interfaces or Windows compatible personal computers. The latest features of Flowcode include Ghost Technology for test and debug, the ability to interface with external third-party hardware, a 3D simulation engine and user-driven personalised component creation. In this session we will have Experts from Matrix on site to answer your detailed questions on this solution or simply to demonstrate Flowcode.			
19119 LAB12	meet with Experts form Lab Center to learn about their solution	Proteus integrates all the schematic capture, simulation and PCB layout tools into a unified environment giving the designer an unparalleled tool suite. During this session we will demonstrate the new features of Proteus working with Microchip tools and create and simulate a PIC® MCU design. We will have Labcenter technical experts on hand to answer any Proteus questions you may have.			
19120 LAB13	meet with Experts on Ethercat	Ethercat is the open real-time Ethernet network originally developed by Beckhoff. EtherCAT sets new standards for real-time performance and topology flexibility. In this Lab we will show our Ethercat Slave solution.			
19121 LAB14	meet with Experts from Equologic on coaxial communications solutions	We will have different demos available to show 3G-SDI over Coax, Camera Control over Coax, Power over Coax.			
19122 LAB15	Meet with Experts from Teledyne Lecroy to learn about USB Compliance Testing	During this slot Teledyne LeCroy in cooperation with Tameq (Teledyne LeCroy Business Partner) will demonstrate a USB 2.0 Device Compliance Test for physical and protocol layer using advanced test equipment like oscilloscope and protocol analyzer according to the specification published by the USB org. During this session the participants will get detailed information about test execution and interpretation of the results. Test-Equipment and software used will be the same as for official USB.org IF events, where Teledyne LeCroy supports the USB org.			
19123 LAB16	Meet with Experts from Teledyne Lecroy to learn about USB Protocol Analysis	During this slot Teledyne LeCroy in cooperation with Tameq (Teledyne LeCroy Business Partner) the participants will learn about the importance on using appropriate test tools during development qualification and performance testing. The Microchip starter kit will be used to generate USB traffic, which is captured and interpreted by the protocol analyzer. This session is held as a workshop to demonstrate the usage of the advanced USB test equipment during the development cycle.			
19124 LAB17	meet with Experts from LDRA to learn about Functional Safety	LDRA are world leaders in tools and techniques for formal verification and testing of code. Their software allows testing to various standards and the static rules checking integrates with MPLAB-X. Attendees of this session will be able to ask detailed questions of LDRA and will have the opportunity to explore how their products can be used to test their end devices performing the various activities such as: MISRA C:2012 compliance checking, quality metrics measurement, unit testing, structural code coverage which are necessary for conforming to standards such as ISO 26262, IEC 61508 and IEC 62304.			

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Class	Title	Abstract	Hours	Tech Level	Prerequisites
19125 LAB18	meet with our Experts on wireless / RF implementation topics	Microchip's low power wireless devices allow to build up short range radio links for metering, industrial automation, home control and many other applications. Let's discuss how to implement these devices into your application and learn something about RF PCB layout, antennas and propagation. You will be surprised how easy RF can be.			
19126 LAB19	meet with our Experts on EMC topics	Starting from an introduction into the basic requirements to a proper PCB design for good EMC performance, we will discuss some common mistakes on practical examples and simulations. Get some pragmatic assistance in choosing the right components and designing a proper PCB layout			
Guest Speakers					
19127 K2L	Efficient Test and Simulation approaches for CAN, LIN and MOST	"In almost every industry communication between and connectivity of electronic devices can be observed in many electronic systems. Microchip is one of the key players in these industries offering a large portfolio of semiconductor solutions for electronic communication and connectivity over bus systems such as CAN, LIN and MOST. They key to success for customers developing such kind of electronic systems is to manage time to market, mitigate cost and increase quality of their systems or devices. A crucial measure in that context is to start testing in the development process as early as possible. Since these connected devices or systems are communicating over bus systems such as CAN, LIN, MOST or other, a counterpart device connected to the device under test (DUT) is always needed talking these bus systems. Early in the development process these counterparts have to be simulated to test the DUT. This is the reason why test and simulation are the key to success of electronic distributed systems. This class gives an overview on possible and effective approaches how test and simulation can be applied very early in development process."	1.5	2	No prior knowledge on topic is necessary

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BUILD YOUR OWN AGENDA

USE THE TABLES BELOW TO CREATE YOUR EUROPEAN MASTERS AGENDA...

Tuesday 15th September

Start Time	Class Name	Class Number	Duration
09:00			
11:00			
12:30			
14:00			
16:00			
19:00			
20:30			

Wednesday 16th September

Start Time	Class Name	Class Number	Duration
07:30			
09:00			
11:00			
12:30			
14:00			
16:00			
18:00			

Thursday 17th September

Start Time	Class Name	Class Number	Duration
07:30			
09:00			
11:00			
12:30			
14:00			

MICROCHIP'S PREMIER TECHNICAL CONFERENCE
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MASTERS 2015



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