

Embedded Software Boot Camp® Course Syllabus

Course Length: 4 Days

CEUs: 3.0

Format: Hands-On/Lecture

Barr Group's Embedded Software Boot Camp® is an efficient and information-rich hands-on training program for embedded programmers of all levels. Through a combination of lectures and programming exercises on actual embedded hardware, attendees will learn how to use the C programming language to create portable device drivers, use real-time operating systems, and more. Attendees will independently complete nearly a dozen hands-on programming exercises, including a large capstone project. Students will be using Micrium's uC/OS-III operating system and uC/GUI graphics package.

Topics covered during this course include:

- Embedded C Fundamentals
- Programming Embedded Peripherals
- How to Handle Interrupts
- How to Choose a Language
- Fundamentals of Preemptive Multitasking
- Inter-task Communication and Synchronization
- Memory Management and Other Related Topics

Prerequisites

Attendees should be familiar with the C or C++ programming language. Prior experience programming for embedded systems may be beneficial but is not necessary.

Requirements

Each student will need a computer, such as a laptop, running XP or a newer version of Windows with an available USB port and administrator privileges. (Windows over Mac OS X generally works.)

Syllabus

The following summary covers the major course topics and may be modified at the instructor's discretion based on the needs and pace of the course.

- Introduction
 - Embedded C Fundamentals
- Fixed-Width Integers
 - Binary Data Manipulation
 - Fixed and Floating Point Math
 - Performance Improvement
 - Data Storage and Lifetimes
 - The World Before main()
- Peripheral Control
 - Peripheral Registers
 - Memory-Mapped I/O
 - Struct Overlays
 - Volatile Keyword
 - Bitmasks vs. Bitfields
 - Device Drivers
- Interrupt Handling
 - Interrupt Service Routines
 - Vector Tables
 - Hardware Hurdles
 - Disabling Interrupts
 - Interrupt Latency
- Language Choice
 - C vs. Assembly
 - C vs. C++
- Multitasking Fundamentals
 - Tasks and Task States
 - Scheduling Points
 - Context Switching
 - System Calls
 - Mutual Exclusion

- Intertask Communication
 - Semaphores
 - Mailboxes
 - Message Queues
 - Event Flags
 - Starvation and Deadlock
- Related Topics
 - Memory Management
 - Timer Ticks
 - OS Hooks
 - Interrupt Handling
- Key Takeaways