

## Arm-Cortex-M-Efficient-System-Design-and-Development

### Summary

Arm Cortex-M training courses are designed to help engineers working on new or existing Cortex-M system designs. Whether you're working on design, verification, validation, or developing software for a Cortex-M system, the course can be **configured according to your team's needs**.

Courses include fundamental topics to enable a solid platform of understanding. The rest of the course then builds on from this with optional topics and can be tailored appropriately. Some key topics are delivered via **pre course on-demand video**.

**Learning activities** such as interactive workbooks, walkthrough examples and quizzes are incorporated into the training to help bring the learning to life.

A **pre course call** with the engineer delivering the training will help you discuss your team's individual training requirements.

At the end of the course delegates will be able to:

- Describe different Cortex-M processors features and their use.
- Explain the fundamentals of the M-profile architecture.
- Identify and solve key Cortex-M system design issues.
- Make appropriate system design choices.
- Decide on the best configuration options for their system.
- Develop standardised and efficient software for Cortex-M processor.
- Debug issues on Cortex-M processors.

Course Length	Delivery Method	Location
2-4 days	Classroom	Virtual or Onsite

### Audience

- Embedded Software Engineers
- Firmware Engineers
- Hardware Design Engineers
- Security Engineers
- System Architects
- Technical Authors
- Validation/Verification Engineers
- Project/Product Managers

### Prerequisites

- Knowledge of programming in C.
- Experience of assembler programming is not required but would be beneficial.
- Knowledge of embedded systems.
- A basic awareness of Arm is useful but not essential.

## Related Products

Armv6-M, Armv7-M, Armv8-M, Armv8.1-M, Cortex-M, Cortex-M0, Cortex-M0+, Cortex-M1, Cortex-M3, Cortex-M4, Cortex-M7, Cortex-M23, Cortex-M33, Cortex-M35P, Cortex-M55, SC000, SC300, SecurCore, IoT, M-profile, PSA, TrustZone, DSP, Helium, TF-M

## Topics

Agendas will be created from the following list of fundamental and optional topics

Fundamental Topics	Optional Architecture & Software Development Topics	Optional Hardware Design Topics
<ul style="list-style-type: none"> <li>• Introduction to the Arm Architecture ♥</li> <li>• Introduction to Armv7-M ♥</li> <li>• Introduction to Armv8-M ♥</li> <li>• Introduction to Armv8.1-M</li> <li>• Introduction to TrustZone for M-profile ♥</li> <li>• CMSIS Overview ♥</li> <li>• Cortex-M Overview</li> <li>• Programmers Model</li> <li>• Memory Model</li> <li>• Exception Handling</li> <li>• Debug and Trace</li> <li>• Migrating from other Arm Systems</li> <li>• Physical Protection (SecurCore and Cortex-M35P only)</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly Language Programming</li> <li>• Booting &amp; Initialisation</li> <li>• Compiler and Linker Fundamentals</li> <li>• Further Compiler Hints and Tips</li> <li>• Further Linker Hints and Tips</li> <li>• Synchronization</li> <li>• Cache Management</li> <li>• MPU Programming</li> <li>• Security Extension (TrustZone-M)</li> <li>• Floating-point Extension</li> <li>• DSP Extension</li> <li>• MVE (Helium) (Cortex-M55 only)</li> <li>• Arm Platform Security Extension (PSA)</li> <li>• Trusted Firmware for Cortex-M (TF-M)</li> </ul>	<ul style="list-style-type: none"> <li>• Cortex-M Processor Core</li> <li>• AMBA AHB</li> <li>• AMBA APB</li> <li>• AMBA AXI</li> <li>• Cortex-M Clocks, Reset and Power Management</li> <li>• SysTick Timer</li> <li>• Introduction to CoreSight</li> <li>• Cortex-M Configuration</li> <li>• Cortex-M System Interfaces</li> <li>• Micro Trace Buffer (MTB)</li> <li>• Safety Features</li> <li>• Security Features</li> </ul>

♥ = Online and on-demand.

## Related face-to-face and on-demand courses

- CoreSight Training
- Cryptocell-312 Training
- Introduction to Arm DS ♥
- Introduction to Keil MDK ♥
- Introduction to Fast Models ♥
- PSA Threat Analysis
- Trusted Firmware for Cortex-M (TF-M)

## Example Training Courses

### "Cortex-M55 Fundamentals" (2 Days)

- Cortex-M55 Overview
- Armv8.1-M Overview
- Programmers Model
- Cortex-M55 Clocks, Reset & Power
- MVE Overview
- Booting & Initialisation
- Debug & Trace
- Cortex-M55 Configuration
- Cortex-M55 System Interfaces

### "Migrating from Cortex-M7 to Cortex-M55" (4 Days)

- Cortex-M55 Overview
- Armv8.1-M Overview
- Programmers Model
- Memory Model
- Cortex-M55 Processor Core
- Exception Handling
- Synchronization
- MVE Overview
- Caches Management
- Cortex-M55 Clocks, Reset & Power
- Memory Protection
- Security Extension
- Cortex-M55 Safety Features
- Cortex-M55 Security Features
- Cortex-M55 Configuration
- Cortex-M55 System Interfaces
- Compiler & Linker Fundamentals
- Booting & Initialisation
- Debug & Trace

### "Cortex-M7 Software Development (3 Days)"

- Cortex-M7 Overview

- Programmers Model
- Memory Model
- Assembly Language Programming
- Cortex-M7 Processor Core
- Exception Handling
- Cache Management
- Synchronization
- MPU Programming
- Compiler and Linker Fundamentals
- Further Compiler Hints and Tips
- Further Linker Hints and Tips
- Debug and Trace
- DSP Extension
- Floating-point Extension

## **"Cortex-M23 Hardware Design" (3 Days)**

- Cortex-M23 Overview
- Programmers Model
- Memory Model
- Memory Protection
- Assembly Language Programming
- Cortex-M23 Processor Core
- AMBA 5 AHB
- Exception Handling
- Cortex-M23 Clocks, Reset and Power
- SysTick Timer
- Debug & Trace
- Introduction to CoreSight
- Security Extension
- Cortex-M23 Configuration
- Cortex-M23 System Interfaces

## **"Cortex-M33 System Design" (4 Days - combined Hardware Design and Software Development course)**

- Cortex-M33 Overview
- Programmers Model
- Memory Model
- AMBA 5 AHB
- Cortex-M33 Processor Core
- Assembly Language Programming
- Exception Handling
- Cortex-M33 Clocks, Reset and Power
- SysTick Timer
- Debug
- MPU Programming
- Security Extension

- Synchronization
- Compiler and Linker Fundamentals
- Booting and Initialisation
- Introduction to CoreSight
- Debug & Trace
- Cortex-M33 Configuration
- Cortex-M33 System Interfaces