multisoft
Systems

STM32 Training

COURSE CONTENT

GET IN TOUCH

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About Multisoft

Train yourself with the best and develop valuable in-demand skills with Multisoft Systems. A leading certification training provider, Multisoft collaborates with top technologies to bring world-class one-on-one and certification trainings. With the goal to empower professionals and business across the globe, we offer more than 1500 training courses, which are delivered by Multisoft's global subject matter experts. We offer tailored corporate training; project Based Training, comprehensive learning solution with lifetime e-learning access, after training support and globally recognized training certificates.

About Course

STM32 Training by Multisoft Systems is designed to help you build strong, job-ready skills in embedded systems using STM32 ARM Cortex-M microcontrollers. The program starts with core concepts like MCU architecture, memory mapping, registers, clock configuration, and development workflows, so you understand what's happening under the hood while you code.

Module 1: Introduction to Embedded Systems & ARM Cortex

- ✓ What is an Embedded System?
- ✓ Introduction to ARM architecture
- ✓ Features and advantages of Cortex-M series
- ✓ Overview of STM32 microcontrollers
- ✓ Applications of STM32 in industry

Module 2: STM32 Architecture & Peripherals

- ✓ STM32 family overview (F0, F1, F3, F4, G0, L0 series)
- ✓ Block diagram interpretation
- ✓ CPU, memory organization (Flash, SRAM, EEPROM emulation)
- ✓ Bus architecture (AHB, APB)
- ✓ Clock system and power domains

Module 3: Development Tools & Environment Setup

- ✓ Installing IDEs (STM32CubeIDE / Keil / IAR)
- ✓ Configuring toolchains
- ✓ Introduction to STMCubeMX
- ✓ Project creation and code generation
- ✓ Debugging setup

Module 4: GPIO Programming

- ✓ GPIO modes and configurations
- ✓ Digital input and output operations
- ✓ Alternate function GPIO pins
- ✓ Interrupts & EXTI (External Interrupts)
- ✓ Practical GPIO exercises

Module 5: Clock Configuration

- ✓ System clock tree and sources
- ✓ PLL configuration
- ✓ AHB and APB prescalers
- ✓ Low power modes and clock management
- ✓ Hands-on clock setup labs

Module 6: Timers & Delay Management

- ✓ Basic timers (TIMx) introduction
- ✓ Timer modes (up/down counting)
- ✓ PWM generation
- ✓ Input capture and output compare
- ✓ Timer interrupts and callbacks

Module 7: ADC (Analog to Digital Converter)

- ✓ ADC features and internal architecture
- ✓ Single-shot vs continuous conversion
- ✓ Channel sampling and configuration
- ✓ Interrupts and DMA with ADC
- ✓ Practical ADC exercises

Module 8: DAC (Digital to Analog Converter)

- ✓ DAC fundamentals
- ✓ Output waveform generation
- ✓ Trigger sources and configurations
- ✓ DAC with timers

Module 9: Communication Interfaces

- ✓ USART / UART

- Configuration and basic communication
- Interrupt & DMA modes

✓ SPI (Serial Peripheral Interface)

- Master/slave communication
- Full-duplex vs half-duplex

✓ I2C (Inter-Integrated Circuit)

- Addressing modes
- Multi-master communication

✓ CAN / USB (optional depending on course level)

- CAN bus setup and message framing
- USB device/host basics

Module 10: DMA (Direct Memory Access)

✓ DMA controller overview
✓ Peripheral to memory/memory to memory
✓ DMA with ADC, UART, Timers
✓ Practical DMA use cases

Module 11: NVIC & Interrupt System

✓ Nested Vector Interrupt Controller (NVIC)
✓ IRQ priority configuration
✓ Shared interrupt handlers
✓ Real-time event handling

Module 12: Low Power Modes & Power Optimization

- ✓ Sleep, Stop, Standby modes
- ✓ Wakeup sources
- ✓ Power consumption analysis
- ✓ Practical low-power application examples

Module 13: RTOS (FreeRTOS) Basics

- ✓ RTOS fundamentals
- ✓ Task creation and scheduling
- ✓ Queues, semaphores, mutexes
- ✓ Interrupt-to-task communication
- ✓ Integrating FreeRTOS with STM32

Module 14: Bootloaders & Firmware Upgrades

- ✓ What is a Bootloader?
- ✓ Designing custom bootloader
- ✓ Firmware Over-The-Air (FOTA) basics
- ✓ Bootloader security considerations

Module 15: Debugging & Troubleshooting

- ✓ Debugging with breakpoints
- ✓ Peripheral register view
- ✓ Logic analyzer and oscilloscopes
- ✓ Common issues and resolution techniques