

# FreeRTOS on STM32

32 Hours

## Course Description

This Online Course focuses on the utilization of CMSIS\_OS v1.x based on the FreeRTOS operating system in STM32 MCU applications. Engineers will gain insights into FreeRTOS features, components, configuration options, and API functions. The course emphasizes practical knowledge, demonstrating the integration of FreeRTOS with other STM32 ecosystem components such as the HAL library and STM32CubeMX for code generation

## Audience

This course is designed for engineers seeking a comprehensive understanding of FreeRTOS and its implementation with STM32 MCUs. It is particularly beneficial for those looking to enhance practical skills in CMSIS\_OS v1.x based application development using FreeRTOS as the underlying operating system.

## Pre-requisite Knowledge/Skills

- Any STM32L4 based board (preferably NUCLEO or Discovery)
- 1x miniUSB A/B cable
- PC (MS Windows 7, 8, 10) with preinstalled software:
- STM32 toolchain supported by STM32CubeMX (EWARM, MDK-ARM, STM32CubeIDE, SW4STM32, TrueStudio)
- STM32CubeMX
- STM32L4-Cube library

## Course Objectives

Upon completion of this participants will:

- Improve their knowledge of FreeRTOS and its main features.
- Enhance practical skills related to CMSIS\_OS v1.x based application development using FreeRTOS.
- Gain proficiency in configuring and utilizing FreeRTOS with other STM32 ecosystem components.
- Learn effective debugging support for the operating system.

# Course Outline

## Module 1: FreeRTOS Basic Features

- Introduction to FreeRTOS fundamentals
- Understanding task scheduling and prioritization

## Module 2: Resources Used by Operating System

- Exploration of hardware resources allocated by FreeRTOS

## Module 3: FreeRTOS and its STM32CubeMX Support

- Integration of FreeRTOS with STM32CubeMX for code generation
- Leveraging STM32CubeMX to streamline configuration

## Module 4: Configuration of the Operating System

- Hands-on exercises on configuring FreeRTOS parameters

## Module 5: Memory Allocation

- Understanding memory allocation in FreeRTOS applications

## Module 6: FreeRTOS Scheduler

- In-depth exploration of FreeRTOS scheduling mechanisms

## Module 7: Tasks in FreeRTOS

- Practical implementation and management of tasks

## Module 8: Intertask Communication Methods

- Queues, semaphores, signals, and mutexes for intertask communication

## Module 9: Software Timers in Operating System

- Utilizing software timers for time-based operations

## **Module 10: Debug Support of the Operating System**

- Techniques for effective debugging in FreeRTOS applications