

## PREREQUISITES

### PREREQUISITE SKILLS

The following are the basic requirements in terms of skills for each of the candidates:

- Working knowledge of the Microsoft Windows Operating System
- Object-Oriented Programming concepts
- Proficiency in any programming language (preferably C/C++)
- Know how to access the Internet and use email services
- Know various web terminologies including:
  - Internet
  - World Wide Web
  - HTTP, FTP, SMTP, POP3, IMAP, etc.

### LAB SETUP

For the Participants' Machines (**in the order of installation**):

- Windows 10/11 with Service Packs
  - Window Components
    - IIS 10.0
    - WCF HTTP Activation
    - WCF Non-HTTP Activation
- Office 2013 or above with Service Packs
- Microsoft Edge
- Google Chrome
- **Node** and **NPM**
- **Git for Windows** from <https://git-for-windows.github.io/>
- **FREE SQL Server Developer Edition** downloadable from Microsoft at: <https://www.microsoft.com/en-in/sql-server/sql-server-downloads>
- **FREE SQL Server Management Studio** downloadable from Microsoft at: <https://docs.microsoft.com/en-us/sql/ssms/download-sql-server-management-studio-ssms>
- **Visual Studio 2022** (Professional / Ultimate)
  - Or the **FREE Visual Studio 2019/2022 Community Edition** downloadable from Microsoft at: <https://visualstudio.microsoft.com/downloads/>

Other Requirements

- Administrator Access Grant on the local computer
- Activated Azure Account with Privileges to Add Resources
- GitHub Account (with Access permissions to Visual Studio from the local computer)

### PRE-TRAINING PREPARATION

All participants are expected to have gone through the online tutorials on the following topics:

- HTML ( <https://www.w3schools.com/html/default.asp> )
- CSS ( <https://www.w3schools.com/css/default.asp> )
- JavaScript ( <https://www.w3schools.com/js/default.asp> )
- Bootstrap5 ( <https://www.w3schools.com/bootstrap5/index.php> )
- XML ( <https://www.w3schools.com/xml/default.asp> )
- JSON ( [https://www.w3schools.com/js/js\\_json.asp](https://www.w3schools.com/js/js_json.asp) )
- SQL ( <https://www.w3schools.com/sql/default.asp> )

**Module 01: Understanding the Development Process**

**LEVEL 2**

- SDLC Vs Agile Development Process Vs SCRUM
- Source Code Versioning and GIT
- Working with GIT
  - Check-In, Check-Out
  - Branching and Merging
- SCRUM Roles and Responsibilities
- DevOps – Steps and Workflows

**Module 02: Introduction to Development Models**

**LEVEL 1**

- Application Development Models
  - The Desktop model
  - The Client-Server model
  - The Web model
- Advantages of the Web Application Model
- Client-side scripting Vs. Server-Side Scripting
- Tools and Environments for developing a Web Application
- Role of the IIS

**Module 03: Overview of the Microsoft .NET Framework**

**LEVEL 1**

- Introduction to the .NET
- Overview of ASP.NET
  - Introduction to Common Language Runtime (CLR)
  - Introduction to the Common Type System (CTS)
  - Introduction to the Common Language Specifications (CLS)
  - Compilation
  - Just-In-Time (JIT) Compilation
- Managed Code Vs. Unmanaged Code
- .NET Platform Vs..NET Framework Vs. .NET Standard Vs..NET CORE

**Module 04: Using Microsoft Visual Studio .NET**

**LEVEL 1**

- Overview of Visual Studio .NET
- Creating a Console Application Project
- Creating a desktop Windows Forms Project
- Recommended Practices
  - Comments and Documentation
  - Naming Conventions
- Compiling, Running, and Debugging

**Module 05: Working with Types in C#**

**LEVEL 1**

- Using Built-In Data Types
- Creating User-Defined Data Types
- Converting Data Types
- Typecasting
- Checked and Unchecked
- Boxing and Un-boxing data types

**Module 06: Methods and Parameters using C#**

**LEVEL 1**

- Using Methods
- Using Parameters
- Using Overloaded methods

**Module 07: Essentials of Object-Oriented Programming in C#**

**LEVEL 2**

- Classes and Objects
- Using Encapsulation
- C# and Object-Oriented
- Defining Object-Oriented Systems
  - Namespace
  - Class
  - Data Field
  - Property
  - Method
  - Indexer
  - Constructor
  - Destructor

**Module 08: Language Enhancements in C# - Advanced concepts, continued**

**LEVEL 3**

- Managing inheritance and Polymorphism
  - Sealed
  - Abstract
- Partial Classes
- Defining Event Driven Systems
  - Delegates
  - Events
  - Interfaces
  - Design Patterns & Observer Patterns
- Understanding Class Libraries
- Understanding and working with NuGet packages

**Module 09: Key Language Enhancements in the C# 3.0**

**LEVEL 4**

- Implicitly typed local variables
- Extension methods
- Object Initialization Syntax
- Collection Initialization Syntax
  - Working with Custom Collections
- Lambda expressions
- Query expressions
- Expression Trees
- Anonymous Types
- Partial Methods
- Generics
- LINQ

**Module 10: Key Language Enhancements in the C# 4.0**

**LEVEL 4**

- Dynamic Data Types
- Named Arguments
- Optional Arguments

**Module 11: Multi-Threading and Parallelism in C#**

**LEVEL 3**

- Understanding Threads
- Handling Multi-Threaded Code
  - Addressing Thread Safety
- Working with Object Locks

<b>Module 12: Key Language Enhancements in C# 5.0</b>	<b>LEVEL 4</b>
<ul style="list-style-type: none"> <li>• Working with the Task Parallel Library (TPL) <ul style="list-style-type: none"> <li>○ Parallel Extensions</li> <li>○ Parallel Extensions into LINQ</li> </ul> </li> <li>• Tasks</li> <li>• Understanding and working with the Async / Await Feature</li> </ul>	
<b>Module 13: Introduction to ASP.NET concepts</b>	<b>LEVEL 2</b>
<ul style="list-style-type: none"> <li>• Visual Studio Project Templates <ul style="list-style-type: none"> <li>○ Web Site</li> <li>○ Web Application</li> <li>○ .NET Core Web App</li> <li>○ SPA</li> </ul> </li> <li>• Understanding the Project Template Structures</li> <li>• Web Configuration Files</li> </ul>	
<b>Module 14: Understanding and Working with Controllers</b>	<b>LEVEL 2</b>
<ul style="list-style-type: none"> <li>• Understanding Patterns: MVC Vs. MVP Vs. MVVM</li> <li>• Introduction to Controllers</li> <li>• Routes and Controllers <ul style="list-style-type: none"> <li>○ ASP.NET Controllers Vs API Controllers</li> </ul> </li> <li>• Actions and Parameters</li> <li>• Action Results</li> <li>• Action Filters</li> </ul>	
<b>Module 15: Understanding foundational ASP.NET Concepts</b>	<b>LEVEL 3</b>
<ul style="list-style-type: none"> <li>• Inversion of Control</li> <li>• Dependency Injection</li> <li>• Services</li> <li>• Handlers</li> </ul>	
<b>Module 16: Database Concepts</b>	<b>LEVEL 2</b>
<ul style="list-style-type: none"> <li>• DDL, DML, DCL</li> <li>• Database Concepts</li> <li>• Database Normalization Process</li> </ul>	
<b>Module 17: Understanding EF Core and Models and Validation</b>	<b>LEVEL 3</b>
<ul style="list-style-type: none"> <li>• Key Entity Classes <ul style="list-style-type: none"> <li>○ Data Context</li> <li>○ Data Models</li> </ul> </li> <li>• Attributes and using Data Annotations for Validation</li> <li>• Validators &amp; Custom Validation Attributes</li> </ul>	
<b>Module 18: Model Binding and View Model</b>	<b>LEVEL 4</b>
<ul style="list-style-type: none"> <li>• The role of the Model Binder</li> <li>• View Model Vs. Domain Model Vs. Data Model</li> </ul>	

**Module 19: Advanced Concepts in Entity Framework Core****LEVEL 4**

- Key Entity Classes revisited
- Understanding the differences between Database-First and Model-First Approach
- Understanding and working with Data Migrations and addressing Versioning of Data
  - Importance of Code Migrations
  - Working with Enumerations in EF Core
  - Seeding the Database
  - Data Versioning
- Working with Stored Procedures

**Module 20: Unit Testing and Test-Driven Development (TDD)****LEVEL 3**

- Understanding Test Driven Development using xUnit
- Test-Driven Design
- Controller Tests
- Creating Action Tests
- Creating and Automating Tests using the Visual Studio Test Studio

**Module 21: TypeScript and ECMAScript (ES6)****LEVEL 4**

- Understanding TypeScript and ECMAScript
- Understanding Prototypes
- Classes
- Properties, Methods, Events, and Constructors
- Scoping and Modules
- Understanding and Working with Promise
- Transpiling TypeScript

**Module 22: Introduction to Angular****LEVEL 2**

- What is Angular?
- Project Setup
  - Typical Angular Project Setup
  - Angular 8 in Visual Studio 2022
- How Angular works
- Angular Modules
- Angular Components
- Templates and Styles

**Module 23: Advanced Angular Concepts****LEVEL 3**

- Routing
- Observables
- Components and Databinding
- Services and Dependency Injection

**Module 24: Advanced Angular Concepts****LEVEL 4**

- Data binding the UI and performing CRUD operations with the Web API using Angular
- Enriching the UX