Course Design Document

Course Code	
Course Name	C# Programming

Duration (in days)	16	Proficiency Level	Fundamental
Pre-requisites	C / C++ Programming	Target Audience	Campus Hires

Learning Outcome

At the end of the program, participants will learn:

- C# Language Syntax
- Implementation of OOC in C# Language
- Collections and Generics
- Assemblies and GAC
- Exception Handling
- IO Streams
- GoF Design Patterns
- Reflection And Attributes
- Advanced Concepts of Classes
- Delegates & Events
- Multithreading
- Task Parallel Library
- Serialization & Deserialization

Day-wise Session Plan

Day	Unit	Objective(s)	Hours
1	MS.NET Framework Fundamentals	**MS.NET Framework Fundamentals** • What is Microsoft .NET? • **.**Net Framework • .Net Core Framework • .Net Framework vs .Net Core • Common Language Runtime • Metadata • Common Type System • Framework Class Library • Language Interoperability	2
	C# First Program	• First .Net Application using Visual Studio 2022 • Command Line Arguments • Return Value of Main • Using Command Line Compiler • Using VS Code for building .Net Core Applications • Creating .Net Core Applications using VSCode	2
	C# Language Syntax	• C# Introduction and Evolution	

		• Classes and Structures • Data Types • Value Types and Reference Types • Implicit and Explicit Casting • Programming Constructs	4
2	C# Language Syntax (Continued)	• Boxing & Unboxing • Operators • Control Statements • Working with Arrays • Multi-Dimensional Arrays • Jagged Arrays • Nullable Types • Ref and Out Parameters • Unsafe Code	8
3	Overview of Gang of Four (GoF) Design Patterns	• Creational Patterns • Structural Patterns • Behavioral Patterns • Implementing GoF Patterns in C# • Understanding the implementation of GoF Patterns in .Net Library / APIs • Consequences of using Design Patterns	8
4	Getting Started with OOP	• Writing Classes & Initializing Objects • Access specifiers • Writing methods in Classes • Working with Properties in Class • Constructors and Destructors • Parameterized Constructors • Copy Constructors in C# • Mutable & Immutable types • Singleton Pattern in C#	5
	Static keyword	• Static Classes • Static Constructors • Static variables • Static Members • Static vs non static	3
5	Implementing Inheritance in C#	• Protected Keyword and Constructors In Inheritance • Casting Between Reference Types • Static And Dynamic Binding • Abstract Class & Methods • Object Class As Parent • Single Inheritance • Multi vs Multi level Inheritance • Var and dynamic keyword • Stopping Inheritance using sealed keyword • Sealed Classes • Abstract Factory Pattern	8

		• Factory Method Pattern	
6	Implementing Interfaces & Polymorphism	• Polymorphism And Syntax Of Interface • Explicit Implementation & Casting • Types Of Interfaces • Method overloading • Method Overriding • Virtual keyword • Late binding vs early binding • Runtime polymorphism • Façade Pattern	8
7	C# Programming Constructs	• Partial Classes • Extension methods • Collection Initializers • Object Initializers • Nullable Types • Enums • Tuples • Const keyword • Readonly keyword • Anonymous Types	8
8	Collections and Generics	• Introduction To Collection Classes • ArrayList • HashTable • Dictionary • Stack • Queue • LinkedList • BinaryTree • IEnumerable, IComparable And IComparer Interface • Indexers • Writing Generic Classes & Methods • Generic Constraints • Generic Delegates • Generic Interfaces • Generic Collection Classes	8
9	Assemblies and GAC	• Assemblies • Public and Private Assemblies • Class Library • Shared Assemblies And GAC	4
	LINQ	• LINQ • Linq Operators • Query Expressions • Lambda Expressions • IQueryable interface • PLinq	4

10	Exception Handling	• What are Exceptions? • Try & Catch Blocks • Throw And Finally Keywords • Writing Custom Exceptions • Global Exceptions	2.5
	Memory Management	• Garbage Collection • Mark-Sweep Algorithm • Finalizers • IDisposable Interface • Dispose method	2.5
	String Operations	• Handling Strings • String Operations • String Builder • Builder Design Pattern	3
11	Regex	• RegularExpressions • Regex Class • Match method	4
	Windows Forms	• Creating Windows Forms • Working with Controls like Textboxes, Buttons, Listboxes,Menus etc.	4
12	IO Streams	• What are Streams & Types Of Streams • Standard IO Streams • Dealing With FileStreams • Binary Reader & Binary Writer • TextReader, TextWriter classes • Working With File System • Directory • Path • MemoryStream	8
13	Reflection and Attributes	• Reflection • Reflection And Attributes • Pre-Defined Attributes • Custom Attributes Include Invoking members using reflection with binding options	4
	Delegates & Events	• Declaring And Using Delegates • Singlecast & Multicast Delegates • Anonymous Delegates • Covariance and Contravariance • Async Callbacks • Declaring & Handling Custom Events	4
14	Multi-Threading	• Multithreading Overview • Programming Threads • Thread Priority • Suspend Resume Interrupt and Cross Thread Operations • Background & foreground threads	8

		• Thread Pool • Sync Using Monitor • Sync Using Mutex • Lock statement • Sync Using Semaphore & Events	
15	Task Parallel Library (TPL)	• Creating and working with Tasks • async-await • Task Continuation • Parallel.For and Parallel.ForEach • Task.Factory and TaskCreationOptions • TaskSchedulers • Handling Exceptions in TPL • CancellationToken	8
16	Serialization and Deserialization	• Need for Serialization • XML Serialization • Binary Serialization • JSON Serialization • Controlling Serialization • Memento Design Pattern	8