1. Introduction to C# and .NET Framework

- Overview of .NET Framework and .NET Core
- Features of C# and its applications
- Common Language Runtime (CLR)
- Understanding Intermediate Language (IL)
- Just-In-Time (JIT) Compiler
- Common Language Specification (CLS) and Common Type System (CTS)

2. Basic C# Syntax and Structure

- C# Program Structure and Syntax Rules
- Variables, Data Types, and Type System
- Operators (Arithmetic, Relational, Logical, Bitwise, etc.)
- Constants, Literals, and Type Casting
- Nullable Types

3. Control Structures

- Conditional Statements (`if`, `else`, `switch`)
- Looping Statements (`for`, `foreach`, `while`, `do-while`)
- Jump Statements (`break`, `continue`, `return`, `goto`)
- Exception Handling Basics (`try`, `catch`, `finally`, `throw`)

4. Object-Oriented Programming in C#

- **Classes and Objects**:
  - Defining and Instantiating Classes and Objects
  - Properties, Methods, and Fields
- **Constructors and Destructors**:
  - Types of Constructors, including Static Constructors
- **Encapsulation**:
  - Access Modifiers (Public, Private, Protected, Internal)
  - Properties and Auto-Implemented Properties
- **Inheritance**:
  - Base Classes, Derived Classes
  - Method Overriding and `virtual` / `override` keywords
  - `sealed` Keyword and Preventing Inheritance
- **Polymorphism**:
  - Method Overloading and Method Overriding
  - Upcasting and Downcasting
- **Abstraction**:
  - Abstract Classes and Abstract Methods
  - Interfaces and Interface Inheritance
- **Interfaces vs. Abstract Classes**:
  - Differences and Practical Usage Scenarios

5. Advanced OOP Concepts

- Partial Classes and Partial Methods
- Static Classes and Static Members
- Nested Classes
- Generics in C#:
    - Generic Classes, Methods, Delegates, and Constraints
- Anonymous Types and Dynamic Types

6. Delegates and Events

- Understanding Delegates and Multicast Delegates
- Events and Event Handling
- `Action`, `Func`, and `Predicate` Delegates
- Lambda Expressions and Anonymous Methods

7. Collections and Data Structures

- Arrays (Single, Multidimensional, Jagged)
- Array vs. ArrayList
- Collections in C#:
    - List, Dictionary, Queue, Stack, HashSet, SortedSet
- Working with `IEnumerable`, `IEnumerator`, and LINQ for Collections
- Custom Collections and Implementing Interfaces (`IComparable`, `IComparer`)

8. Language Integrated Query (LINQ)

- LINQ to Objects
- LINQ Query Syntax and Method Syntax
- Standard Query Operators (Select, Where, OrderBy, GroupBy, Join, etc.)
- Lambda Expressions in LINQ
- LINQ to XML, LINQ to SQL, LINQ to Entities

9. File Handling and I/O Operations

- Working with `System.IO` Namespace
- Reading and Writing to Text and Binary Files
- `FileStream`, `StreamWriter`, `StreamReader`
- Working with `File`, `Directory`, `Path` Classes
- Serialization and Deserialization:
    - XML Serialization, JSON Serialization, Binary Serialization

10. Asynchronous Programming

- **Threads and Threading**:
    - Creating Threads, Thread Pooling, Thread Safety
    - Synchronization (`lock`, `Monitor`, `Mutex`)

- **Task-Based Asynchronous Programming**:
    - `Task` and `Task<T>`, Parallel Programming
    - `async` and `await` Keywords
    - Exception Handling in Async Methods
- **Parallel LINQ (PLINQ)** and its Uses