

The C# Programming Language

Length: 30 – 40 hours, depending on the practical part

Required facilities: VGA projector, white board, one workstation (per two programmers), Microsoft Visual C# Express Edition (or Microsoft Visual Studio)

Who can participate: programmers who want learn the fundamentals of C# and .NET platform

Prerequisites: it is helpful the knowledge of another object oriented language like Java or C++, the basics of object oriented programming

Course objectives: a solid introduction of C#, main elements of the .NET platform

Related courses: Object oriented analysis and design, Design Patterns, specialized courses related to .NET – Windows Forms, WPF, ASP .NET

Attendees' evaluation: optional, during the training and/or a final test

Description: this course is designed to enter .NET programming by using C#. Even the main goal is the C# programming language, there are covered .NET related issues due to the intimate bond between the language and the underlying platform. Besides the language there are presented the main class packages.

The theory is illustrated by examples and it is exercised by solving practical problems.

This course is the foundation for more specialized courses related to the .NET technologies: Windows Forms, Windows Presentation Foundation (WPF), Active Server Pages (ASP .NET), etc.

Contents:

1. .NET Architecture – relation between C# and .NET, CLR – Common Language Runtime, Assemblies, framework .NET classes, namespaces, use of C# in enterprise applications
2. Introduction to C#, basics – variables, predefined types, program control, enumerations, arrays, use of namespaces, compilation, console input/output, preprocessor directives

3. Types and objects – classes and structs, class members, anonymous types, partial classes, static classes, Object class, extending the classes – extension methods
4. Inheritance – types of inheritance, implementation inheritance, virtual methods, methods hiding, abstract classes and abstract methods, sealed classes and methods, constructors, modifiers, interfaces
5. Arrays – simple arrays, multidimensional arrays, jagged arrays, Array class, array and collection interfaces, enumerations, IEnumerator, foreach, yield
6. Operators and casts – checked, unchecked, is, as, typeof, nullable types, type conversions, boxing and unboxing, comparing objects for equality, operator overloading, user defined casts
7. Delegates and events – declaring, using, multicast delegates, anonymous methods, Lambda expressions, use of events
8. Strings and regular expressions – System.String, StringBuilder, format strings, regular expressions
9. Generics – performance, type safety, creating, default values, constraints, inheritance, static members, generic interfaces, generic methods, generic delegates
10. Collections – collection interfaces and types, lists, queues, stacks, sorted lists, dictionaries, hashset, bit arrays
11. LINQ – Language Integrated Query
12. Memory management
13. Reflection – custom attributes, System.Type class, Assembly class
14. Exception handling – exception classes, catching exceptions, user defined exception classes
15. Threading – asynchronous delegates, Thread class, thread pools, threading issues, synchronization, timers
16. Manipulating files and the registry – files and directories, operations
17. Manipulating XML – standard support in .NET, classes in System.Xml, using the DOM in .NET, serializing objects in XML