

# Programming with C# Language II

Course code: GOC2125

The course is intended for all programmers who already have basic experience with programming in the C# language and want to acquire additional broader and practical knowledge and skills. In the course, you will learn to use modern extensions of the C# language, generic data types, delegates, events, extension methods, tuples, deconstruction, anonymous methods, lambda expressions, LINQ, attributes, but also records or, for example, compiler directives. You will also understand how memory management works with the Garbage Collector and learn to use compiler directives and Attributes, but many other interesting topics will be discussed. The course assumes basic knowledge of C# programming at least in the scope of the course [GOC2124].

## What we will teach you

- A brief overview of the .Net platform and the C# language
- Brief recap of PPE
- Generic data types
- Selected language extensions of the latest versions
- Delegates, Lambda expressions and LINQ
- Compiler Directives, Attributes and Assemblies
- Memory and Resource Management and Garbage Collector
- Reading and writing data using streams. Using CryptoStream.
- Data serialization
- Basics of asynchronous programming

## Required entry skills

- The course assumes knowledge and experience with programming in the C# language at the level of the GOC2124 course
- The course can be taken without prior knowledge of c# and the .Net platform, but in that case a very good programming knowledge of other platforms and languages such as Java or C++ is required.

## Teaching methods

- Expert interpretation with practical examples, exercises on computers.

## Studying materials

- Printed presentations of the discussed material.

## Course outline

A brief overview of the .Net platform and the C# language

- Overview of the .Net platform
- Basic command line tools
- A brief overview of the basic concepts of PPE
- Class and static members
- Inheritance and polymorphism
- Virtual methods and shading
- Interface

Generic data types

- Generic types and type safety
- Generic classes
- Generic interface
- Generic methods
- Generic collections

Operator overloading

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# Programming with C# Language II

- Introduction to overloading operators
- Implicit and explicit overloading

## Delegates and events

- Definition and use of delegates
- Callback usage
- Using events

## An extension of the language of previous versions

- Keyword "var"
- Partial Classes
- Nullable Types and Operators `??`, `?.`, `?[`
- Automatic properties
- Tuples
- Discards, Out variables, Deconstructions
- Extension methods
- Optional and named parameters
- Object Initializers

## Delegates Lambda expressions and LINQ

- Anonymous types
- Lambda expressions
- Generic delegates
- IEnumerable and IQueryable
- Closure
- Covariance and Contravariance

## Pattern Matching

- Pattern Matching Overview
- Switch Pattern Matching
- Is Pattern Matching
- Switch Pattern Expression and Expression Bodies

## Records

- Introduction to Records
- Mutability
- Value Equality

## Assemblies and attributes

- Compiler directives and conditional compilation
- Assemblies and the use of attributes

## Memory and Resource Management and Garbage Collector

- Garbage Collector
- Implicit and Explicit release of resources
- Interface IDisposable
- Using and IDisposable
- Weak references
- Generation

## Reading and writing data using streams

- Introduction to streams
- Using the FileStream class
- BinaryReader and BinaryWriter
- StreamReader and StreamWriter

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- Using the FileInfo class
- Using the FileSystemWatcher class
- Using the CryptoStream class

## Data serialization

- Introduction to serialization
- Shallow and deep serialization
- XML serialization
- Serialization Binary
- JSON serialization

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