

Modern C++ Programming

Audience Modern C++ Programming Course

The course Modern C++ Programming is intended for developers who are familiar with $\underline{C++}$ but who wish to delve into the newest and most advanced techniques and features of the language.

Prerequisites Course Modern C++ Programming

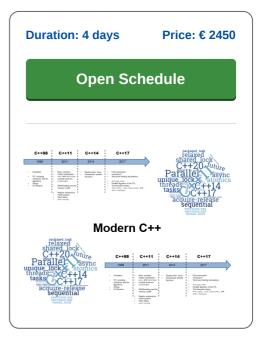
To join this course knowledge of the basic concepts of $\underline{C++}$ and programming experience in C++ is required.

Realization Training Modern C++ Programming

The concepts are treated on the basis of presentations. Illustrative demo's are used to clarify the concepts. Theory and practice are interspersed and there is ample opportunity to practice.

Certification Modern C++

Participants receive an official certificate Modern C++ Programming after successful completion of the course.



Content Course Modern C++ Programming

In the course Modern C++ the new and advanced aspects of the C++ language based on the standards C++11, C++14, C++17 and C++20 are extensively discussed.

C++11 Features

The course starts with an overview of the features that have been introduced in C++11 such as type inference, initializer lists, range based for loop, lambda functions and strongly typed enums.

Right References en Move Constructors

Next right references are discussed and the performance gains that can be booked by using move constructors in addition to copy constructors.

Inheritance Enhancements

The new possibilities with respect to inheritance with the keywords default, delete, override and final are also on the course program. The implementation of virtual functions and the need for virtual destructors are discussed as well.

Smart Pointers

Attention is paid to smart pointers like unique pointers, shared pointers and weak pointers.

Operator Overloading en Templates

Operator overloading and templates are also on the program and variadic templates and perfect forwarding are treated.

RAII Pattern

The modern C ++ Resource Acquisition is Initialization or RAII idiom is explained while discussing exception handling.

Multithreading

Attention is also paid to threads as well as the synchronization between threads which are now part of the C++ standard. This also includes asynchronous calls with promises and futures.

C++11, C++17 en C++20 Features

Next specific C++11, C++17 and C++20 features are discussed such as optional types, structured binding declarations and constructions from the world of functional programming such as fold expressions.

Advanced STL

The course concludes with an overview of advanced features of the Standard Template Library STL.

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Modules Course Modern C++ Programming

Module 1 : Modern C++ Features	Module 2 : Move Semantics	Module 3 : Inheritance
C++11 Features	Reference Initialization	default and delete Keyword
Type Inference	References and Pointers	Delegating Constructors
Auto Keyword	Rvalues and Rvalues in C++	Inheritance
Deduction with decltype	Passing and Returning References	Calling Base Class Constructors
Uniform Initialization	Rvalue References	Multiple Inheritance
Initializer Lists	Comparing Reference Types	Virtual Derivation
Range Based for Loop	Rvalue Reference Usage	Polymorphism
Null Pointer Constant	Assignment Operator	Virtual Functions
constexpr Keyword	Copy Constructor	Abstract Classes
Static Asserts	Passing and Returning Objects	Interfaces in C++
Lambda Functions	Passing References to Objects	Destructors and Inheritance
Strongly Types Enums	Move Constructor	Virtual Destructors
User Defined Literals	Move Assignment Operator	override Specifier
Raw String Literals	Golden Rule of 5	final Specifier
Module 4 : Smart Pointers	Module 5 : Operator Overloading	Module 6 : Templates
unique_ptr	Syntax Operator Overloading	Template Functions
Using unique_ptr	Overloading Numeric Types	Template Specialization
Specialization for Arrays	Overloading Overview	Template Parameter List
Replacement for std::auto_ptr	Overloading Restrictions	Inclusion Compilation Model
std::make_unique	When not to Overload	Class Templates
shared _ptr Pointer	Operators as Class Members	Template Member Functions
Control Block	Operators as Friend Functions	Template Parameter Scope
shared_ptr Destruction Policy	Overloading Stream Operators	Templates and Statics
shared_ptr Interface	Overloading ostream and istream	Templates and Friends
Cyclic References	Overloading Unary Operators	Alias Templates
weak_ptr	Overloading Binary Operators	Perfect Forwarding
Module 7 : Exception Handling	Module 8 : Multiple Threads	Module 9 : Synchronization
Error Conditions and Exceptions	Multiple Threads	Data Corruption
Class Objects as Exceptions	Benefits and Drawbacks	Lock Guard
Parameter Catch Block	Thread Class	Automatic Lock Management
Catching in Hierarchy	Joining Threads	Mutex and RAII
Golden Rule	Detaching Threads	Recursive Locking
Rethrowing Exceptions	Thread ID	Atomic Types
noexcept Specifier	Callables	Call Once
Preventing Resource Leaks	Passing Parameters	Event Handling
RAII Idiom	Pass by Reference	Condition Variables
C++ Standard Exceptions	Pass by std::ref and std::move	Wait and Notify
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User Defined Exceptions	Member Function as Thread	Promises and Futures
Exception Handling Costs	Thread Local Storage	Asynchronous Tasks
Module 10 : C++14-17-20 Features	Module 11 : Standard Template Library	
Init-statement for if	STL Core Components	
Selection Initialization	Containers, Algorithms and Iterators	
Structured Binding Declarations	Manager Lists and Daminus	
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