Learn C++ Programming for Beginners – Free 31-Hour Course

Chapter 1: Setting up the tools

Tools

- Installing C++ Compilers on Windows
- Installing VS Code on Windows
- Configuring Visual Studio Code for C++ on Windows
- Installing C++ Compilers on Linux
- Installing Visual Studio Code on Linux
- Configuring Visual Studio Code for C++ on Linux
- Installing C++ Compilers on MacOs
- Installing Visual Studio Code on MacOs
- Configuring Visual Studio Code for C++ on MacOs
- Online Compilers

Chapter 2: Diving in

- Your First C++ Program
- Comments
- Errors and Warnings
- Statements and Functions
- Data input and output
- C++ Program Execution Model
- C++ core language Vs Standard library Vs STL

Chapter 3: Variables and data types

- Variables and data types Introduction
- Number Systems
- Integer types : Decimals and Integers
- Integer Modifiers
- Fractional Numbers
- Booleans
- Characters And Text
- Auto
- Assignments
- Variables and data types summary

Chapter 4: Operations on Data

- Introduction on Data operations
- Basic Operations
- Precedence and Associativity
- Prefix/Postfix Increment & Decrement
- Compound Assignment Operators
- Relational Operators
- Logical Operators
- Output formatting
- Numeric Limits
- Math Functions
- Weird Integral Types
- Data Operations Summary
- Chapter 5: Flow Control
- Flow Control Introduction
- If Statements
- Else If
- Switch
- Ternary Operators
- Flow Control Summary

Chapter 6: Loops

- Loops Introduction
- For Loop
- While Loop
- Do While Loop

Chapter 7: Arrays

- Introduction to Arrays
- Declaring and using arrays
- Size of an array
- Arrays of characters
- Array Bounds

Chapter 8: Pointers

- Introduction to Pointers
- Declaring and using pointers
- Pointer to char
- Program Memory Map Revisited
- Dynamic Memory Allocation
- Dangling Pointers

- When new Fails
- Null Pointer Safety
- Memory Leaks
- Dynamically allocated arrays

Chapter 9: References

- Introduction to References
- Declaring and using references
- Comparing pointers and references
- References and const

Chapter 10: Character Manipulation and Strings

- Introduction to Strings
- Character Manipulation
- C-string manipulation
- C-String concatenation and copy
- Introducing std::string
- Declaring and using std::string

Chapter 11: Functions

- The One Definition Rule
- First Hand on C++ Functions
- Function Declaration and Function Definitions
- Multiple Files - Compilation Model Revisited
- Pass by value
- Pass by pointer
- Pass by reference

Chapter 12: Getting Things out of functions

- Introduction to getting things out of functions
- Input and output parameters
- Returning from functions by value
- Chapter 13: Function Overloading
- Function Overloading Introduction
- Overloading with different parameters

Chapter 14: Lambda functions

- Introduction to Lambda Functions
- Declaring and using lambda functions
- Capture lists

- Capture all in context

Summary

Chapter 15: Function Templates

- Introduction to function templates
- Trying out function templates
- Template type deduction and explicit arguments
- Template parameters by reference
- Template specialization
- Chapter 16: C++20 Concepts Crash course
- Introduction to C++20 Concepts
- Using C++20 Concepts
- Building your own C++20 Concepts
- Zooming in on the requires clause
- Combining C++20 Concepts
- C++20 Concepts and auto
- Chapter 17: Classes
- Introduction to classes
- Your First Class
- C++ Constructors
- Defaulted constructors
- Setters and Getters
- Class Across Multiple Files
- Arrow pointer call notation
- Destructors
- Order of Constructor Destructor Calls
- The this Pointer
- struct
- Size of objects

Chapter 18: Inheritance

- Introduction to Inheritance
- First try on Inheritance
- Protected members
- Base class access specifiers : Zooming in
- Base class access specifiers - A demo

- Closing in on Private Inheritance
- Resurrecting Members Back in Context
- Default Constructors with Inheritance
- Custom Constructors with Inheritance
- Copy Constructors with Inheritance
- Inheriting Base Constructors
- Inheritance and Destructors
- Reused Symbols in Inheritance
- Chapter 19: Polymorphism
- Introduction to Polymorphism
- Static Binding with Inheritance
- Dynamic binding with virtual functions
- Size of polymorphic objects and slicing
- Polymorphic objects stored in collections (array)
- Override
- Overloading, overriding and function hiding
- Inheritance and Polymorphism at different levels
- Inheritance and polymorphism with static members
- Final
- Virtual functions with default arguments
- Virtual Destructors
- Dynamic casts
- Polymorphic Functions and Destructors
- Pure virtual functions and abstract classes
- Abstract Classes as Interfaces

Watch the full course below or on the freeCodeCamp.org YouTube channel (31-hour watch).