Jaipur Engineers
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PROGRAMMING COURSE



C++ Programming

Write console programs with classes, the Standard Template Library and file handling.

COURSE FEE

₹4,000

10 syllabus modules

Coding practice and a sample project

MANSAROVAR, JAIPUR

jaipurengineers.com

The C++ syllabus

Ten modules cover the language, object-oriented programming, standard library tools and project work.

01 C++ setup and syntax

Install an editor and compiler, build a program and use console input and output.

02 Variables and data types

Types, constants, operators, conversions, scope and storage duration.

03 Control statements

Branch with if/else and switch. Repeat with for, while and do-while.

04 Functions

Declarations, parameters, overloads, default arguments and recursion.

05 Arrays and strings

Indexed data, multidimensional arrays, character arrays and std::string.

06 Object-oriented programming

Classes, constructors, encapsulation, inheritance and polymorphism.

07 Pointers and dynamic memory

Addresses, references, object lifetime, new/delete and smart pointers.

08 File handling

Read, write and append records. Check stream errors and explore binary I/O.

09 Standard Template Library

Containers, adapters, iterators, standard sorting and searching algorithms.

10 Projects and interview prep

Build and test a console app, solve coding tasks and explain your choices.

Write your first programs

Set up your tools, read input and use conditions and loops to control what runs.

Write

```
hello.cpp
```

Compile

```
g++ hello.cpp -o hello
```

Run

```
.\hello.exe
```

01 C++ setup and syntax

Set up GCC with VS Code or Code::Blocks. Explore headers, main(), tokens, keywords, comments, std::cin and std::cout. Build and run a .cpp file.

02 Variables and data types

Work with built-in types, constants and operators. Trace expressions and type conversions, and learn how scope and storage duration affect variables.

03 Control statements

Write if/else, nested conditions and switch cases. Use for, while, do-while, break and continue. Read a short example of goto.

PRACTICE

Build a menu-based calculator. Repeat the menu until Exit is selected and test invalid choices.

Organise code and data

Write reusable functions and use arrays and strings to process multiple inputs.

04 Functions

Practise function declarations, definitions and calls, overloads, default arguments, inline functions, recursion and the scope resolution operator.

05 Arrays and strings

Use one- and multi-dimensional arrays, traverse rows and columns, and practise character arrays, std::string and string operations.

message.cpp

```cpp
#include <iostream>
#include <string>
void greet(const std::string& name) {
    std::cout << "Hello, " << name << "\n";
}
int main() { greet("Jaipur"); }
```

PRACTICE

Write a function that counts vowels in a string. Test it with a blank line and mixed-case input.

Classes, objects and memory

Model a record with a class and trace what happens when functions access the same object.

06 Object-oriented programming

Create classes and objects with access specifiers, constructors and destructors. Use encapsulation, abstraction, inheritance and polymorphism. Explore overrides, operator overloading, friend functions and static members.

```
CLASS       Book
STATE       id, title, onLoan
BEHAVIOUR   borrow(), returnBook()
```

07 Pointers and dynamic memory

Work with addresses, references, dereferencing, pointer arithmetic, arrays and object pointers. Learn new/delete, object lifetime and introductory smart pointers.

PRACTICE

Write a Book class with private fields. Call a method that marks a copy as on loan and check its state.

Save, sort and search

Read and write records with file streams. Use containers and algorithms to organise them in memory.

08 File handling

Open text files with file streams. Read, write and append records, check open and read errors, and practise basic binary input and output.

09 Standard Template Library

Choose from vector, list, map and set, and use stack and queue adapters. Traverse data with iterators and practise sorting and searching with standard algorithms.

`std::vector`

Keep a sequence of books.

`std::map`

Look up books by ID.

`std::sort`

Order a list by title.

`std::find_if`

Find an available copy.

PRACTICE

Load a catalogue from a file, sort the titles and search for a book by ID.

Library Management System

In this sample project, build a console app that tracks books, loans and returns.

```
LIBRARY CONSOLE
------------------------------------------------------------------------

[1]     Add or list books

[2]     Find a book by ID

[3]     Borrow or return a book

[4]     Save the catalogue and exit
```

Build and test

Use a Book class to model each record, a container to hold the catalogue, and file streams to save and reload it. Test duplicate IDs, a missing file and borrowing a book that is already on loan.

Interview preparation

Walk through your class design, explain why you chose each container and describe a bug you fixed. Practise short exercises on strings, loops and searching.

PROJECT OPTIONS

Other project options include a student management system, a quiz and a console billing app.

Enquire about the next batch

Contact Jaipur Engineers for class timings and admission details.

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₹4,000

Call Jaipur Engineers

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Course content

MODULES 01–02

01

Lessons & practice

- Toolchain
- Types
- Expressions
- Control statements

HANDS-ON

Build a C++ console program and trace a switch and loop on sample input.

02

Lessons & practice

- Functions
- Overloading
- Arrays
- Strings

HANDS-ON

Write overloaded functions for string and numeric searches and test an empty input.

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MODULES 03–04

03

Lessons & practice

- Classes
- Constructors
- Inheritance
- Polymorphism

HANDS-ON — Model book loans with constructors and an interface for different loan rules.

04

Lessons & practice

- References
- Pointers
- Dynamic memory
- Smart pointers

HANDS-ON — Compare pass-by-reference and pointer use and inspect ownership of a dynamic object.

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MODULES 05–06

05

Lessons & practice

- STL containers
- Iterators
- Sorting
- Searching

HANDS-ON — Sort catalogue records with std::sort and locate a match with an iterator.

06

Lessons & practice

- File streams
- Troubleshooting
- Interview practice

HANDS-ON — Save and reload catalogue records and explain which checks handle a failed file open.